

(Un)intended effects of parental leave policies: Evidence from the Czech Republic

1 Introduction

Gender unemployment gaps have almost disappeared in the US and much of Western Europe, yet there are still many EU countries where the unemployment rate of women vastly exceeds that of men (Albanesi and Sahin 2018). Gender unemployment gaps are substantially higher among individuals with children younger than 15, especially in countries that offer very long paid family leave (Bičáková 2016). There are several reasons why longer family leave may be associated with higher female unemployment. Longer family leave is detrimental to the mother's productivity and may result in a job loss, especially in countries with no or ineffective job protection. An anticipation of long family-related career breaks may lead to statistical discrimination of prospective mothers in the labor market and also reduces the incentives of young women to invest in their human capital (Das and Polachek 2015). Family leave policies may also affect men and influence the size of gender unemployment gaps through their impact on male unemployment rate (Han, Ruhm, and Waldfogel 2009).

In this paper, we zoom in on one particular link between family leave policies and gender unemployment gaps. We focus on the impact of paid family leaves on the post-birth inactivity and unemployment of mothers (the subpopulation typically targeted and the most directly affected by the family leave policies). In particular, we evaluate the impact of two parental leave reforms in the Czech Republic in 1995 and 2008 that altered the duration of paid family leave.¹ The first reform prolonged the paid family leave from 3 to 4 years but kept the job protection period at 3 years. Mothers who took up the 4 years of the paid leave, therefore, gave up their right to return to their pre-birth jobs, as their job protection expired 1 year before the end of the benefit receipt period. The second reform allowed some women to shorten the paid leave from 4 to 3 or 2 years keeping the overall amount of benefit virtually unchanged, while the job protection remained at 3 years. This paper asks to what extent the changes in the parental leave duration affected mothers' labor force participation due to the take-up of the new statutory leave and to what extent they also induced changes in mothers' post-leave unemployment and inactivity.

While the impact of family leave policies on mothers' post-birth employment has been widely studied (see Olivetti and Petrongolo 2017 and Rossin-Slater 2018 for an overview), their impact on mothers' unemployment has been so far only considered by Lalive et al. (2014), who find that mothers facing longer family leave accumulate fewer months of unemployment in the first three years after childbirth. Das and Polachek (2015) also explore the impact of family leave regulations on unemployment, but they study the impact on unemployment of all young women, not specifically that of mothers after childbirth. They conclude that paid family leave increases the unemployment rate

¹We use the term paid family leave for the entire period since childbirth during which a mother is entitled by law to receive childcare-related benefits. Paid family leave in the Czech Republic consists of an initial maternity leave and a subsequent parental leave. Job protection period, on the other hand, is the time interval since childbirth during which a mother is entitled to return to her pre-birth job. See Section 2.1 for details.

and unemployment duration of young women. This paper contributes to this scarce literature by evaluating the effect of family leave policies on post-leave unemployment of mothers.

We also provide additional evidence about the impact of reforms that prolong the duration of the receipt of benefit beyond the job protection period. Although such reforms are quite uncommon and also rarely studied, they can provide crucial evidence about the relative importance of the two aspects of the family policies; the financial support and the right to return to the pre-birth job. There are only two studies that consider a similar type of reform and their findings diverge. Schönberg and Ludsteck (2014) evaluated the 1986 reform in Baden-Württemberg, Germany, which prolonged benefit receipt by 1 year beyond job protection, and found long-lasting negative effects on mothers' labor market outcomes. In particular, the reform discouraged up to 4% of mothers from returning to work and lowered their labor market income by roughly 8% in the 6 years after childbirth. Lalive et al. (2014), on the other hand, studied a similar reform in Austria in 2000, which increased benefit receipt by 6 months beyond job protection, and did not find any effect on the mothers' labor market outcomes 5 years after childbirth.

Finally, we extend the existing literature with estimates of the unintended effects of a very long paid family leave. Paid leave longer than 2 years are rarely evaluated in the literature but they are frequent in Central and Eastern Europe. The Czech reforms are also studied by Mullerova (2017), who estimates the impact of the 1995 reform on employment of mothers with young children, and Mullerova (2016), who evaluates the impact of the 2008 reform.² We complement these two studies by providing separate evidence on the intended and unintended effects of the two reforms. While both Mullerova's papers focus only on the impact on mothers' employment, we estimate the impact on mothers' inactivity and unemployment as two separate outcomes up to 6 years from childbirth. We formulate a theoretical framework based on which we predict the expected impact of the two reforms on a woman's decision to stay inactive as well as her probability of being unemployed both before and after the end of a statutory leave. We show that considering only the effect on employment disguises the true behavioral impact of the reforms, as the effects on unemployment and inactivity often go in opposite directions. We point out that zero employment effect is sometimes an outcome of two simultaneous effects on inactivity and unemployment of similar magnitude but opposite sign. As the 2008 reform was partly a reversal of the 1995 reform, we estimate and compare their impact in a single study.

There are several reasons that make the Czech Republic and the two parental leave reforms a unique setting for the estimation of the impact of family leave on intended and unintended labor market outcomes of mothers with young children. A strong overall attachment of Czech women to the labor force (a legacy of the Communist regime, see e.g. Fodor 2005) contrasts sharply with the absence of mothers of children younger than 3 from the labor market.³ A combination of one of the longest paid family leave with one of the highest take-up rates in the EU (OECD 2010) and very limited early institutional childcare places the Czech Republic (together with Slovakia and Hungary) among the three EU countries with the most sizable employment impact of motherhood (Eurostat).

²Our study was first published as an IZA DP No. 10149 in August 2016, i.e. after the first publication of the working paper version of Mullerova (2017), but before the first appearance of Mullerova (2016).

³When we exclude mothers with children aged 0-3, the labor force participation of prime-age women is as high as 93%.

Our data reveal that paid family leave in the Czech Republic is often followed by a spell of unemployment. Over 50% of women who terminate their family leave when their children are aged 2-5 return to the labor force as unemployed and over 80% of those unemployed with children under 5 enter unemployment immediately after the end of the family leave (Czech LFS data, 2011-2014). In contrast with EU countries with traditionally low female labor force participation, very few Czech women withdraw from the labor force in the long run (Bičáková 2016).

Following the existing research, we first estimate the impact of the two reforms of paid family leave in the Czech Republic on mothers' non-employment. Next, we distinguish between mothers' unemployment and inactivity as two different labor market outcomes. This allows us to separate the impact of the reforms on the initial paid family leave (the intended effects on mothers' inactivity under family leave provisions) from the impact on post-leave unemployment and labor force withdrawal (the effects unintended by the reforms). Our empirical strategy compares mothers of the last unaffected and the first affected cohorts of children, controlling for current economic conditions using mothers of two subsequent cohorts of older children in a difference-in-differences framework.⁴

Our results show that 38% of women prolonged their leave beyond the 3-year job protection period in response to the 1995 reform. Apart from these large effects on leave take-up, we also find substantial unintended effects of the 1995 reform. Some women prolonged the leave beyond the statutory leave duration, and the likelihood of post-leave unemployment increased among women with both 4 and 5-year-old children. The 2008 reform partially reversed the impact of the 1995 reform. Almost one-fourth of women shortened their leave from 4 to 3 years. The 2008 reform brought the opposite, but much smaller, impact on post-leave unemployment. We also find heterogeneity in the reforms' effects by woman's education. Finally, we confirm our main findings in a robustness analysis, which uses the rotational panel structure of the data to construct a more precise measure of the child's age.

The estimated share of mothers who prolonged their leave beyond the job protection period after the 1995 reform is much larger than was found in previous literature. Studying similar reforms, which also prolonged benefit receipt beyond job protection, Lalive et al. (2014) and Schönberg and Ludsteck (2014) estimate a much smaller impact on mothers' return to work behavior.⁵ Why are the effects of the Czech reform greater than those in Lalive et al. (2014) and Schönberg and Ludsteck (2014)? Insufficient institutional childcare or an absence of flexible forms of work are plausible factors, whose relative importance could be addressed by future research. The enormous take-up rate of the 4 year paid leave also reveals the high compliance of Czech women with the family leave policies, whereas the traditionally high participation rate of women in a post-Communist labor market brings these women eventually back to the labor market even after such a long leave.⁶

Our findings on the unintended effects of the two reforms on mothers' post-leave unemployment and inactivity are also in contrast to the findings of Lalive et al. (2014),

⁴An alternative method used in Schönberg and Ludsteck (2014) or Lalive et al. (2014) combines the regression discontinuity design around the childbirth with the difference-in-difference estimation controlling for age and seasonal effects. The design of the Czech reforms (which also affected parents already on family leave) and the data limitations (the LFS data do not have information about the date of birth) preclude us from using a similar approach.

⁵Mullerova (2017) also estimated a large impact of the 1995 Czech reform on mothers' employment.

⁶Note that Schönberg and Ludsteck (2014) estimate only the impact on women from West Germany.

who report no medium run effects on mothers. However, our results are consistent with the conclusion of Schönberg and Ludsteck (2014), who stress the importance of job protection in avoiding the long-lasting negative effects of family leave expansions on mothers' position in the labor market.

The paper is organized as follows: The next section is devoted to the institutional and theoretical background of the two reforms. We then present our empirical strategy and describe the data we use. The results section is followed by the conclusions.

2 Institutional and Theoretical Background

2.1 Family Leave Policies in the Czech Republic

Family leave policies in the Czech Republic include job protection, maternity benefits, and parental allowance. Parents are eligible for *job-protected leave* until the child's third birthday.⁷ The job protection period was introduced in 1990 and its duration has been kept at 3 years since then.

Czech women who were employed for at least 270 days in the 2 years prior to child's birth are entitled to receive *maternity benefits* for 28 weeks (starting 6 to 8 weeks prior to birth). Maternity benefits pay 70% of a woman's salary from the last 12 months prior to the commencement of maternity leave. There were no substantial changes to maternity benefits since 1990.⁸

A parent caring for a child is also eligible for *parental allowance*, a non-means-tested flat-rate benefit. The parental allowance starts either immediately after maternity benefits end or right after childbirth if the mother is not eligible for maternity benefits.⁹ Only parents with earnings below a certain threshold (in force until 2004, when the threshold was CZK 3480 per month—one fifth of the average wage at that time) who care for a child who does not attend a childcare facility for more than a certain amount of time per month (this clause remains in force today) are eligible for the parental allowance. Given the very low part-time job availability in the Czech Republic, these conditions virtually preclude parents from working and collecting parental allowance at the same time.

The 1995 Reform

Until 1995, the duration of parental allowance coincided with the three-year job-protected leave. In October 1995, the duration of parental allowance was prolonged until child's 4th birthday and thus exceeded the 3-year job protection leave by one year.¹⁰ All parents with children under 3 as of October 1, 1995 (i.e. all those born after October 1, 1992) were eligible for the prolonged parental allowance. The parental allowance paid a flat rate of CZK 1,740 per month in 1995, which corresponded to about one-fourth of the average wage.

⁷Employees employed on a permanent contract are eligible for job protection. An employee with a fixed-term contract is eligible for job protection up to the date of contract expiration.

⁸In 2009, the maximum amount of maternity benefits was doubled. However, this change only affected women who earned more than three times the average female wage at that time.

⁹There is no paternity leave. Parental allowance can, in principle, be received by a father but this is very rare (1.8% of parental allowance recipients were fathers in 2015).

¹⁰The extension of parental allowance came unexpectedly. It was added to the Act on State Social Support during the legislative process, at the initiative of the Christian Democrat Union. The bill was passed by Parliament on May 26, 1995.

The 2008 Reform

Since January 1, 2008, some parents are entitled to choose a leave of a shorter duration than 4 years and the corresponding level of the monthly parental allowance.¹¹ In general, three tracks of paid leave were available: The shortest track paid CZK 11,400 (EUR 320) per month until the child's 2nd birthday, the standard track paid CZK 7,600 (EUR 213) until the child's 3rd birthday, and the longest track paid CZK 7,600 until the child was 21 months old and then CZK 3,800 (EUR 107) until the child's 4th birthday. All tracks offered approximately the same total amount of money per child and all were more generous than the pre-reform scheme, which paid CZK 3,696 for 48 months.

All parents were entitled to the 4-year track. Entitlement to the 3-year track was conditional on one of the parents having worked for at least 270 days in the 2 years prior to birth. If, in addition, one of the parents earned on average at least CZK 16,500 (EUR 463) per month in the 12 months prior to the birth,¹² the caring parent was also eligible for the 2-year track. The new system of parental allowance covered also parents of children born before January 2008. In particular, parents of children born after August 1, 2007, could choose from all three tracks, and parents of children born after April 1, 2006, were eligible for the 3- or 4-year track, conditional on fulfilling the other eligibility criteria.

There were some minor changes to the parental allowance scheme shortly before and after the 2008 reform. In 2007, the monthly amounts of the parental allowance doubled (from CZK 3,696 to CZK 7,580) keeping the length of the allowance constant. While this change affected all children born in 2004-2007, they only experienced this increase for one year, because everyone switched to the new scheme in 2008. In 2011, the monthly amounts of the allowance decreased for the 4-year track (it only paid CZK 7,600 until the child was 9 months old and then CZK 3,800 until child's 4th birthday) and in 2012, it decreased also for the 3-year track (from CZK 7,600 to CZK 7,100 per month). The purpose of these changes was to unify the total amount of allowance per child for all tracks to CZK 220,000 (EUR 6,180). When we evaluate the impact of the 2008 reform, we abstract from these other changes, as they are minor relative to the introduction of the flexible parental allowance system and they do not alter the duration of the paid parental leave. While we cannot fully exclude the cohorts of children affected by the 2007 change from our estimation, we do exclude the cohorts affected by the 2011 change (see Section 3.2).

2.2 Hypotheses about the Impact of the Two Reforms

Theoretical Framework

The theoretical framework is based on the model of a choice of family leave duration, such as the one in Klerman and Leibowitz (1999), but extended to include unemployment as one of the possible post-leave outcomes.¹³

A woman after childbirth is deciding whether to stay at home with a child or return to

¹¹The intention to introduce such a flexible system was first mentioned in April 2007 and the proposal was approved by the government only in November 2007, any anticipation effects of the reform are thus very unlikely.

¹²In 2008, an average male wage was CZK 29,429 and an average female wage CZK 21,789.

¹³Data limitations and non-stationary nature of the underlying value functions prevent us from estimating a full structural model, such as that of Ondrich et al. (2003).

work. Her choice depends on her preferences, her individual characteristics, the situation in the labor market, and the family policy tools.

When employed, a woman earns her labor income and spends less time at home with a child. There are non-zero costs of working, both varying with the work intensity (such as child-care costs or commuting costs) and fixed costs when entering employment after the family leave (such as costs of arranging a regular child-care or catching up with new technologies at work). **The child-care-related costs are assumed to decrease with child's age, as child-care availability typically increases and its cost decreases as children grow older.**¹⁴ The quality of the post-leave job is likely to decrease and the probability of losing it to increase with the duration of the career break (i.e. time spent at home since childbirth) because of human capital depreciation, technological changes in the job content and so on.

When unemployed, a woman receives (for a given period of time) unemployment benefits, spends more time at home with a child than an employed woman but also allocates some time to the job search. There are variable job search costs (i.e. such as the costs of the actual search or costs of child care while searching) as well as fixed costs of starting a job search after the family leave (such as costs of career services, job interview preparation or training courses). **The child-care-related costs are again assumed to decrease with child's age. The probability of finding a job is assumed to be a decreasing function of the duration of the preceding career break due to human capital depreciation.**

When inactive (on family leave), a woman spends all the time with a child and does not incur any additional costs. There is a non-zero probability of finding a job but lower than when a woman is unemployed (i.e. actively seeking employment). **This probability is again assumed to decrease with the duration of the preceding career break.**

The standard tools of family leave policies - the monthly financial support (parental leave allowance) and the job protection (the right to return to one's previous job until certain date since childbirth) - affect the current value of staying at home with a child as well as the likelihood of the transition to employment.

The choice of a given length of a family leave and the probability a woman finds herself in a given state at a given point in time since childbirth depends on her preference for leisure (i.e. time spent with a child, home production etc.) versus consumption (earnings), the probability of returning to or finding a job after the leave, as well as woman's expectations about the future value of the three states (employment, unemployment and inactivity).

The value functions characterizing the three states are as follows:

$$\begin{aligned} rV_t^E &= (w_t - c_t) + \delta_t (\max[V_t^U - F_t^U, V_t^N]) \\ rV_t^U &= b_t^U + (1 - s)x - s c_t + p_t^U (\max[V_t^E - F_t^E, V_t^U]) \\ rV_t^N &= a_t + b_t^N + x + p_t^N (\max[V_t^E - F_t^E - F_t^c, V_t^N]) \end{aligned}$$

The parameters of the model are:

w_t labor market income, decreases with the time spent out of work since childbirth

x value of staying at home, normalized to zero when working

¹⁴When there is access demand, older children have priority in enrollment into public kindergardens. They also typically have shorter adaptation period.

s fraction of forgone leisure if searching for a job (i.e. if unemployed)

r subjective discount rate

δ_t job separation rate, increases with the time spent out of work since childbirth

p_t^U arrival rate of job offer if searching, decreases with the time spent out of work since childbirth

p_t^N arrival rate of job offer if at home, ($p_t^N = 1$ for those eligible for the job protection, $p_t^N < p_t^U$ for those not covered by the job protection and for everybody once the job protection expires), decreases with the time spent out of work since childbirth

a_t parental leave allowance, $a_t > 0$ until the end of the paid parental leave and $a_t = 0$ afterwards

b_t^U value of total social transfers received when unemployed

b_t^N value of total social transfers (other than parental leave allowance) when inactive

c_t variable cost incurred when employed or when searching for a job

F_t^c fixed cost of child care (such as of enrollment into a kindergarten), incurred when leaving inactivity for employment or job search, decreases with child's age

F_t^U fixed cost of starting a job search, increases with the time spent inactive

F_t^E fixed cost of entering employment, increases with the time spent out of work since childbirth

We assume time is continuous. The value functions have time subscripts as they are functions of variables that are deterministic but vary over time. The first year after childbirth is normalized to 1 ($t = 1$ when the youngest child is aged 0). While some parameters of the model are fixed across individuals, others vary, such as (x or w), as women differ in terms of preferences over leisure versus career, their level of human capital, productivity etc.

Ex-ante optimal trajectory is a sequence of a family leave of preferred duration, either followed by employment or by unemployment (searching for a job) and then by employment, unless the woman chooses not to return to the labor market. While the preferred time spent at home is given by the ex ante optimal trajectory, the duration of the expected overall career break (including the post-leave unemployment) depends on the probability of an arrival of an acceptable job offer.

The optimal sequence of the E, U, N states is a solution to the following maximization problem:

$$\max (V_t^E - F_t^E - F_t^c, V_t^U - F_t^U - F_t^c, V_t^N) \text{ for every } t,$$

where the fixed costs are incurred only upon entry (i.e. $F_t^E = 0$ if employed in $t - 1$, $F_t^c = 0$ if employed or unemployed in $t - 1$, and $F_t^U = 0$ if unemployed in $t - 1$).

The model does not explicitly consider woman's budget constraint and her ability to borrow. Women's choice is subject to intertemporal and intratemporal budget constraints. Women who are credit-constrained may not be able to cover, for example, the

fixed costs when entering unemployment or employment, and therefore return to the labor market at a later than preferred time. The initial family leave benefits may alleviate some of these credit constraints and facilitate the transition of credit-constrained women to the labor market.

Examples of ex-ante optimal trajectories

Consider a woman with a very high stock of human capital, who is strongly career-oriented (high w relative to x) and has a job to continue with. Her optimal trajectory will be to return to work right after childbirth.¹⁵ At the other extreme, a woman with a very low level of human capital, who is strongly family-oriented (high x relative to w), will never find any job offer attractive enough to enter employment. Her optimal trajectory will be to stay at home with a child and never return to the labor market. Most women will fall in between these two cases and prefer to spend some time at home with a child and then return to the labor market. The duration of the preferred (family leave) and the actual (family leave followed by post-leave unemployment) career break after childbirth will vary with women's preferences and characteristics.

The optimal path that was most compatible with the family policy instruments in the Czech Republic prior to the 1995 reform was to stay at home and return to the previous job at child's 3rd birthday, when both the parental allowance receipt and the job protection expired. Returning to the labor force later resulted in post-leave unemployment. The two reforms considered in this paper altered a subset of the parameters of the model. We discuss their expected impact on woman's choice of the length of the family leave and on her risk of experiencing a post-leave unemployment next.

The Expected Impact of the 1995 Reform

The 1995 reform increased the length of the parental allowance receipt from 3 to 4 years keeping the job protection unchanged at 3 years. The receipt of the parental leave allowance was de facto conditioned on not working (see Section 2.1 for details).

In terms of our model, the 1995 reform increased a_4 (parental leave allowance at $t = 4$) from zero to $a_4 = a_3 (= a_2 = a_1)$. This change increased the value of being inactive during the 4th year since childbirth, and therefore induced some women to prolong their family leave to more than 3 years. The additional value from staying at home longer, however, had to more than compensate the lower expected value after the end of the family leave. As the job protection expired at child's 3rd birthday and the probability of receiving a job offer as well as the wage rate decrease with the length of the career break, the expected value of the trajectory after the prolonged family leave was substantially lower compared to the trajectory following a 3-year family leave prior to the reform. On the other hand, the reform could also shorten some leaves longer than 4 years, as the increase in the initial financial support could enable some credit-constrained women who were forced to choose very long leaves prior to the reform to now return to the labor market earlier.

We formulate the expected impact of the 1995 reform on women separately by the age of their youngest child. Women with the youngest child aged 3 were incentivized by the reform to stay at home for one more year. As there was no reason for women to shorten their leave from 4 (or more) to 3 years, we expect the reform to increase the

¹⁵The actual trajectory may involve a subsequent job loss but with a very small probability.

Table 1: Overall impact of the 1995 reform

Age of the youngest child:	Theoretical impact of the reform on the mother's:	
	inactivity	unemployment
aged 3	+	-
aged 4	+/-	+/-
aged 5	+/-	+/-

inactivity of women with 3-year old children (see Table 1).¹⁶

The impact on inactivity of women with 4-year-old (5-year-old) children is ambiguous (see Table 1). While the income effect of the net transfer of one more year of benefits could induce some of them to prolong their leave even beyond child's 4th (5th) birthday, the extra income could also enable some credit-constrained women who previously stayed at home for 5 (6) or more years to cover the fixed costs of joining the labor force and return to the labor market before child's 5th (6th) birthday.¹⁷

Based on the predicted impact of the reform on inactivity of women described above, we expect the impact of the 1995 reform on post-leave unemployment to be as follows:

As inactivity of women with 3-year-old children is predicted to increase due to the reform, we expect to observe smaller share of unemployed in that group. In particular, as both women who were employed and unemployed in $t = 4$ (when the child was 3) prior to 1995 are likely to prolong their family leave and be inactive until at least child's 4th birthday, the probability of women with 3-year-old children to be unemployed should decrease in response of the reform.

As the impact of the reform on women with 4 and 5-year-old children is ambiguous, so is the impact on their unemployment. On one hand, women who prolonged their leave to child's 4th birthday are more likely to become unemployed and stay unemployed for a longer period of time than if they returned to the labor force after 3 years (as the probability of finding a job is lower at $t = 4$ due to human capital depreciation and no job protection). In addition, some of the women who shortened their leave to 4 (5) years are also likely to experience post-leave unemployment, thus increasing the share of the unemployed among women whose child is 4 (5). On the other hand, women who prolonged their leave beyond child's 4th (5th) birthday, are less likely to be unemployed when their child is 4 (5) and therefore decrease the share of unemployed among women with 4-year-old (5-year-old) children (Table 1).

Combining all our predictions together, we expect the 1995 reform to have a positive impact on inactivity and negative effect on unemployment when the youngest child is 3, while both effects are ambiguous when the child is older (Table 1).

¹⁶In principle, some women may shorten their leave from 4 (or more) to between 3 and 4 years. In particular, even a less than full year of the additional allowance may enable some credit-constrained women to cover the fixed costs of entering the labor force and return prior to child's 4th birthday. The inactivity of these women when their child is 3 would then decrease. The share of women who took 4 or more years of leave was, however, only 24% prior to 1995, these women are thus unlikely to affect our prediction of a rise in inactivity among mothers of 3 year-olds.

¹⁷Note that women who remained inactive for more than 4 years prior to the reform may also shorten their leave to 4 years after the reform due to the combination of a more accessible and cheaper child-care for a 4-year-old and the desire to maintain the same consumption level as when receiving the benefits.

The Expected Impact of the 2008 Reform

The 2008 reform partly reversed the 1995 extension of the paid parental leave from 3 to 4 years, offering a subset of women to shorten their paid parental leave from 4 to 3 or 2 years without substantially affecting the overall amount of benefits received (see Section 2.1 for details). The option to receive the same amount of money over a shorter period of time substantially reduced the value of staying at home until child’s 4th birthday, as all the financial support could be collected over the first 3 years before the job protection expired. The eligible mothers are therefore predicted to shorten their preferred family leave and to be less likely inactive at $t = 4$ (when their youngest child was 3) or beyond.

The 2008 reform also somewhat increased the total amount of money that parents received per one child (see Section 2.1 for details). On one hand, this extra income could enable some women to prolong their leave. On the other hand, this extra income (available at an earlier time since childbirth) could again enable some credit-constrained women, who would have preferred to enter the labor force earlier but could not cover the fixed entry costs, to shorten their leave. The effect of the increase in the total amount of benefits on the choice of the leave duration is therefore ambiguous. However, it is likely to be relatively small, as the size of the additional income women received was only moderate.

Although the overall impact of the 2008 reform (change in the timing as well as in the total amount of the benefits) on inactivity of women with 3 to 5-year-old children is ambiguous, we argue that the reduction in inactivity of mothers of 3-year-old children is a very likely outcome (Table 2). As the total amount of benefits available to women over the 4 and 3-year paid leave was rather similar, we would expect some women who would previously choose a 4-year paid leave or longer and are eligible for a shorter leave to choose the 3-year option and return to the labor market earlier. Since the 4-year leave was the most common choice among mothers prior to the reform (41% of women stayed at home for 4 years prior to 2008), we would expect the decrease in inactivity among women with 3-year-old children to dominate. Therefore, we expect the 2008 reform to reverse some of the expected impact of the 1995 reform. The size of the effect is, however, likely to be smaller, as only a subset of women was eligible to a shorter paid parental leave and formal child-care for 3-year-old children is typically less available than for older children.

Table 2: Overall impact of the 2008 reform

Age of the youngest child:	Theoretical impact of the reform on the mother’s:	
	inactivity	unemployment
aged 3	–	+
aged 4	+/-	+/-
aged 5	+/-	+/-

As we expect the 2008 reform to reduce inactivity among women with 3-year-old children, their unemployment is likely to rise (assuming at least some of these women enter labor market as unemployed, see Table 2).

Since the impact on inactivity is ambiguous when the child is 4 and 5, so is the impact on unemployment, as in the case of the 1995 reform. On one hand, unemployment is likely to drop if women prolong their leave and remain inactive at a given age of a child

but increase afterward (due to a lower probability of receiving a job offer after a longer leave). On the other hand, unemployment is likely to rise at an earlier age of a child if women return to the labor market sooner (although less so due to a higher probability of receiving a job offer after a shorter leave) and drop afterward.

Combining all the predictions together, the 2008 reform is likely to decrease inactivity and increase unemployment of mothers when their youngest child is 3. For women with older children, both effects are again ambiguous (Table 2).

3 Methodology and Data

3.1 Data Description

We use the Czech Labor Force Survey (LFS), a quarterly survey covering about 60,000 Czech individuals, for 1994-1999 and 2008-2013. The estimation sample consists of prime-age (25-55) women with at least one child. The age of the youngest child is reported in completed years in the LFS data, e.g. children aged 2 are children between 2 and 3 years old.

LFS has a 5-quarter rotating panel structure, which allows construction of a more detailed measure of the child's age (in quarters of a year). Since this approach leads to a substantial reduction in the sample size and a possible measurement error due to imprecise reporting, we use the more precise age information only in the robustness analysis (Section 4.4).

We define the economic status of women in the sample based on their self-reported status in the LFS data using the International Labour Organization (ILO) definition but make one important adjustment. While the ILO sometimes treats individuals on maternity and parental leave as employed,¹⁸ we always treat them as inactive in our analysis. For further discussion of the ILO classification and the behavioral distinction between unemployment and inactivity, see Bičáková and Kalíšková (2016).

3.2 Empirical Strategy

Our empirical strategy compares mothers of the last unaffected and the first affected cohorts of children, controlling for current economic conditions using mothers of two subsequent cohorts of somewhat older children. We look at the labor market outcomes of mothers whose youngest child is 3, 4, and 5.

For the 1995 reform, we compare mothers of children who reached the age of 3 before October 1, 1995, and those who reached the age of 3 after October 1, 1995 (for details on the institutional background, see Section 2.1). Since we only observe the age of a child in completed years, we cannot be sure if children aged 3 in the year after the reform are affected by the reform or not, as they could have had the third birthday both before and after October 1995. Therefore, the before period is defined as one year before October 1995 (i.e., Q4 1994-Q3 1995), but the after period is defined as Q4 1996-Q3 1997 so that all children who are aged 3 in this period are indeed affected by the reform (see Panel A of Table 3). We further follow these mothers as their children grow older reaching the age of 4 in Q4 1995-Q3 1996 (the before period) and Q4 1997-Q3 1998 (the after

¹⁸If a person has a formal attachment to his/her job, but is temporarily not at work because of the maternity/parental leave, ILO codes that person as employed.

period) and the age of 5 in Q4 1996-Q3 1997 (the before period) and Q4 1998-Q3 1999 (the after period).

Table 3: Summary of empirical strategy

<i>Panel A: 1995 reform</i>		
	Before: Q4 1994 - Q3 1995	After: Q4 1996 -Q3 1997
Treatment	Groups consist of women whose youngest child is:	
Control	aged 3	aged 3
	aged 5	aged 5
<i>Panel B: 2008 reform</i>		
	Before: Q2 2008 - Q1 2009	After: Q2 2010 - Q1 2011
Treatment	Groups consist of women whose youngest child is:	
Control	aged 3	aged 3
	aged 5	aged 5

Note: The table illustrates structure of the treatment and control groups defined by the quarter and year of data and by the age of the youngest child of a woman.

The outcomes of mothers of the two cohorts of children (the last unaffected and the first affected) that we compare at a given age of their youngest child are therefore observed over two different calendar periods. In order to filter out the impact of aggregate trends and business cycle effects, we follow the standard approach in the literature and use mothers with older children observed in the same two periods as a control group (Naz 2004, Schone 2004, Sánchez-Mangas and Sánchez-Marcos 2008, Geyer, Haan, and Wrohlich 2015, Bergemann and Riphahn 2015, Mullerova 2017). In particular, we use women whose youngest child is aged 5 as a control group for the treated women whose youngest child is 3 around October 1995 (see Table 3). We cannot use women with children aged 4 as a control group, because some of them could have reached the age of 3 before the reform. As the children of mothers in the treatment group grow older (reaching 4 and 5 years of age), so do the children of the mothers in the control group (reaching 6 and 7). Our empirical strategy is somewhat similar to the approach used by Mullerova (2017) but focuses on a broader sample of mothers.¹⁹

We use a similar empirical strategy for the 2008 reform. We compare mothers of the last unaffected cohorts of children to mothers of the first affected cohorts who had the

¹⁹Mullerova (2017) uses a rotating panel structure of the data to identify women whose child just reached the age of 3 (we use this approach in the robustness analysis in Section 4.4). She compares those mothers whose child reached 3 in the 3 quarters before and the 3 quarters after October 1995, while we focus on all mothers whose youngest child is 3. This increases the sample size and allows us to address the unintended effects of the reforms on all women up to the point when their child reached the age of 6. To control for business cycle effects, Mullerova (2017) uses a similar approach to ours—a control group of mothers with a slightly older child (women whose child reached the age of 4 around the reform date), and she also applies an alternative control group of mothers whose child reached 3 around October 1997, when no reform occurred. We find the assumption of similar time trends across the two periods too strong, given the macroeconomic development after 1997, when financial and economic crises hit the Czech economy. Therefore, we only apply the first approach using mothers of slightly older children as a control group.

option to shorten their leave from 4 to 3 years. The choice between the 4-year and the 3-year track was available to mothers of children born after April 1, 2006 (see Section 2.1). The first affected children thus reached the age of 3 in April 2009. Therefore, the before period is again defined as one year before April 2009 (Q2 2008-Q1 2009) for mothers whose youngest child is 3. Since we only observe the age of a child in completed years, we cannot use data on mothers whose child was 3 in the year after April 2009, because we cannot be sure if these children were born before or after the April 2006 cut-off. Therefore, the after period is Q2 2010-Q1 2011 for mothers whose youngest child is 3 (see Panel B of Table 3). Similarly to the 1995 reform, mothers whose youngest child is aged 5 are used as a control group for mothers with the youngest child aged 3. These women in the treatment and the control groups are then followed over time as their children grow older (reaching 4 and 5 years, and 6 and 7 years, respectively).

When estimating the impact of the 2008 reform, we focus on the choice between the 4-year and the 3-year track. Although part of our treatment group (with children born after August 1, 2007) was also eligible for the 2-year track, this option was only very rarely chosen.²⁰ We thus expect our results to mostly capture the effect of the possibility to shorten the leave to 3 years.

The regression equation, which is estimated separately for each group of treated women (defined by the age of their youngest child) and for each reform, is the following:

$$Y_{it} = \beta_0 + \beta_1 \text{Treat}_i + \beta_2 \text{After}_t + \beta_3 (\text{Treat}_i * \text{After}_t) + X'_{it} \theta + \gamma_t + \gamma_{gt} + \epsilon_{it}. \quad (1)$$

The outcome of interest (Y_{it}) is a binary variable that denotes a mother's labor market status. We first estimate the impact of the reforms on non-employment and then focus on unemployment and inactivity separately. Treat_i is the fixed effect for the treatment group and After_t is the fixed effect for the after-reform period (see Table 3). The impact of the parental allowance reforms is captured by β_3 , the coefficient of the indicator variable for the treated women in the after-reform period.

We also control for the common time trend in the labor supply using fixed effects for each quarter-year combination (γ_t), for education-specific time trends using interactions between the quarter-year fixed effects and four educational groups (γ_{gt}), and for the observable characteristics (X_{it}) including quadratic polynomial of age, four education dummies, dummy variables for cohabiting and married women, number of children, dummy variable for presence of elderly household members, and regional fixed effects. The sample size and the relevant descriptive statistics with a precise description of the variables are all reported in Appendix Tables A.1 and A.2.

3.3 Identification Assumptions

Our empirical strategy assumes that trends in labor market status of the treatment group and that of the control group would have been the same in the absence of treatment. We plot the evolution of the non-employment and unemployment-to-population rates for our main treatment group (women whose youngest child is 3) and the corresponding control group (women whose youngest child is 5) over the pre-reform period in Appendix Figures A.1 and A.2.

The share of unemployed in the population followed the same increasing trend before the 1995 reform in the treatment and control groups. The non-employment rate also

²⁰The take-up rate was only 6% in 2011 according to the Czech Ministry of Labour and Social Affairs. The most likely reason was the lack of public childcare facilities for children below 3.

increased in both groups, but the trend was less steep in the control group than in the treatment group (see Appendix Figure A.1). In the period before the 2008 reform, the share of unemployed in the population followed a similar decreasing trend in both groups, especially since 2006. The non-employment rate was also slightly decreasing in both treatment and control groups, but only until 2007 (Appendix Figure A.2). In 2007, there is some increase in the non-employment rate of the treatment group, which is likely caused by a one-time increase in the parental allowance this year. Nevertheless, we do not use the year 2007 in our estimation, so this should not jeopardize the validity of our approach.²¹

Appendix Figures A.1 and A.2 show that trends in the non-employment and unemployment-to-population rates of the treatment and the control groups are not quite parallel but reasonably close. The same is confirmed by a formal test. Controlling for individual characteristics in a regression, we can not reject the null hypothesis that the coefficients of the interaction terms of quarterly dummies with treatment indicator are jointly equal to zero (results are available upon request).

The empirical strategy further requires that there were no significant composition changes in the treatment and control groups. This assumption could be violated if fertility decisions of Czech couples were significantly influenced by reforms of the parental allowance, and the fertility changes then affected the composition of the treatment and control groups. The trends in fertility in the 1990s and early 2000s are described in Appendix Figure A.3 and seem unrelated to the reforms of parental allowance. While fertility evolved rather dynamically over the two periods we study, the changes are in the opposite direction than the potential impact we would expect the reforms to have on fertility and are driven, primarily, by external factors.²² The composition of the treatment and control groups could also change if the reforms affected the timing of second (and further) birth. While we cannot address this issue directly with our data, we estimated our main specification separately for women with one child and for women with more than one child (assuming these are less likely to plan a subsequent child irrespective of the reform). The results (available upon request) were fairly similar, suggesting that our findings are not driven by changes in the composition due to the postponement of subsequent birth.

The substantial impact of the reforms on the labor force participation of women with young children could have also caused an aggregate labor market shock to the labor supply of young women. To the extent to which women with older children (our control group) are substitutes for women with younger children (our treatment group), this may violate our identification assumptions. Our treatment group of mothers whose youngest child is 3 constitutes only 6.6% of women aged 25-40. Even if this share could generate a market-wide shock, this argument should not undermine our results: First, the potential (opposite) impact of the reforms on the control group presupposes the

²¹The before period in our estimation is defined as Q2 2008-Q1 2009. If the 2007 increase also affected the behavior of women in the following years, this could still bias our estimation. However, both our treatment and control groups of women with the youngest child aged 3 and 5 were affected by the 2007 increase in the parental allowance at some point in time. So unless the 2007 increase had a differential impact on a further behavior of women based on when they were affected, this change is not a threat to our identification of the 2008 reform effect.

²²The steep decline in fertility rates in the 1990s started long before the 1995 reform and was part of a general trend of fertility decrease in all post-communist countries (Sobotka 2003). Fertility changes in the 2000s also took place before the 2008 reform and were mainly a consequence of a generation of baby boomers from the 1970s entering the childbearing age.

existence of the effect on the treatment groups that we find. Second, such an impact would only bias our results downwards, suggesting that our already sizable estimates represent a lower bound of the true effects of the reforms.

Finally, our approach is somewhat limited by the fact that we observe the age of a child only in completed years. To address this issue, we conduct a robustness analysis, which takes advantage of rotating panel structure of the data to construct a more precise age information (see Section 4.4). While this approach substantially decreases the sample size, it allows us to construct the before and after periods that immediately follow each other (unlike in the main specification, where there is a gap between the before and the after periods).

4 Estimation Results

We first present the impact of reforms on mothers' non-employment. We then disentangle the two different types of non-employment and present our main findings: the separate impact of the two reforms on mothers' inactivity and unemployment.

4.1 Impact on Non-employment

Table 4 presents the impact of the two reforms on the probability that a mother of a child of a particular age between 3 and 5 is non-employed. The impact of the 1995 reform was enormous. The share of non-employed among mothers with a 3-year-old child increased by as much as 27 p.p. in response to the 1995 reform. The 1995 reform also increased the non-employment among mothers when their child was 4 (by 8.3 p.p.) but the impact seems to fade away by the time the child turned 5. These results are in line with the findings of Mullerova (2017) who estimates a decrease in the probability of employment of mothers of 3-year-old children of 23 p.p. and a smaller, but still significant, effect on mothers of 4-year and 5-year-old children.

Table 4 also presents the first available estimates of the effect of the 2008 reform on non-employment of mothers with children aged 3, 4, and 5.²³ The 2008 reform caused a decline in non-employment among women with 3-year-old children by 18.8 p.p., about two-thirds of the size of the impact of the 1995 reform.²⁴ The non-employment also decreased among mothers of 4-year-old children (by 7.5 p.p.) but the reform had no impact beyond the child's 5th birthday.

While the effects of the two reforms on non-employment of mothers of 3-year-old children were likely driven by changes in their choice of parental leave, as intended by the reforms, the interpretation of the effects on mothers when their child turned 4 is less straightforward. The observed changes in non-employment after the child's 4th birthday could be driven either by changes in post-leave inactivity or post-leave unemployment caused by changes in the duration and the timing of the termination of the preceding leave. We focus on the reforms' impact on inactivity and unemployment separately in the next section.

²³In an analysis subsequent to ours, Mullerova (2016) also estimates the impact of the 2008 reform on employment of mothers of small children.

²⁴The smaller effect of the 2008 reform is fully consistent with the fact that while the 1995 reform prolonged the benefit receipt to 4 years to all mothers, the 2008 reform offered the option to collect the same amount of benefits in 3 years rather than 4 only to mothers who satisfied the eligibility requirements (see Section 2.1).

Table 4: Impact of the reforms on non-employment

	<i>Impact on women whose youngest child is:</i>		
	<i>aged 3</i>	<i>aged 4</i>	<i>aged 5</i>
Panel A: Impact of the 1995 reform			
Treat*After	0.270*** (0.013)	0.083*** (0.013)	(0.006) (0.014)
R-squared	0.253	0.124	0.134
Observations	7229	7087	7137
Panel B: Impact of the 2008 reform			
Treat*After	-0.188*** (0.014)	-0.075*** (0.013)	0.010 (0.013)
R-squared	0.227	0.156	0.127
Observations	5403	5006	4816

Note: The treatment groups consist of prime-aged women (aged 25-55), whose youngest child is 3-5. The control group consists of prime-aged women whose youngest child is 5-7. All regressions include dummies for the treatment group and after period, quarter-year dummies, quarter-year dummies interacted with level of education, and other control variables. Standard errors (in parentheses) are clustered at the group-year level (* p<0.10, ** p<0.05, *** p<0.01). Source: Czech LFS (1994-1999, 2008-2013), own calculations.

4.2 Impact on Inactivity and Unemployment

Table 5 presents the impact of the 1995 reform on inactivity and unemployment of women when their youngest child is 3, 4, and 5 years old. The results that consider the two states of non-employment separately reveal that the substantial rise by 27.7 p.p. in non-employment among women with 3-year-old children documented in Table 4 was driven by an even greater rise in inactivity by, as much as, 37.7 p.p. The rise in non-employment was smaller due to a simultaneous reduction in the share of the unemployed (by 10.8 p.p.). These findings suggest that focusing only on (non-)employment, as much of the previous research has done, underestimates the actual take-up of the 4th year of the paid leave by 10 p.p., as it focuses on women who would have been otherwise employed during that year and disregards those who would have been unemployed.

The estimated effect of the 1995 reform on mothers with 3-year-old children is also consistent with our theoretical predictions in Section 2.2. The results suggest that a substantial share of women who would choose a 3-year leave prior to the reform prolonged their leave up to the child's 4th birthday in response to the additional year of benefits offered by the reform. As some of these women would become unemployed after the 3-year leave prior the reform but instead remain on leave until the child's 4th birthday after the reform, their unemployment declined.

Table 5 further shows that the rise in non-employment by 8.3 p.p. among mothers of 4-year-old children documented above was primarily driven by the rise of post-leave unemployment (by 6 p.p.) and only to a limited extent by women's preference to prolong their leave beyond child's 4th birthday (by 2.3 p.p.). The observed increase in inactivity among mothers of 4-year-olds, however, attests that the extra year of benefits did serve as an additional source of income that allowed women to stay at home with a child even

Table 5: Impact of the 1995 reform on inactivity and unemployment

	<i>Impact on women whose youngest child is:</i>		
	<i>aged 3</i>	<i>aged 4</i>	<i>aged 5</i>
Inactivity:			
Treat*After	0.377*** (0.015)	0.023* (0.013)	-0.050*** (0.014)
R-squared	0.292	0.086	0.072
Observations	7229	7087	7137
Unemployment:			
Treat*After	-0.108*** (0.006)	0.060*** (0.010)	0.044*** (0.005)
R-squared	0.055	0.079	0.109
Observations	7229	7087	7137

Note: The treatment groups consist of prime-aged women (aged 25-55), whose youngest child is 3-5. The control group consists of prime-aged women whose youngest child is 5-7. All regressions include dummies for the treatment group and after period, quarter-year dummies, quarter-year dummies interacted with level of education, and other control variables. Standard errors (in parentheses) are clustered at the group-year level (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$). Source: Czech LFS (1994-1999), own calculations.

longer than the paid 4 years, rather than as the means to alleviate the credit constraints that allowed women who would previously take a 5 year leave or longer to enter the labor force earlier.²⁵ The rise in unemployment among mothers of 4-year-olds is also in line with the two mechanisms discussed in Section 2.2: First, as many women prolonged their leave to 4 years, the occurrence of the post-leave unemployment moved forward by one year. Second, longer leave per se (and in particular, a leave longer than the job-protected period) further increased the occurrence of post-leave unemployment. These two effects clearly dominated the potential decrease in unemployment due to prolonged inactivity, also discussed in Section 2.2. This is not surprising, as the increase in inactivity beyond the child's 4th birthday was only modest.

As for the mothers of 5-year-old children, separating unemployment from inactivity in the estimation is even more important. While the impact on non-employment estimated in Section 4.1 suggests the reform had no impact, Table 5 shows that this is merely a result of two effects of similar magnitudes but opposite signs—a decrease in inactivity and an increase in unemployment by about 5 p.p. The negative impact on inactivity seems to point at the importance of the effect of the additional year of benefits in allowing some credit-constrained women to enter the labor force earlier (when their child was 5) than before the reform (see Section 2.2). The further rise in unemployment is again consistent with the two mechanisms discussed above. Moreover, it is also in line with the reduction in inactivity and the fact that some of these women who returned to the labor force earlier (when their child is 5) in response to the reform had to first search for a job.

The estimated effects of the 1995 reform are much larger than was found in the previous studies. In particular, our estimate of almost 40 p.p. increase in inactivity

²⁵More precisely, the impact on the first type of women and their share clearly dominated.

among mothers of 3-year-olds is in stark contrast with the results of Schönberg and Ludsteck (2014). Studying a similar reform, which extended the receipt of the allowance to 22 months but the job protection period to only 10 months in Germany, they found a reduction in the employment rate between 10 and 22 months by less than 10 p.p. We also find a more sizable effect than Lalive et al. (2014), who estimate that the 2000 reform in Austria, which extended the duration of the allowance from 18 to 30 months (keeping job protection at 24 months), increased the time mothers spent at home by 3 months. We discuss the potential reasons why our results differ from those in the literature in the Conclusion.

The results for the 2008 reform are presented in Table 6. Disentangling the impact on inactivity and unemployment again reveals that the effect of the reform on non-employment of mothers of 3-year-olds presented in Section 4.1 disguises an even stronger behavioral response. The share of mothers who decided in response to the reform to return to the labor force when their child was 3 increased by 23.7 p.p. The smaller overall impact on non-employment (of 18.8 p.p., see Table 4 above) was due to the 4.9 p.p. increase in unemployment, suggesting that some of the mothers of the 3-year-olds joined the labor force as unemployed.

Table 6: Impact of the 2008 reform on inactivity and unemployment

	<i>Impact on women whose youngest child is:</i>		
	<i>aged 3</i>	<i>aged 4</i>	<i>aged 5</i>
Inactivity:			
Treat*After	-0.237*** (0.009)	-0.032*** (0.010)	0.011 (0.007)
R-squared	0.271	0.092	0.071
Observations	5403	5006	4816
Unemployment:			
Treat*After	0.049*** (0.015)	-0.042*** (0.007)	-0.001 (0.015)
R-squared	0.072	0.113	0.111
Observations	5403	5006	4816

Note: The treatment groups consist of prime-aged women (aged 25-55), whose youngest child is 3-5. The control group consists of prime-aged women whose youngest child is 5-7. All regressions include dummies for the treatment group and after period, quarter-year dummies, quarter-year dummies interacted with level of education, and other control variables. Standard errors (in parentheses) are clustered at the group-year level (* p<0.10, ** p<0.05, *** p<0.01). Source: Czech LFS (2008-2013), own calculations.

The reduction in non-employment by 7.5 p.p. among mothers with a 4-year-old child reported in Table 4 above was driven to a similar extent by the decrease in inactivity (of 3.2 p.p.) and in unemployment (of 4.2 p.p.). The zero effect of the reform on mothers when their child is 5 documented above is confirmed, as we find no impact either on their inactivity or unemployment.

The negative impact on the inactivity of mothers of 3 and 4-year-old children is fully consistent with our predictions in Section 2.2. The possibility to collect the same amount of benefits over a shorter period induced some women to return to the labor force earlier.

The size of the impact is only about 60% of that of the 1995 reform, as only a subset of women were eligible to the shorter leave. The rise in unemployment among mothers of 3-year-olds suggests that some women who shortened their leave from 4 to 3 years entered the labor force via unemployment. The subsequent decline in unemployment when the child is 4 confirms our theoretical predictions that at least some of these women found jobs before their child turns 4, as unemployment spells shifted to an earlier stage and/or the likelihood of unemployment was lower and its duration was shorter after a shorter inactivity spell.

4.3 Heterogeneity of Responses

Lower-income mothers are expected to be more sensitive to monetary incentives of family policies, whereas mothers with higher earnings potential and steeper labor market profiles are more likely to care about job protection provisions (Lalive and Zweimüller 2009).²⁶ Given that the 1995 reform affected only the duration of the parental allowance receipt but not the length of the job protection, it should have a greater impact on lower-income mothers. The 2008 reform also changed only the parental allowance conditions (and not the job protection), but the eligibility to shorter parental leave (with the same total amount of benefit) was limited to women who worked prior to birth. As the lower-income mothers were less likely to meet the eligibility conditions, the relative impact of the 2008 reform on high and low-income mothers is ambiguous.

We next explore the potential heterogeneity in mothers' responses to the reforms using education as the best proxy for income and job stability that is available in our data.²⁷ In particular, we estimate our baseline specification separately by two levels of education, low and high, defined by a woman's successful completion of high school.²⁸

Somewhat surprisingly the low- and high-educated mothers do not differ too much in terms of the use of parental leave (see the summary statistics in Appendix Table A.3). The differences in the non-employment rate between these two groups are driven to a great extent by the share of unemployed, which is twice as high among the low-educated when compared to the high-educated prior to the reforms.

In line with our expectations, the changes in the duration of the parental allowance in 1995 affected the low-educated (i.e. low-income) mothers more than the high-educated (see Table 7), but the differences are relatively small. The reform raised the probability of being inactive among low-educated women with the youngest child of 3 by 40 p.p., whereas the increase among the high-educated women was as much as 36 p.p. While the change in monetary incentives was indeed more important for the lower-income women, but the response of higher-income women was also surprisingly strong. The results suggest that the 1995 reform induced more than one third of high-educated mothers to forfeit job protection and remain on leave beyond child's 3rd birthday, which is in stark contrast with the predictions of Lalive and Zweimüller (2009) discussed above. Whether this reflects that the job protection in the Czech Republic was ineffective or that the

²⁶The higher-income mothers with more stable jobs are also more likely to be entitled to job protection than the lower-income mothers.

²⁷Education serves also as a proxy for husband's income, given the well-documented evidence of assortative mating (see for example Pencavel 1998).

²⁸'Low-educated' corresponds to the ISCED 3 level with apprenticeship certificate, but without a school leaving examination, or lower level of education. Finer classification using ISCED renders the sample size too small for some of the groups.

family policy reform induced a universal change in the social norm of a mother as a primary caregiver cannot be addressed in our data.²⁹

The reduction in unemployment among mothers of 3-year-old children, who stayed at home in response to the 1995 reform instead of returning to the labor market, was also greater among the low-educated mothers (Table 7). This is not surprising as they were substantially more likely to be unemployed than the high-educated prior to the reform. Their likelihood of being unemployed decreased by as much as 13 p.p. after the reform.

Table 7: Impact of the 1995 reform by woman's education

	<i>Impact on women whose youngest child is:</i>		
	<i>aged 3</i>	<i>aged 4</i>	<i>aged 5</i>
Inactivity:			
Treat*After	0.395*** (0.017)	-0.013 (0.018)	-0.074*** (0.02)
Treat*After*HighEduc	-0.035** (0.014)	0.070*** (0.017)	0.048*** (0.015)
R-squared	0.293	0.086	0.073
Observations	7229	7087	7137
Unemployment:			
Treat*After	-0.126*** (0.012)	0.046** (0.016)	0.033*** (0.011)
Treat*After*HighEduc	0.036* (0.017)	0.025* (0.014)	0.023 (0.014)
R-squared	0.056	0.08	0.109
Observations	7229	7087	7137

Note: The treatment groups consist of prime-aged women (aged 25-55), whose youngest child is 3-5. The control group consists of prime-aged women whose youngest child is 5-7. All regressions include dummies for the treatment group and after period, quarter-year dummies, quarter-year dummies interacted with level of education, and other control variables. Standard errors (in parentheses) are clustered at the group-year level (* p<0.10, ** p<0.05, *** p<0.01). Source: Czech LFS (1994-1999), own calculations.

The high-educated mothers of 4-year-old children experienced an increase in both inactivity and unemployment after the 1995 reform (Table 7). The rise in their inactivity suggests that the additional income from the longer parental allowance induced some high-educated mothers to stay at home with a child even longer than the paid 4 years (consistent with our prediction in Section 2.2). The rise in their post-leave unemployment is likely a negative consequence of the longer career break. It is also consistent with the possibility that some of the high-educated mothers did not stay at home for a full additional year but instead returned to the labor market (as unemployed) when the child was still 4. This is also in line with the fact that inactivity no longer increased for high-educated mothers after their child turned 5.

²⁹The job protection in transition economies can be less effective due to an unstable business environment, in which companies disappear quickly or rationalize work positions (Kantorova 2004, Fodor 2005). As for the impact of the social norm, there is anecdotal evidence that the 1995 reform was accompanied by a media campaign highlighting the benefits of maternal care and traditional division of gender roles in the household.

The low-educated mothers responded to the 1995 reform in a slightly different way (Table 7). The inactivity among those with a 4-year-old child did not change, suggesting that the low-educated did not prolong the leave beyond the statutory duration. On the contrary, the decrease in inactivity rate among the low-educated mothers with a 5-year-old child implies that some of the low-educated mothers who would take a leave of at least 6 years prior to the reform shortened the leave to less than 6. We conjecture that the extra income from the additional year of parental allowance helped some of the credit-constrained low-educated women to enter the labor force earlier.

The impact of the 2008 reform on inactivity of mothers of 3-year-olds did not differ by education (see Table 8). It is likely that the larger impact of monetary incentives on low-educated mothers was counteracted by the fact that a larger share of the low-educated mothers did not meet the eligibility requirements and therefore experienced no impact of the reform. The observed decrease in inactivity among mothers with 4-year-old children was driven entirely by the high-educated mothers. This is consistent with the observed impact of the 1995 reform (Table 7), where only some of the high-educated mothers responded by prolonging their leave beyond the child's 4th birthday. The 2008 reform seems to have reversed this effect.

Table 8: Impact of the 2008 reform by woman's education

	<i>Impact on women whose youngest child is:</i>		
	<i>aged 3</i>	<i>aged 4</i>	<i>aged 5</i>
Inactivity:			
Treat*After	-0.198*** (0.027)	-0.013 (0.011)	0.029* (0.016)
Treat*After*HighEduc	-0.059 (0.039)	-0.030*** (0.009)	-0.031 (0.02)
R-squared	0.273	0.093	0.071
Observations	5403	5006	4816
Unemployment:			
Treat*After	0.072*** (0.015)	-0.095*** (0.014)	0.023 (0.022)
Treat*After*HighEduc	-0.043** (0.015)	0.088*** (0.019)	-0.04 (0.024)
R-squared	0.076	0.114	0.111
Observations	5403	5006	4816

Note: The treatment groups consist of prime-aged women (aged 25-55), whose youngest child is 3-5. The control group consists of prime-aged women whose youngest child is 5-7. All regressions include dummies for the treatment group and after period, quarter-year dummies, quarter-year dummies interacted with level of education, and other control variables. Standard errors (in parentheses) are clustered at the group-year level (* p<0.10, ** p<0.05, *** p<0.01). Source: Czech LFS (2008-2013), own calculations.

The impact of the 2008 reform on unemployment of mothers of 3- and 4-year-old children was much smaller among the high-educated women. Both the initial increase in unemployment when the child is 3 and the subsequent decrease when the child was 4 were much larger among the low-educated (Table 8). This is again in line with the

fact that high-educated mothers returning to the labor market are much less likely to experience unemployment than low-educated mothers.

In sum, the low-educated mothers responded to the two reforms of parental allowance somewhat more than high-educated mothers, but the differences were much smaller than expected. However, we do observe heterogeneity in the type of response to the 1995 reform, which induced some high-educated mothers to prolong their leave to more than 4 years, while some weakly attached low-educated mothers to shorten their leave to less than 6 years.

4.4 Robustness Analysis

In this section, we take advantage of the rotating panel structure of the LFS data, which allows a construction of a more precise information of a child's age (in quarters of a year) when the reported age changes between the two consecutive quarters. This substantially decreases the sample size, but enables us to construct an after period that immediately follows the before period (they are one year apart in the main specification) and thus increases the credibility of our identification strategy.

In particular, we focus on mothers of children who are of a given age and at the same time had their birthday in the 4 quarters before or the 4 quarters after the reform (the quarter of birth information comes from the rotating panel structure). For the 1995 reform, we compare mothers whose youngest child is 3 and had the 3rd birthday one year before the reform (i.e., in Q4 1994-Q3 1995), and those whose youngest child is 3 and had the 3rd birthday in the year after the reform (in Q4 1995-Q3 1996). We then follow these mothers as their children grow older reaching the age of 4 in Q4 1995-Q3 1996 (the before period) and Q4 1996-Q3 1997 (the after period), and the age of 5 in Q4 1996-Q3 1997 (the before period) and Q4 1997-Q3 1998 (the after period). Similarly for the 2008 reform, we compare mothers whose youngest child is 3 and had the 3rd birthday one year before the reform (Q2 2008-Q1 2009, the before period) and those whose youngest child is 3 and had the 3rd birthday one year after the reform (in Q2 2009-Q1 2010, the after period). We again follow these mothers for two consecutive years as their children reach the age of 4 and 5.

To control for aggregate trends and business cycle effects, we use mothers of slightly older children observed in the same calendar quarter. The control groups are the same as in the main specification (see Section 3.2). In particular, mothers of children aged 5/6/7 are used as a control group for mothers whose youngest child is 3/4/5.

Results of the robustness analysis can be found in Table 9. The estimated effects of the 1995 reform on inactivity and unemployment of mothers are very similar in both sign and magnitude to those from the baseline specification (see Table 5 above). Estimated impacts on inactivity are slightly lower in magnitude—31 percentage point increase at the age of 3 (38 percentage points in the baseline), and 4 percentage point decrease at the age of 5 (5 percentage points in the baseline). The unemployment effects are slightly smaller at the age of 4 of a child (4 percentage point increase compared to 6 percentage points in the baseline), but virtually the same at the ages of 3 and 5 as in the baseline.

The estimated impacts of the 2008 reform in the bottom part of Table 9 are also quite similar to the baseline specification (in Table 6 above). The impacts on inactivity are again somewhat smaller when the child is 3 (16 percentage points decrease compared to 24 percentage points in the baseline), but larger when the child is 4 (7 percentage points decrease compared to 4 percentage points in the baseline). There is also a significant

Table 9: Robustness analysis: Impact of the reforms on inactivity and unemployment

	<i>Impact on women whose youngest child is:</i>		
	<i>aged 3</i>	<i>aged 4</i>	<i>aged 5</i>
1995 reform:			
	Inactivity:		
Treat*After	0.307*** (0.018)	0.012 (0.009)	-0.038*** (0.010)
R-squared	0.274	0.108	0.095
Observations	4429	4502	4068
	Unemployment:		
Treat*After	-0.103*** (0.011)	0.042*** (0.007)	0.043*** (0.010)
R-squared	0.092	0.085	0.101
Observations	4429	4502	4068
2008 reform:			
	Inactivity:		
Treat*After	-0.156*** (0.031)	-0.067*** (0.018)	0.027*** (0.008)
R-squared	0.315	0.130	0.115
Observations	2799	2773	2801
	Unemployment:		
Treat*After	0.081*** (0.010)	-0.012 (0.017)	0.020 (0.019)
R-squared	0.099	0.123	0.127
Observations	2799	2773	2801

Note: The treatment groups consist of prime-aged women (aged 25-55), whose youngest child is 3-5. The control group consists of prime-aged women whose youngest child is 5-7. All regressions include dummies for the treatment group and after period, quarter-year dummies, quarter-year dummies interacted with level of education, and other control variables. Standard errors (in parentheses) are clustered at the group-year level (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$). Source: Czech LFS (1994-1999, 2008-2013), own calculations.

positive increase in inactivity of mothers of 5-year-old children (by 2.7 percentage points). This increase was not present in the baseline specification but it is in line with our theoretical predictions. The 2008 reform increased the total amount of money that parents received per one child and this could induce some mothers to prolong their inactivity (Section 2.2). Finally, the robustness analysis found an even larger increase in unemployment of mothers with 3-year-old children after the 2008 reform (8 percentage points compared to 5 in the baseline specification), but the unemployment effects when the child is 4 are no longer significant. Overall, the robustness analysis confirms all main results and provides further support for the validity of our conclusions.

5 Conclusion

This paper examines the impact of two reforms of parental leave allowance in the Czech Republic on the labor market status of women 3-5 years after childbirth. In contrast with previous literature, we consider not only the timing of post-birth employment but also distinguish between unemployment and inactivity among mothers who are not employed. This allows us to explore the unintended effects the reforms had on post-leave unemployment and inactivity.

In line with our theoretical predictions, the 1995 reform, which extended the parental allowance duration from child's 3rd to 4th birthday, induced women to prolong their family leave to at least 4 years. The size of the response was, however, unexpectedly high, especially with regard to the fact that the duration of the job protection remained unaltered at 3 years. In particular, our estimate of almost 40 p.p. increase in inactivity among mothers of 3-year-olds is in stark contrast with previous studies that found a much smaller impact of similar reforms (Schönberg and Ludsteck 2014, Lalive et al. 2014).

A large response to the 1995 reform was present even among high-educated women, who should value the job protection more than the duration of the allowance receipt. Against the predictions of the human capital model, a high share of both high and low-educated Czech women gave priority to the monetary aspect of the paid family leave above job security. This may reflect a universal compliance of Czech mothers with the change in the social norm induced by the new policy that emphasized the mother's role as primary caregiver for the first 4 years of a child's life. The unexpectedly large share of mothers who gave up their job protection in favor of an additional year of parental allowance could also question the effective strength of job protection in the Czech Republic. We cannot test these hypotheses with our data and therefore leave the explanation for future research. The difference between our findings and previous literature suggests that similar parental leave reforms can have a very different impact under different social norms or in different institutional settings.

While the response to the 1995 reform was very similar across education groups for women with 3-year-old children, we do find heterogeneity across mothers' responses more than 4 years since childbirth. High-educated women with 4-year-old children increased their inactivity, suggesting that they used the extra income from the 4th year of allowance to stay at home even beyond the statutory leave duration (but not beyond child's 5th birthday). The low-educated mothers, on the other hand, who remained out of the labor market for at least 6 years prior to the reform, seem to have used the extra income from the 4th year of allowance to cover the fixed costs of labor market entry and return to the labor market before a child's 6th birthday. Both of these behavioral responses are in line with our theoretical predictions.

In addition to the impact on post-leave inactivity, the 1995 reform had also large unintended effects on post-leave unemployment. As many women extended their leave to (at least) child's 4th birthday, the unemployment among mothers of 3-year-old children decreased (by 11 p.p.), whereas that among mothers of 4 and 5 years old increased by 6 and 4.4 percentage points, respectively. As women returned to the labor force after a longer career break, they experienced post-leave unemployment with higher probability but at a later time since childbirth.

The 2008 reform, which slightly increased the size of the allowance and enabled a subset of eligible women to receive the same total amount of allowance over 2 or 3 years

instead of 4, somewhat reversed the impact of the 1995 reform. In response to the reform, almost one-fourth of women shortened their leave from 4 to 3 years. The inactivity of high-educated mothers of 4-year-old children, which increased in response to the 1995 reform, has again partially decreased. The 2008 reform also brought opposite, but smaller, unemployment impact than the 1995 reform, in particular for the low-educated.

While the major effects of the two reforms were driven by mothers' take-up of the newly enacted statutory parental leave, the unintended effects on inactivity and unemployment were also important. In particular, an extension of a paid family leave to as much as 4 years resulted in an even longer career-break due to post-leave inactivity among some of the high-educated and post-leave unemployment among all, but especially low-educated women. Family policies that promote long family leave should internalize these unintended effects. At the least, they should be accompanied not only by effective job protection but by other complementary measures that help women maintain their human capital, such as training or requalification courses, and facilitate their return to work, such as flexible work arrangements.

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Appendix

Table A.1: Summary statistics by treatment group and period, 1995 reform

	Treatment group						Control group					
	Child aged 3		Child aged 4		Child aged 5		Child aged 5		Child aged 6		Child aged 7	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Non-employed	0.392	0.715	0.262	0.391	0.225	0.306	0.175	0.225	0.146	0.199	0.148	0.215
Inactive	0.258	0.668	0.173	0.218	0.141	0.128	0.113	0.141	0.087	0.109	0.075	0.108
Unemployed	0.134	0.047	0.089	0.173	0.084	0.178	0.062	0.084	0.059	0.09	0.073	0.107
Age	30.421	30.498	30.888	31.198	31.835	31.638	31.736	31.835	32.797	32.647	33.543	33.492
Primary education	0.103	0.101	0.082	0.078	0.098	0.108	0.124	0.098	0.123	0.106	0.115	0.095
Secondary education without school-leaving exam	0.351	0.395	0.379	0.387	0.367	0.401	0.348	0.367	0.369	0.379	0.398	0.416
Secondary education with school-leaving exam	0.43	0.408	0.443	0.428	0.438	0.397	0.412	0.438	0.411	0.411	0.409	0.385
Tertiary education	0.117	0.096	0.096	0.107	0.097	0.094	0.116	0.097	0.096	0.103	0.079	0.104
Married	0.912	0.894	0.898	0.87	0.897	0.846	0.897	0.897	0.863	0.883	0.849	0.854
Cohabiting	0.025	0.043	0.034	0.049	0.035	0.053	0.027	0.035	0.04	0.029	0.05	0.04
Number of children	2.007	1.99	2.003	1.925	1.895	1.911	1.955	1.895	1.919	1.909	1.859	1.857
Presence of elderly	0.03	0.033	0.03	0.033	0.032	0.026	0.031	0.032	0.02	0.027	0.03	0.025
Observations	1653	1804	1807	1649	1896	1560	1876	1896	1976	1656	2022	1659

Note: Treatment group consists of women whose youngest child was born in Q4 1990 - Q3 1992 in the before period and in Q4 1992 - Q3 1994 in the after period. Control group consists of women whose youngest child was born in Q4 1988 - Q3 1990 in the before period and in Q4 1990 - Q3 1992 in the after period. We follow these women as their children grow older reaching the age of 3, 4, and 5 for the treatment group and 5, 6, and 7 for the control group.
Source: Czech LFS (1994-1999), own calculations.

Table A.2: Summary statistics by treatment group and period, 2008 reform

	Treatment group						Control group					
	Child aged 3		Child aged 4		Child aged 5		Child aged 5		Child aged 6		Child aged 7	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Non-employed	0.641	0.464	0.325	0.263	0.202	0.211	0.205	0.202	0.194	0.203	0.156	0.144
Inactive	0.596	0.35	0.149	0.11	0.081	0.079	0.099	0.081	0.075	0.078	0.065	0.05
Unemployed	0.045	0.114	0.176	0.154	0.121	0.132	0.106	0.121	0.119	0.125	0.091	0.093
Age	32.732	33.789	33.898	34.65	35.502	35.406	34.11	35.502	35.172	36.268	36.157	36.95
Primary education	0.075	0.058	0.076	0.067	0.063	0.08	0.079	0.063	0.084	0.084	0.059	0.071
Secondary education without school-leaving exam	0.314	0.313	0.32	0.315	0.339	0.317	0.366	0.339	0.351	0.31	0.375	0.34
Secondary education with school-leaving exam	0.462	0.443	0.45	0.444	0.446	0.421	0.443	0.446	0.441	0.44	0.435	0.414
Tertiary education	0.149	0.185	0.154	0.173	0.152	0.182	0.112	0.152	0.124	0.166	0.131	0.174
Married	0.773	0.76	0.75	0.762	0.746	0.731	0.747	0.746	0.735	0.753	0.718	0.717
Cohabiting	0.122	0.154	0.132	0.117	0.126	0.117	0.104	0.126	0.093	0.096	0.104	0.114
Number of children	1.809	1.839	1.828	1.899	1.818	1.863	1.86	1.818	1.789	1.775	1.7	1.778
Presence of elderly	0.018	0.019	0.027	0.025	0.037	0.021	0.021	0.037	0.026	0.026	0.024	0.026
Observations	1516	1545	1230	1459	1218	1415	1124	1218	1195	1122	1092	1091

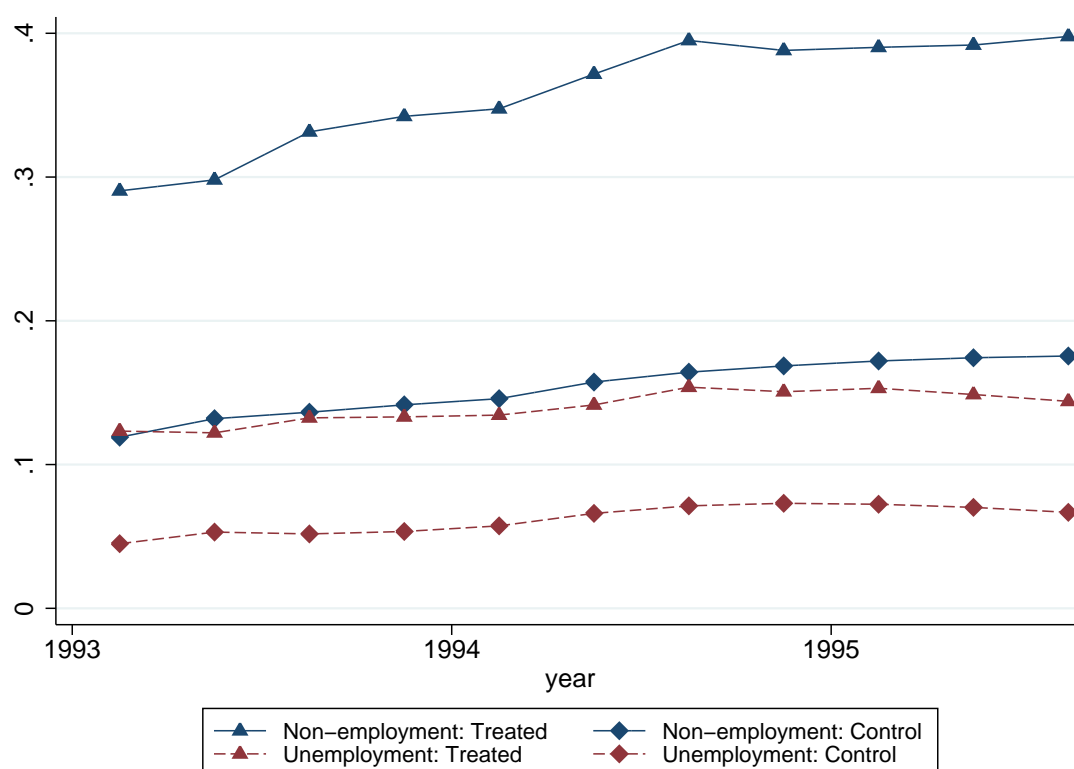
Note: Treatment group consists of women whose youngest child was born in Q2 2004 - Q1 2006 in the before period and in Q2 2006 - Q1 2008 in the after period. Control group consists of women whose youngest child was born in Q2 2002 - Q1 2004 in the before period and in Q2 2004 - Q1 2006 in the after period. We follow these women as their children grow older reaching the age of 3, 4, and 5 for the treatment group and 5, 6, and 7 for the control group.
Source: Czech LFS (2008-2013), own calculations.

Table A.3: Summary statistics by woman's education

	1995 reform				2008 reform			
	High education		Low education		High education		Low education	
	Before	After	Before	After	Before	After	Before	After
Non-employed	0.273	0.421	0.384	0.544	0.43	0.235	0.608	0.448
Inactive	0.186	0.312	0.245	0.393	0.362	0.146	0.448	0.245
Unemployed	0.087	0.109	0.139	0.151	0.067	0.089	0.161	0.203
Observations	1878	2557	1582	2456	1669	2726	1077	1693

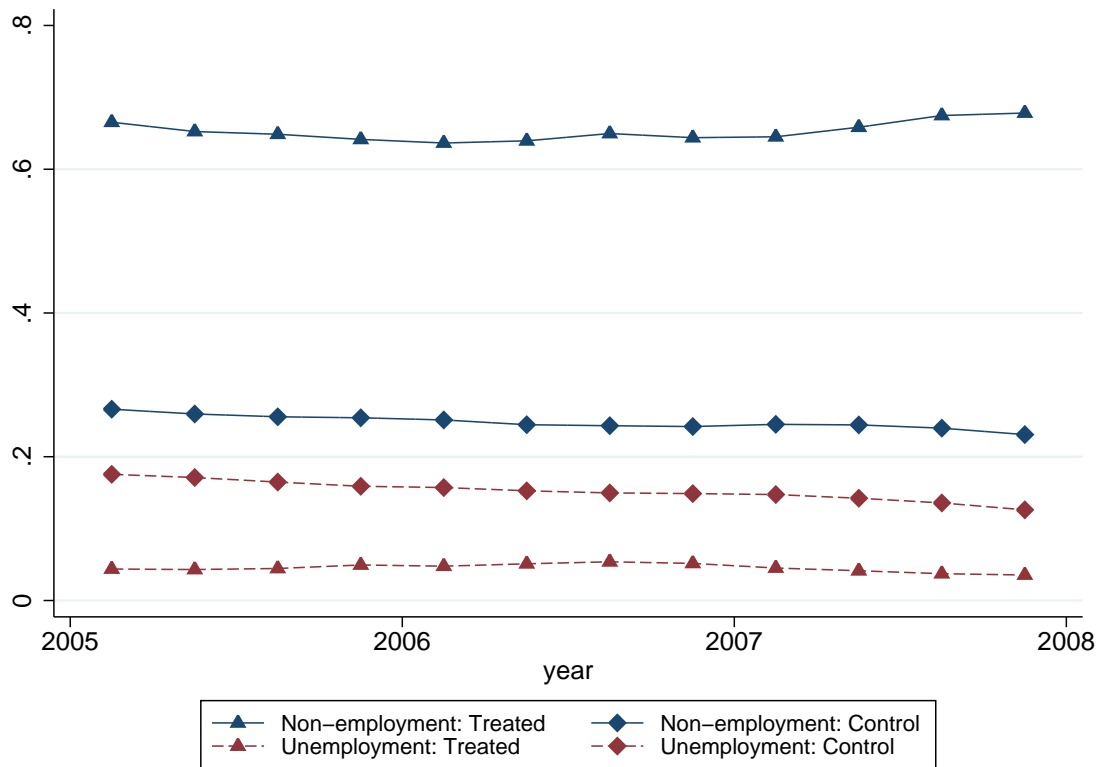
Notes: The sample includes all treated women, i.e. women whose youngest child is 3-5. High education corresponds to ISCED 3 level with school leaving examination or more, while low education is defined as ISCED 3 level with apprenticeship certificate (but without a school leaving examination) or less. Source: Czech LFS (1994-1999, 2008-2013), own calculations.

Figure A.1: Evolution of non-employment and unemployment before the 1995 reform



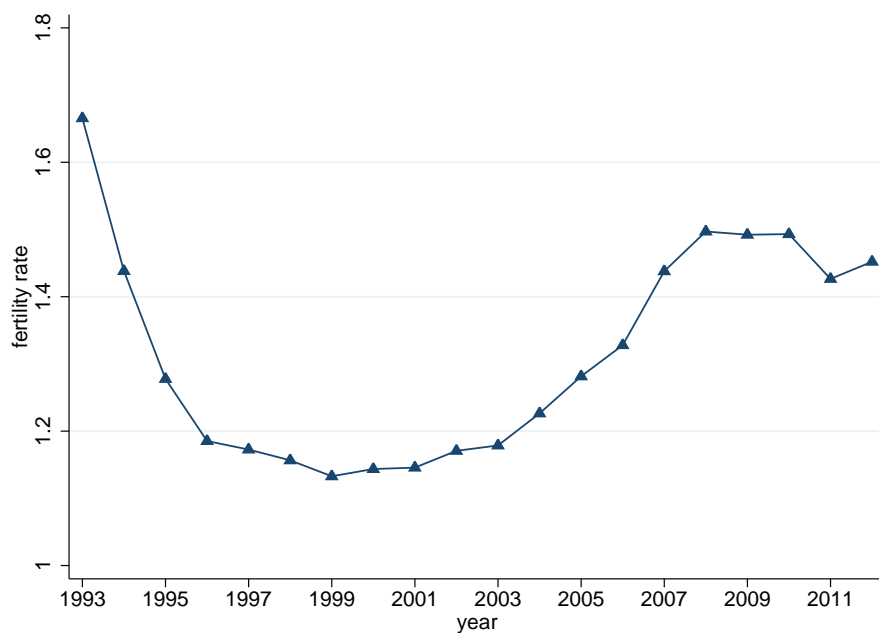
Note: The figure depicts the non-employment rate (share of inactive and unemployment in the population) and unemployment-to-population rate for women in the treatment group (with youngest child aged 3) and control group (with youngest child aged 5). The evolution is shown for the period before the 1995 reform, i.e. Q1 1993-Q3 1995. The time series were seasonally adjusted using MA(4) smoothing. Source: Czech LFS data (1993-1995).

Figure A.2: Evolution of non-employment and unemployment before the 2008 reform



Note: The figure depicts the non-employment rate (share of inactive and unemployment in the population) and unemployment-to-population rate for women in the treatment group (with youngest child aged 3) and control group (with youngest child aged 5). The evolution is shown for the period before the 2008 reform, i.e. 2005-2007. The time series were seasonally adjusted using MA(4) smoothing. Source: Czech LFS data (2005-2007).

Figure A.3: Fertility rates, 1993-2012



Note: The figure depicts fertility rates in the Czech Republic in 1993-2012. The fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates. Source: Czech Statistical Office.