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$$\frac{n!}{(n-1)!} p^{m-1} (1-p)^{n-m} = p \sum_{\ell=0}^{n-1} \frac{\ell+1}{n} \frac{(n-1)!}{(n-1-\ell)! \ell!} p^{\ell} (1-p)^{n-1-\ell}$$
$$= p \frac{n-1}{n} \sum_{\ell=0}^{n-1} \left[\frac{\ell}{n-1} + \frac{1}{n-1} \right] \frac{(n-1)!}{(n-1-\ell)! \ell!} p^{\ell} (1-p)^{n-1-\ell} = p^2 \frac{n-1}{n} +$$

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Parental Leave Length and Mothers' Careers: What Can Be Inferred from Occupational Allocation?

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Abstract:

This paper shows that the time spent on parental leave affects mothers' careers several years after childbirth. It also shows that policy-relevant conclusions can be drawn from occupational allocation data even in the absence of individual wage or earnings information. I take advantage of a legislative reform that changed the duration of parental benefit payments effective in the Czech Republic in 2008. Introducing the possibility of the flexible timing of benefit collection over the period of two to four years, as opposed to the only option of four years before, the reform significantly increased the share of mothers returning to work before their youngest child turns four. This further translates to increased representation of employed mothers in high-skilled occupations and increases the average occupation wage of the affected mothers six to eight years after childbirth. These findings indicate that shorter leaves are beneficial for mothers' careers, at least in the medium run.

JEL: J16, J13, J24

Keywords: Parental leave length, parental benefits, occupational allocation

1. Introduction

Female employment is strongly influenced by childbearing. Women leave the labor market when giving birth to a child and their return to work is to a large extent motivated by the design of childcare leave policies. These policies, offering mothers time off work to take care of their newborn children, were primarily implemented to improve child and maternal health and wellbeing. By regulating employment breaks, they also affect mothers' position in the labor market. This study investigates how an important dimension of childcare leave policies – the length of paid childcare leave – affects mothers' careers as revealed through their occupational allocation.

Recent literature is consistent in showing that childcare leave influences employment rates and earnings of mothers, although the signs and strength of these effects seem to differ by the length of leave (Olivetti and Petrongolo 2017). While childcare leave policies can also affect the occupational allocation of mothers, there is little research documenting this channel. To the best of my knowledge only the study by Akgunduz and Plantenga (2013) links parental leave length with occupational segregation, showing that countries with longer parental leave mandates experience higher occupational gender segregation¹.

There are several reasons why analyzing mothers' occupational allocation is important. The type of occupation where an individual is employed is a detailed statistic of their labor force status, conveying much more information than a mere employment dummy. Occupational allocation is related to individuals' skills and productivity, while abstracting from potential within-occupation discrimination that corrupts wages. Moreover, even if wages were of fundamental interest to the policymakers, they often cannot be used to evaluate parental leave policies because of the

¹ There is large literature documenting occupational gender segregation (Blau and Kahn, 2017). One of the explanations of occupational segregation is childbearing. Nevertheless, there is no research directly analyzing the relationship between the time women spend off the labor market after childbirth and occupational segregation.

sensitive character of earnings information and their exclusion from or selective availability in different datasets. This paper illustrates that much useful information can be retrieved from employees' occupational allocation and changes thereof that are triggered by a policy change.

Occupational allocation is quantified in this paper by the skill level of occupation – where occupations are classified as either high-skilled or low-skilled based on their ISCO classification – or by the average occupational wage. To identify the effect of parental leave length on occupational allocation I take advantage of a legislative reform that changed the system of parental benefit payment effective in the Czech Republic from January 2008. While before the reform it was the most financially attractive to stay on the parental leave until the youngest child's fourth birthday, after the reform the most attractive option was parental leave until the child's third birthday. Bicakova and Kaliskova (2016) show that this reform motivated a large share of mothers to re-enter the labor market earlier than they would have before the reform, i.e. that it effectively shortened the time mothers spend on the parental leave. I ask how this reform affected maternal occupational allocation up to eight years after childbirth.

The policy change analyzed in this paper has effectively shortened the time mothers spend on childcare leave. This can influence mothers' post-leave occupational allocation through several channels. First, mothers can face human capital depreciation while on childcare leave (Mincer and Polachek, 1978). Edin and Gustavsson (2008) show that one year of non-employment is associated with a five-percentile move down the general skills distribution, as measured by the Adult Literacy Test. If individuals also lose occupation-relevant skills while being out of the labor market, they may be forced to change occupations upon resuming work after a childcare leave. When the time spent off the labor market is shortened, like in the case of the analyzed reform, one can expect more mothers employed in high-skilled occupations and in high-paying

occupations. This effect might be further strengthened by the fact that after the reform mothers accumulate more experience and job tenure by the time they are observed, simply because they re-enter the labor market earlier. Second, the reform might have changed employers' expectation about the time women spend out of the labor market during their fertile years and their willingness to employ and train young women (Lai and Masters, 2005; Puhani and Sonderhof, 2011). Third, shortening the expected time spent on future childcare leave might make it worthwhile for young women to invest in job-specific human capital and sort into skill-demanding occupations (Polachek 1981; Grolich and de Grip 2009; Adda et al. 2017). The latter two effects could lead to higher allocation of young childless women in high-skilled and high-paying occupations that would further lead to improvement in their post-parental leave occupational allocation.

To identify the effect of the reform on mothers' occupational allocation I rely on the difference-in-differences estimation usually applied in similar studies (Schonberg and Ludsteck, 2014, Bicakova and Kaliskova 2016, Mullerova 2017). This approach allows me to estimate the intention to treat effect, i.e. the effect of the reform on all mothers eligible for collecting parental benefits over the shortened period independently of whether they actually took advantage of this possibility. Such analysis provides the lower bound for the effect of shortening the time spent on the parental leave and might be found insignificantly different from zero even if the average treatment effect is positive. It is important to mention that measuring maternal outcomes by their occupational allocation infects the analysis with selection to employment issues.² Before the reform only highly motivated mothers were employed before their child turned four, while after the reform selection to employment of mothers with young children was weaker. This might

² A similar challenge is faced by studies analyzing wage effects of time spent on parental leave.

mechanically lead to the worsened average occupational allocation of mothers observed in the labor market at low child ages after the reform even if these mothers hold better positions than they would have if entering the labor market later. These concerns are valid when analyzing the short-run effects of the reform (i.e. occupations performed by mothers shortly after terminating the leave). However, the medium-run effects are measured when the analyzed mothers' children reach the compulsory school age and the majority of mothers are back in employment independently on how much time they have spent on leave.³ Thus, selection to employment should not be an issue in this case.

I find that the analyzed reform has significantly affected occupational allocation of medium educated mothers – the group that has strongly reacted to the policy change by shortening the time spend on leave. Medium educated mothers affected by the reform have on average lower-skilled and lower paying jobs just after the leave and have on average higher-skilled and higher paying jobs by the time their children reach the compulsory school age than mothers not affected by the reform. The former finding is most probably driven by the composition of mothers reacting to the reform, as additional analyses reveal that the reform has mainly affected mothers who held low-skilled occupations before childbirth. The latter finding points towards the importance of job experience (non-)accumulation and skill depreciation associated with career breaks and suggests that a shorter time spent on the parental leave corresponds to the better position of mothers in the labor market several years after childbirth. The analyzed case study of the Czech Republic is especially interesting, as the investigated reform motivated mothers to shorten time spent off the labor market from four to three years. My results illustrate that even for long leave duration the changes in time spent off the labor market affect the careers of mothers.

³ Employment rates among Czech women with school-age children are among the highest in Europe.

Altogether, this study adds an important voice to the discussion concerning career-related consequences of maternity. I illustrate that even if employment effects of the time spent on childcare leave disappear several years after childbirth, the effects on maternal occupational allocation persist at least until the early school years of their children. This might be partially responsible for the observed gender wage gaps and occupational segregation.

2. Family Leave Policies in the Czech Republic

The system of maternity and parental leave is very generous in the Czech Republic. Mothers are eligible for up to 28 weeks of maternity leave in the case of giving birth to a single child and up to 37 weeks of maternity leave in the case of giving birth to two or more children. Out of this time six weeks are exclusively reserved for before the expected delivery date leave. The minimum total length of maternity leave is 14 weeks and it cannot be terminated or interrupted before the end of the sixth week after the actual delivery date.

While on maternity leave a mother is eligible for a maternity benefit (MB) if she was a holder of valid healthcare insurance for at least 270 days during the previous two years and was insured or was in a protection period (seven days after the end of the insurance) when entering the maternity leave. MB is calculated per calendar day and its level corresponds to roughly 70% of her pre-leave gross earnings.⁴ When collecting a MB a mother cannot work in the same position with the same employer as was the job on the base of which the MB is provided. A different employment position is allowed though. The employer who was employing the mother before she entered

⁴ Pre-leave earnings correspond linearly to the level of parental benefits for mothers earning below a specific threshold, and there is a cap on daily amount of maternity leave.

maternity leave is expected by law to offer her the same position when she terminates the parental leave.

Parental leave, which usually directly follows maternity leave, is fully optional and can be taken by either parent. An employer is obliged by law to let a parent take the leave if she (or he) asks for it by the child's third birthday. When asking for parental leave the parent has to specify its length which should not go beyond the child's third birthday. The initially agreed leave length can be later altered upon mutual agreement between the parent and the employer. Until the child's third birthday the parental leave comes with job protection. The employer has to admit the returning parent back to work, although there is no restriction concerning the job title or wage level to be offered to the returning employee. After the third birthday of the relevant child there is a possibility of agreeing with the employer to start an unprotected leave for one more year; this decision is fully voluntary for the employer with no binding by law.

Maternity and parental leave rules did not change in the Czech Republic over the analyzed period, i.e. between 2002 and 2011. However, in January 2008 there was a significant change to the system of parental allowance – a monthly benefit paid to a parent taking care of a young child.

2.1. Before the 2008 reform

A parent taking care of a child not exceeding four years of age was eligible for the parental benefit. Parental benefit was paid in fixed monthly installments until the relevant child reached the age of four or until a younger child was born to the family. Monthly installments were a flat rate. Each eligible parent, independently of their pre-leave earnings and of their child's age, received the same amount of allowance, which was 2,552 CZK (ca. 83 EUR) in 2002, gradually increased to 3,696 CZK (ca. 131 EUR) in 2006, and jumped to 7,582 CZK (ca. 268 EUR) in

2007. Until 2004 parental benefit collection was conditional on not earning more than roughly one-fifth of the average national salary and on the relevant child younger than three not attending childcare arrangements for more than 46 hours in a month. Conditions on earnings were abolished after 2004, but the childcare attendance restriction remained in this form until 2012.

2.2. After the 2008 reform

The system of parental benefits was significantly changed as of January 1, 2008, while the rules governing maternity and parental leave remained constant. The 2008 reform introduced a multispeed system of parental benefits, where parents could decide whether to collect benefits following a fast track (i.e. until the relevant child's second birthday), a standard track (i.e. until the relevant child's third birthday) or a slow track (i.e. until the relevant child's fourth birthday). Each track paid different amount of monthly installments, which are summarized in Table 1. The slow track was the default. A parent could opt for the fast track by the time their child reached 22 weeks of age, i.e. by the end of maternity leave. If not, the parent could opt for the standard track by the time their child reached 21 months of age. Otherwise, the parent automatically entered the slow track.

Table 1: Summary of the three-speed parental benefits system

Child age	0-22 weeks	23 weeks – 21 months	22 months – 24 months	25 months – 36 months	37 months – 48 months	Total amount
Fast track	MB	11 400	11 400			216 600
Standard track	MB	7 600	7 600	7 600		235 600
Slow track	MB	7 600	3 800	3 800	3 800	224 200

Note: Table summarizes the parental benefits system in place between January 2008 and December 2011. Numbers in each cell correspond to the amount of monthly installments in CZK paid to a parent taking care of his/her youngest child in the given age bracket. Total amount listed in the last column is the sum of all benefits paid until the child reaches the maximum age limit for the given track. MB corresponds to maternity benefits that depend on parent's pre-birth earnings. If a parent was not eligible for maternity benefits she/he automatically entered the slow track and was collecting a parental benefit in the amount of 7 600 CZK/month from birth until the child reached 22 weeks of age.

The reform affected all parents with children born on or after January 1, 2008, and also parents whose children were born prior to the implementation date, depending on their age as of January 1, 2008. Parents whose children were younger than 22 weeks (i.e. born later than July 2007) were fully affected by the reform – they had to choose between one of the three tracks. Parents whose children were older than 22 weeks were automatically assigned to the slow track and their monthly installments were adjusted accordingly. However, parents whose children did not reach 22 months of age as of January 1, 2008 (i.e. parents of children born after March 2006) could actively opt for the standard track.

Although the slow track of collecting parental benefits until the child's fourth birthday was the default option, the data from the Czech Labor Office -- the institution responsible for parental benefits distribution -- show that the majority of parents (mothers) opted for the standard track. This was motivated by the reduction in monthly installments after 21 months on the slow track and by the highest total amount of benefits paid by the standard track.

In 2012 there was a further reform modifying the system of parental benefits. Its main goal was to unify the total amount paid in benefits independent of the length of benefits collection to 220,000 CZK (ca. 8,630 EUR). This reform also introduced a flexible choice of a monthly installment. This system is in place until now. After 2012 parents could choose any amount between 3,800 CZK (ca. 148 EUR) and 11,500 CZK (ca. 448 EUR) as their monthly benefit and this choice can be updated every 3 months. Parental benefits are paid as long as parents meet the eligibility criteria or until the total amount of 220 000 CZK is paid out.

Table 2: Labor force status of mothers with young children born before and after the reform

	Mothers whose youngest child is													
	2-years-old		3-years-old		4-years-old		5-years-old		6-years-old		7-years-old		8-years-old	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
In Household	0.90	0.85	0.69	0.35	0.22	0.10	0.09	0.06	0.08	0.05	0.07	0.04	0.05	0.04
Employed	0.09	0.13	0.28	0.52	0.59	0.73	0.76	0.81	0.78	0.84	0.82	0.87	0.83	0.83
Unemployed	0.00	0.01	0.02	0.12	0.18	0.16	0.14	0.13	0.12	0.09	0.10	0.08	0.10	0.11
In Education	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retired	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	10974	8111	10053	6569	8433	5746	7504	4800	7236	3157	6833	1939	6358	686

Note: Table reports the distribution of all mothers with the youngest child of specific age among detailed labor force states. “In the household” category captures all the women on maternity and parental leave as well as housewives. Numbers in the column labeled *Before* concern mothers of children born prior to 2006; numbers under the column *After* concern mothers of children born in or after 2008. Statistics based on Czech Labor Force Survey microdata. Sample consists of prime-age mothers observed between 2002 and 2016 with their youngest child born before 2012.

2.3. Parental benefits and childcare leave

Prior to the reform parents had no choice over the course of parental benefits collection, which were paid until the month in which their youngest child reached the age of four. The child's fourth birthday also marked the end of parental leave. Although it was not compulsory, the majority of mothers took advantage of the full length of leave and were re-entering the labor market after their youngest child turned four. This is summarized in the first row of Table 2 reporting labor market statistics of mothers. Almost 70% of mothers whose youngest child was older than three but younger than four were on the parental leave before the reform.

The 2008 reform introduced the possibility of shortening the period of parental benefits collection for the majority of parents. Although collecting benefits until the child's fourth birthday was still possible, the most favorable option was to enter the three-year track of parental benefit payments. Indeed, the majority of mothers choose the three-year track after the reform. Also after 2008, the parental allowance was not directly connected to parental leave. A parent could theoretically collect the benefits until their child's third birthday, but be on leave until the child's fourth birthday while receiving no cash transfers during the last year. Nevertheless, the usual practice is that mothers opt for equalizing the length of parental leave and parental benefits collection to smooth income (Haskova et al. 2012). Table 2 shows that after the reform only 35% of all mothers with their youngest child being older than three and younger than four were on parental leave.

In this paper I empirically analyze two sets of outcomes that might have been influenced by the reform. First, I ask whether the change in parental benefit timing motivated some mothers to

resume work earlier than they would have under the old regime⁵. Second, I investigate whether this possibly shorter break in employment after childbirth had any effects on mothers' occupational allocation up to eight years after childbirth.

3. Empirical Approach

3.1. Data

For the purpose of the empirical analysis I use the Labor Force Survey (LFS) data for the Czech Republic for the years 2002-2016 provided by the Czech Statistical Office. This is a quarterly household-level dataset with a rotating panel structure. Each individual (all individuals within the same household) is followed for five consecutive quarters with 20% of the sample being renewed each quarter. The household structure of the dataset allows matching each individual to their children and to their partner provided the children and partner live in the same household. The Czech Labor Force Survey records detailed current socio-economic status of each individual. The provided information include age, education level,⁶ marital status, labor force status, and industry and occupation of employment. Unfortunately, there is no information about income.

Taking advantage of the household structure of the data I match each woman to her children. For each child I record the year of birth and age at the time of the survey.⁷ Each individual is

⁵ This is replication of the findings of Bicakova and Kaliskova (2016) who analyze the effects of the 2008 reform (and of a 1995 reform) on mothers' non-employment, inactivity and unemployment rates.

⁶ Education is coded using the ISCED system. I recode it into three education groups: Low (ISCED 1,2,3c) corresponding to primary, lower secondary and secondary without graduation exam, Medium (ISCED 3a, 3b, 4) corresponding to high school education, and High (ISCED 5,6) corresponding to college or higher levels of education.

⁷ Age increases by one after one's birthday. Thus, an individual born in May 2000 is recorded as 9 years old in the first quarter of 2010, and as 10 years old in the third quarter of 2010. Taking advantage of the rotating panel structure of the data I can thus retrieve each child's age with precision up to a quarter.

observed in the dataset for the maximum period of five consecutive quarters. I use the last quarter of observation to identify the year and quarter of birth of each mother's youngest child.

Detailed labor force status allows for the identification of employed, unemployed, and inactive individuals. Prior to 2012 inactivity was further divided into several reasons including maternity leave, parental leave, and "being in the household". Starting in 2012 parental leave was not recorded as a separate category and it was merged into "being in the household". To maintain consistency, throughout the analysis I code all individuals with children younger than five who report maternity leave, parental leave, or "being in the household" as being on childcare-related leave.⁸

Occupations are coded using a 4-digit ISCO classification.⁹ I use this classification to define high-skilled occupations as those belonging to the first three ISCO groups (group 1 –Managers, group 2 –Professionals, group 3 –Technicians and Associate Professionals).¹⁰ This approach stems from the background of occupational titles which are grouped into levels to reflect their skill or educational requirements (Chevalier 2003). It has been used in other studies to identify high-level occupations (Akgunduz and Plantenga, 2013) or occupations requiring high level of skills (Baert et al. 2013). To partially mitigate the problem of missing income information, I retrieve year-specific average occupational hourly wages from the Average Earnings Information System¹¹ and merge it with the Labor Force Survey data based on the 4-digit occupational code.

⁸ Robustness check using data prior to 2012 and direct definition of parental leave provide almost identical results as the analysis using the adapted definition of childcare leave.

⁹ In 2011 there was a significant change in the system of occupational classification used in the Czech Labor Force Survey. Prior to this year information on occupations was recorded using a Czech system of occupational classification, KZAM, while in 2011 the Czech Statistical Office officially started to code occupations according to ISCO. In the dataset used for analysis presented in this paper all occupations are coded using the ISCO classification. Data prior to 2011 were recoded from KZAM to ISCO by the statistical office.

¹⁰ 2-digit ISCO occupation classification is outlined in the Appendix.

¹¹ <http://ispv.cz/en/homepage.aspx>

Retrospective information is scarce in the used dataset. Each individual reports her labor market status and industry of employment one year prior to the survey. Occupation one year prior to the survey is not recorded. For each employed individual tenure within the current employer is recorded. For each not employed individual time since leaving the last employment is recorded as well as industry and occupation of the last job. This means that for each employed mother I observe tenure with her current employer, but I do not know when she re-entered the labor force after parental leave. On the other hand, for each not-employed mother I know when she left her last employment and what was the occupation of her last job.

Two samples are used in the analysis. First, the full sample consists of all mothers observed between the first quarter of 2002 and the last quarter of 2016 with children born in December 2011 the latest. To account for the rotating panel structure of the data, standard errors are clustered at individual level in each estimation. Summary statistics of the full sample is presented in the first column of Table 3.

Second, the longitudinal sample covers all mothers who are observed for at least two consecutive quarters. For the purpose of parental leave length analysis, this sample is further restricted to mothers for whom the transition from parental leave to work is captured during the observation window. This restriction significantly reduces the sample, but allows observing the length of parental leave (either based on the age of the youngest child or based on the time since last employment) and occupation of employment before going on leave, together with detailed information on the current employment. Summary statistics of the longitudinal sample is presented in the second column of Table 3. Note that the structure of the longitudinal sample is very similar to the structure of the full sample.

Table 3: Summary statistics

	Full sample	Panel transition sample
Age at last childbirth	24.931 (4.749)	25.444 (4.796)
Low education	0.427 (0.495)	0.409 (0.492)
Medium education	0.418 (0.493)	0.422 (0.494)
High education	0.155 (0.362)	0.169 (0.375)
Number of children	1.786 (0.757)	1.783 (0.774)
Employed	0.588 (0.492)	0.519 (0.500)
Observations	261 744	41 671
High-skill occupation	0.396 (0.489)	0.398 (0.489)
Occupation hourly wage (in 2010 CZK)	137.909 (54.405)	141.476 (58.827)
Observations	162 055	22 966

Note: Table summarizes basic variables from the full sample of prime age mothers whose youngest child was born between January 1995 and December 2011, and for the panel subsample of mothers whose youngest child was born between January 2000 and December 2011 for whom I observe transition between parental leave and labor market activity.

3.2. Methodology

To identify the relationship between the time spent on parental leave and mothers' occupational allocation I rely on a reform changing the system of parental benefit payments. As the reform did not directly change the statutory leave length, the first step of the analysis is to document the extent to which the time spent off the labor market after childbirth has been affected by this policy. I take advantage of the longitudinal sample to run a simple before-after analysis of parental leave length to show what was the average adjustment of the time spent on childcare leave in the years following the reform. Splitting the sample by education levels or by the skill-

level of occupation held before parental leave allows identify the groups that were the most responsive to the reform. While this analysis does not control for aggregate trends that might correlate with the reform, it is indicative of the impact of the reform on specific groups of mothers.

To present a more robust evidence of the effects of the reform on leave-taking behavior of mothers, I rely on the difference-in-differences analysis of maternal employment status. In this analysis mothers whose youngest children are aged three through eight constitute the treated groups and the post-reform period is defined as years when the treated mothers' children born after implementation of the reform reach the given age¹². The control group consists of mothers of older children observed in the same calendar years as the treated mothers. This means that year t outcomes of treatment group mothers are compared to year t outcomes of control group mothers. Inclusion of a treatment group in the analysis is expected to capture time-specific changes in the labor market that affect the analyzed group of mothers and are independent of the reform.¹³ This analysis is supposed to reveal how the parental benefits reform affected mothers' employment rates. By construction, the reform was expected to increase employment rates among mothers of three-years-old children. Exploring employment rates of mothers with older children I check whether the reform's effects are persistent.

In the second step, which is the main value added of this paper, I identify the effect of shorter time spent on parental leave on mothers' occupational allocation. Occupational allocation is quantified using two measures: a high-skill occupation status and occupation-specific average

¹² A similar approach was taken by Bicakova and Kaliskova (2016) who analyzed the effect of the 2008 reform on mothers' non-employment, unemployment and inactivity rates.

¹³ See the Appendix for detailed definition and discussion of treatment and control group choices.

hourly wage. Both measures are expected to capture skill requirements of jobs performed by mothers and as such might be indicative of their human capital levels.

The effect of parental leave length on maternal occupational allocation is estimated using the difference-in-differences approach in an analogous way as maternal employment rates were analyzed.¹⁴ As the exact time of return to work after parental leave or the length of any past career breaks is not observed, it is only possible to identify the intention to treat (ITT) effect of being eligible for shorter parental leave on mothers' labor market outcomes. The underlying assumption is that before the reform most mothers took advantage of a four-year parental leave, while in response to the reform a large fraction of mothers returned to the labor market earlier¹⁵. The ITT effect identified by the difference-in-differences analysis can be thus interpreted as the effect of the reform on labor market outcomes of mothers, who after the reform were eligible for faster parental benefits collection.

When analyzing the occupational allocation of mothers, the estimation sample naturally consists of only employed individuals. This might raise concerns about sample selection issues. Mothers motivated by the reform to resume employment earlier, and thus mothers included in the post-reform treated sample, might be systematically lower-skilled than mothers who were employed at younger child ages even before the reform (i.e., mothers included in the pre-reform treated sample). The intuition here is that by lowering the value of the outside option (the value of non-employment after the child has reached the age of three) the reform shifted the marginal mother indifferent between being employed or inactive towards lower skill levels. This concern is verified in the first step of the empirical analysis where the groups of women most responsive to

¹⁴ See the Appendix for detailed explanation of the identification strategy and discussion of treatment and control group choices.

¹⁵ Validity of this assumption is empirically verified in the first step of the analysis.

the reform are identified. Other effects absent, this would lead to a lower post-reform share of employed mothers with young children observed in high-skill occupations. Under such a scenario the ITT estimates presented in this paper can be considered as the lower bound of the true relationship between the time spent on leave and occupation status of mother.

Selection to employment is less of an issue at older child ages. The majority of six-year-old children and all seven- and eight-year-old children are in compulsory education and most of their mothers are active in the labor market.¹⁶ This significantly reduces, if not eliminates, the selection to employment issue. The ITT estimates of the effect of the reform on occupational allocation of mothers with (six-) seven- to eight-year-olds might be thus interpreted as driven by their earlier return to work after the parental leave and, consequently, shorter period of non-employment and longer after-leave labor market experience.

4. Results and Discussion

This section presents the results that (1) document that the reform had the expected effects on the average time spent by mothers away from employment after childbirth, and (2) identify the effect of the shortened time spent on parental leave on maternal occupational allocation. A discussion about interpretation of the results and their practical implications follows.

4.1. Effect of the reform on parental leave length

Documenting that the reform changing the timing of parental benefit payments affected the time spent by mothers off the labor market is crucial for the core analysis of this paper. To this end Table 4 presents the results of the before-after estimation of the reform's effects on the average time spent by Czech mothers on parental leave.

¹⁶ See the Appendix for maternal employment rates by the age of their youngest child.

Table 4: Before-after estimates of the effect of the reform on parental leave length

	(1)	(2)	(3)	(4)
	All	All	Low-skill occupation before leave	High-skill occupation before leave
Child born after reform	-0.359*** (0.056)	-0.470*** (0.088)	-0.595*** (0.089)	-0.256 (0.529)
Medium educ * Child born after reform		0.145 (0.120)	0.396*** (0.138)	-0.184 (0.548)
High educ * Child born after reform		0.299* (0.165)	1.333*** (0.363)	-0.060 (0.560)
<i>N</i>	1047	1047	454	327
<i>R</i> ²	0.162	0.162	0.148	0.111

Note: The dependent variable is parental leave length measured in years with precision to a quarter. The estimation sample consists of all prime age mothers for whom we observe a transition from parental leave to labor market activity. Control variables include mother's age, education level, total number of children, and marital status. Low education group (the reference) consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with a high school diploma, and high education group consists of college-educated individuals. Low-skill occupations are defined as occupations belonging to broad ISCO categories 4-9, high-skill-occupations are defined as belonging to broad ISCO categories 1-3. Standard errors reported in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The main message of Table 4 is summarized in the first row of columns (1) and (2) – the average time a Czech mother spent on parental leave was reduced by a third of a year after the reform, with the strongest effect on low educated mothers (half a year) and the weakest effect on high educated mothers, as column (2) reveals. Columns (3) and (4) of Table 4 further reveal that the observed reduction of time spent on childcare leave is driven by mothers who held low-skilled occupations before the leave. It can be concluded that mothers with lower education levels and/or with worse labor market position were the most responsive to changes in parental benefit system introduced by the reform. This is an important finding from the point of view of the further analysis, as it indicates that a specific pool of mothers was motivated by the reform to (re-)enter the labor market earlier, i.e. before their youngest child's fourth birthday.

4.2. Effect of the reform on mothers' employment rates

Table 5 summarizes a more robust evidence of the reform effects on maternal labor market behavior. Each panel of the table reports difference-in-differences estimates of the reform effects on employment rates of mothers whose youngest children are three (Panel A) to eight (Panel F) years old.¹⁷

Table 5: Difference-in-differences estimates of the effect of the reform on maternal employment rates by the age of the youngest child

	(2) All	(3) Low educ	(4) Medium educ	(5) High educ
<i>Panel A: Mothers of 3-year-olds</i>				
Reform effect	0.169*** (0.017)	0.164*** (0.029)	0.164*** (0.026)	0.170*** (0.041)
Treated	-0.469*** (0.009)	-0.472*** (0.012)	-0.479*** (0.014)	-0.414*** (0.028)
Born after reform	0.099*** (0.029)	-0.017 (0.043)	0.164*** (0.044)	0.037 (0.052)
<i>N</i>	50723	23506	20926	6287
<i>R</i> ²	0.220	0.184	0.204	0.166
<i>Panel B: Mothers of 4-year-olds</i>				
Reform effect	0.093*** (0.018)	0.070** (0.032)	0.120*** (0.026)	0.057 (0.036)
Treated	-0.199*** (0.009)	-0.203*** (0.014)	-0.206*** (0.014)	-0.159*** (0.022)
Born after reform	0.059* (0.030)	0.102* (0.058)	0.031 (0.047)	0.084* (0.051)
<i>N</i>	52097	24393	21232	6471
<i>R</i> ²	0.093	0.047	0.049	0.041
<i>Panel C: Mothers of 5-year-olds</i>				
Reform effect	0.022 (0.017)	-0.003 (0.031)	0.047* (0.025)	0.015 (0.031)
Treated	-0.068*** (0.008)	-0.064*** (0.013)	-0.073*** (0.012)	-0.069*** (0.019)
Born after reform	0.065*** (0.022)	0.107** (0.043)	0.051 (0.032)	0.046 (0.039)
<i>N</i>	53944	25037	22224	6679
<i>R</i> ²	0.057	0.010	0.010	0.024
<i>Panel D: Mothers of 6-year-olds</i>				
Reform effect	0.051***	0.083***	0.038*	-0.001

¹⁷ Graphic representations of unconditional employment rates for mothers with their youngest children in respective age groups are presented in the Appendix. On top of visualizing the effect of the reform on maternal employment rates, these graphs also document the existence of parallel trends in the evolution of employment rates between the treatment and control groups prior to the reform.

	(2)	(3)	(4)	(5)
	All	Low educ	Medium educ	High educ
<i>Treated</i>	-0.069*** (0.016)	-0.085*** (0.031)	-0.054*** (0.022)	-0.048*** (0.026)
<i>Born after reform</i>	0.036* (0.019)	0.025 (0.037)	0.059** (0.025)	0.030 (0.032)
<i>N</i>	21188	9860	8774	2553
<i>R2</i>	0.052	0.017	0.006	0.019
<i>Panel E: Mothers of 7-year-olds</i>				
<i>Reform effect</i>	0.037** (0.016)	0.108*** (0.031)	-0.002 (0.021)	-0.029 (0.025)
<i>Treated</i>	-0.058*** (0.007)	-0.085*** (0.012)	-0.037*** (0.009)	-0.029** (0.014)
<i>Born after reform</i>	0.050*** (0.015)	0.027 (0.032)	0.082*** (0.018)	0.034 (0.023)
<i>N</i>	58475	27307	24211	6954
<i>R2</i>	0.053	0.014	0.008	0.015
<i>Panel F: Mothers of 8-year-olds</i>				
<i>Reform effect</i>	0.017 (0.020)	0.081** (0.038)	-0.034 (0.029)	-0.016 (0.024)
<i>Treated</i>	-0.045*** (0.007)	-0.059*** (0.011)	-0.041*** (0.009)	-0.008 (0.011)
<i>Born after reform</i>	0.025* (0.014)	0.002 (0.029)	0.047*** (0.017)	0.040* (0.023)
<i>N</i>	59707	27959	24752	6995
<i>R2</i>	0.049	0.013	0.007	0.007

Note: The dependent variable is dummy for employment as the main labor force status. The treatment group consists of mothers whose youngest child is 3, 4, 5, 6, 7, 8-years-old, for each panel respectively. The control group consists of mothers whose children are three to four years older than the treated mothers' children and are born before 2006. Control variables include mother's age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with a high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

We observe that the reform has increased employment rates of mothers whose youngest child is three years old by about 17 percentage points (Table 5, Panel A). This is in line with the design of the reform that introduced a multispeed system of parental benefit payments with the most favorable track offering benefits until the relevant child's third birthday. Given that the pre-

reform employment rate of mothers of three-year-old children was only 28%, the identified effect is very large.¹⁸

As documented in Panel B of Table 5, the reform has also increased employment rates among mothers of four-year-olds, even though mothers of four-year-olds were not eligible for parental leave or parental benefit both before and after the reform. Increased employment rates in this group of mothers are most probably driven by moving their post-leave job search to a younger child's age in response to the reform (Bicakova and Kaliskova, 2016) and consequently lowered unemployment and inactivity rates among mothers not eligible for parental leave any more.¹⁹ The effect of the reform on maternal employment rates fades out with the youngest child age. Panels E and F of Table 5 document that when the youngest child reaches the compulsory school age, treated mothers' employment rates are in most cases not affected by the reform.²⁰

The results presented above are very similar to the results reported by earlier studies (Bicakova and Kaliskova 2016, Mullerova 2016)²¹ and confirm that the reform changing the timing of the parental benefit payments affected the time spent by mothers out of employment after childbirth.

Two results reported in Table 4 are especially important for further analysis. First, the analyzed

¹⁸ It might appear striking that employment effects of the reform on mothers with three-year-old children do not differ across education levels, while the before-after analysis identified significant heterogeneity in parental leave length adjustments in response to the reform. This discrepancy might be explained by the fact that lower-educated mothers' response to the reform was indeed stronger, but this group of mothers often entered unemployment right after terminating the parental leave (Bicakova and Kaliskova, 2016) and this is why their response in terms of employment rate is similar to other education groups.

¹⁹ The period of job protection was three years since childbirth both before and after the reform. Motivating mothers to enter the labor market around their child's third birthday might have increased the share of mothers taking advantage of job protection. This would be another reason why employment rates of mothers with four-year-old children increased in response to the reform.

²⁰ Employment rates of low-educated mothers are found to be slightly increased in response to the reform even at higher child ages.

²¹ The analysis presented in this paper basically replicates the results of Bicakova and Kaliskova (2016) who estimate the effects of the 2008 reform (and of another earlier reform) on non-employment, inactivity and unemployment rates of mothers with two- to six-year-old children. Their results might slightly differ from the ones presented in this paper due to different time span of the data used and different definition of control groups. Nevertheless, the overall picture presented in their and in my study is the same pointing towards strong employment effects of the reform for mothers of three and four-year-old children and fading out of these effects with increasing child age.

reform has significantly increased employment rates of mothers with three-year-old children, which suggests that many mothers have shortened the time spent out of employment in response to the reform. Second, employment effects are not persistent in the sense that the reform did not change employment rates of mothers with school-aged children (these were high already before the policy change, as Table 2 and Figure C2 illustrate). This suggests that selection to employment among mothers with school-aged children should be similar before and after the reform.

4.3. Effect of the reform on mothers' occupational allocation

Having established that a shortened period of parental benefit collection motivated a significant share of mothers to resume work earlier than by their youngest child's fourth birthday, I proceed to presenting the estimated effects of the reform on maternal occupational allocation.

Two sets of results are presented in this chapter. First, I report difference-in-differences estimates of the effects of the reform on the probability that a mother is employed in a high-skilled occupation at different child ages (Table 6). Second, the difference-in-differences estimates of the reform effects on average occupational wage experienced by mothers at different child ages are reported (Table 7). Both sets of results are conditional of being employed.

Table 6: Difference-in-differences estimates of the effect of the reform on high-skill occupation status of employed mothers by the age of the youngest child

	(1) All	(2) Low educ	(3) Medium educ	(4) High educ
<i>Panel A: Mothers of 3-year-olds</i>				
Reform effect	-0.031** (0.012)	0.001 (0.013)	-0.046** (0.022)	-0.022 (0.021)
Treated	0.038*** (0.007)	-0.007 (0.008)	0.065*** (0.013)	0.031** (0.014)
Born after reform	-0.091*** (0.017)	-0.015 (0.020)	-0.136*** (0.038)	-0.108*** (0.027)

<i>N</i>	31528	12348	14318	4859
<i>R</i> ²	0.401	0.004	0.030	0.021
<i>Panel B: Mothers of 4-year-olds</i>				
Reform effect	-0.019*	0.001	-0.040**	-0.008
	(0.011)	(0.012)	(0.020)	(0.019)
Treated	0.007	-0.012**	0.031***	-0.010
	(0.005)	(0.005)	(0.010)	(0.011)
Born after reform	-0.069***	-0.031	-0.122***	-0.047
	(0.019)	(0.023)	(0.038)	(0.030)
<i>N</i>	38489	15626	17136	5726
<i>R</i> ²	0.398	0.007	0.043	0.022
<i>Panel C: Mothers of 5-year-olds</i>				
Reform effect	0.004	0.008	0.009	-0.021
	(0.010)	(0.011)	(0.019)	(0.018)
Treated	-0.004	-0.011**	0.001	0.001
	(0.005)	(0.005)	(0.009)	(0.011)
Born after reform	-0.144***	-0.046***	-0.216***	-0.157***
	(0.015)	(0.017)	(0.029)	(0.025)
<i>N</i>	42941	17679	19088	6170
<i>R</i> ²	0.393	0.007	0.035	0.035
<i>Panel D: Mothers of 6-year-olds</i>				
Reform effect	0.010	0.012	0.034*	-0.037**
	(0.010)	(0.011)	(0.020)	(0.017)
Treated	-0.004	-0.001	-0.007	-0.001
	(0.005)	(0.005)	(0.009)	(0.010)
Born after reform	-0.109***	-0.049***	-0.192***	-0.047**
	(0.013)	(0.014)	(0.026)	(0.022)
<i>N</i>	45765	19329	20117	6316
<i>R</i> ²	0.395	0.006	0.029	0.019
<i>Panel E: Mothers of 7-year-olds</i>				
Reform effect	0.021*	0.017	0.042**	-0.006
	(0.011)	(0.012)	(0.021)	(0.018)
Treated	0.012***	0.009*	0.014*	0.007
	(0.004)	(0.004)	(0.008)	(0.009)
Born after reform	-0.132***	-0.052***	-0.237***	-0.055***
	(0.011)	(0.012)	(0.021)	(0.019)
<i>N</i>	48724	20576	21592	6553
<i>R</i> ²	0.390	0.005	0.030	0.017
<i>Panel F: Mothers of 8-year-olds</i>				
Reform effect	0.038***	0.003	0.074***	0.005
	(0.014)	(0.016)	(0.028)	(0.022)
Treated	0.007	-0.002	0.017**	0.006
	(0.004)	(0.004)	(0.008)	(0.009)
Born after reform	-0.114***	-0.031***	-0.224***	-0.028
	(0.010)	(0.011)	(0.020)	(0.018)
<i>N</i>	50576	21627	22279	6669
<i>R</i> ²	0.383	0.005	0.028	0.012

Note: The dependent variable is dummy for working in a high-skilled occupation (occupation belonging to broad ISCO category 1-3). Sample of employed prime-age mothers. The treatment group consists of mothers whose youngest child is 3, 4, 5, 6, 7, 8-years-old, for each panel respectively. The control group consists of mothers whose children are three to four years older than the treated mothers' children and are born before 2006. Control variables

include mother's age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with a high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The estimates presented in Table 6 correspond to separate regressions by treated mothers' youngest child's age (Panels A to F) and by mothers' education level (columns 2 to 4), with the first column reporting the total effect. They reveal negative reform effects for mothers of three- and four-year-old children, namely that after the reform the probability of observing an employed mother of a three-year-old in a high-skilled occupation has dropped by about three percentage points and the probability of observing an employed mother of a four-year-old in a high-skilled occupation has dropped by about two percentage points. On the other hand, the reported results for mothers of school-aged children are positive. Panel E shows that the probability of observing an employed mother of a seven-year-old in a high-skilled occupation has increased by about two percentage points, while panel F shows that this probability has increased by about four percentage points for mothers of eight-year-olds. In all cases the effects are driven by high-school educated mothers (column 3), for which I find a four percentage point (six years after childbirth) to seven percentage point (eight years after childbirth) increase in the probability of being employed in a high-skill occupation. Given that the baseline share of high-school educated mothers employed in a high-skill occupations is about 40%, the estimated effects are very strong.

The analysis of high-skill occupation status is to some extent corrupted by the change in occupation classification used to code data in the Czech Labor Force Survey in 2011. This change has "deflated" some of the occupations and after 2011 the share of mothers employed in high-skill occupations is lower for each child's age, what is represented by negative estimates of the "After the reform" coefficient. Comparing the occupation status of mothers with young children

to occupation status of mothers with older children that is coded using the same classification should reduce, if not eliminate, the corrupting effect of occupational classification change. Robustness analysis on a subsample of data from before the change in occupational classification produces qualitatively the same results (available for a subset of child ages, on request).

That the results are not driven by occupational classification change is also supported by the alternative approach towards quantifying occupational allocation – namely analyzing average wages of occupations where mothers are employed. Occupations are matched to their average wages on a yearly basis and thus change in the occupational classification should not significantly affect this measure. The average occupational wages experienced by mothers vary less than mothers’ high-skill occupation status. Moreover, as Table D2 (in the Appendix) illustrates, there is higher confidence in the common pre-trend between the treatment and control groups when average occupation wages are analyzed.

Table 7: Difference-in-differences estimates of the effect of the reform on average occupation wage of employed mothers by the age of the youngest child

	(1) All	(2) Low educ	(3) Medium educ	(4) High educ
<i>Panel A: Mothers of 3-year-olds</i>				
Reform effect	-4.570*** (1.361)	-1.800 (1.507)	-2.422 (2.020)	-14.134*** (5.096)
Treated	5.711*** (0.842)	1.364 (0.909)	6.617*** (1.216)	12.105*** (3.479)
Born after reform	9.610*** (1.896)	13.428*** (2.284)	12.460*** (3.396)	19.976*** (6.692)
<i>N</i>	29519	12193	13360	3963
<i>R</i> ²	0.350	0.046	0.054	0.043
<i>Panel B: Mothers of 4-year-olds</i>				
Reform effect	-3.779*** (1.195)	-1.266 (1.298)	-4.498** (1.847)	-5.401 (4.509)
Treated	1.453** (0.620)	-0.585 (0.611)	4.029*** (0.968)	0.746 (2.785)
Born after reform	22.963*** (2.154)	14.663*** (2.532)	22.050*** (3.456)	36.664*** (7.116)
<i>N</i>	36018	15424	15990	4604
<i>R</i> ²	0.353	0.042	0.068	0.050
<i>Panel C: Mothers of 5-year-olds</i>				

	(1) All	(2) Low educ	(3) Medium educ	(4) High educ
<i>Reform effect</i>	1.052 (1.131)	1.899 (1.258)	2.380 (1.758)	-1.254 (4.289)
<i>Treated</i>	-0.130 (0.552)	-0.891 (0.545)	0.723 (0.869)	0.275 (2.589)
<i>Born after reform</i>	12.132*** (1.663)	14.768*** (1.857)	10.387*** (2.646)	13.263** (6.152)
<i>N</i>	40275	17471	17845	4955
<i>R2</i>	0.349	0.040	0.058	0.032
<i>Panel D: Mothers of 6-year-olds</i>				
<i>Reform effect</i>	-0.305 (1.127)	-0.065 (1.287)	3.143* (1.764)	-5.557 (4.274)
<i>Treated</i>	-0.275 (0.519)	0.319 (0.522)	-1.157 (0.821)	0.043 (2.510)
<i>Born after reform</i>	17.373*** (1.450)	14.899*** (1.614)	15.359*** (2.327)	23.497*** (5.655)
<i>N</i>	42968	19053	18859	5053
<i>R2</i>	0.343	0.035	0.050	0.027
<i>Panel E: Mothers of 7-year-olds</i>				
<i>Reform effect</i>	-1.007 (1.246)	-0.398 (1.437)	-0.693 (1.975)	-5.064 (4.599)
<i>Treated</i>	0.730 (0.507)	-0.211 (0.532)	0.314 (0.794)	6.146*** (2.361)
<i>Born after reform</i>	18.575*** (1.245)	19.718*** (1.366)	14.418*** (1.986)	29.425*** (5.179)
<i>N</i>	45677	20256	20202	5216
<i>R2</i>	0.324	0.032	0.041	0.027
<i>Panel F: Mothers of 8-year-olds</i>				
<i>Reform effect</i>	0.497 (1.646)	-4.243** (1.881)	3.774 (2.756)	-7.874 (5.618)
<i>Treated</i>	-0.156 (0.499)	-1.570*** (0.519)	-1.517* (0.808)	11.057*** (2.272)
<i>Born after reform</i>	19.911*** (1.189)	21.592*** (1.315)	13.734*** (1.934)	34.684*** (4.813)
<i>N</i>	47445	21336	20829	5279
<i>R2</i>	0.308	0.034	0.038	0.031

Note: The dependent variable is real hourly average wage observed in the relevant calendar year in the same 3-digit occupation where mother is employed. Sample of employed prime-age mothers. The treatment group consists of mothers whose youngest child is 3, 4, 5, 6, 7, 8-years-old, for each panel respectively. The control group consists of mothers whose children are three to four years older than the treated mothers' children and are born before 2006. Control variables include mother's age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with a high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 reveals that using average wages of occupations where mothers are employed to quantify their occupational allocation gives qualitatively similar results to those obtained using the high-skill occupation status as the dependent variable, however the wage results are less precisely estimated.²² Nevertheless, the pattern of negative estimates for medium-educated mothers of three- and four-year-old children and positive estimates for medium-educated mothers of school-age children is identified also here. The positive effect of the reform on medium-educated mothers of school-aged children is about three to four Czech crowns, what corresponds to about 2% of the average occupation wage.

4.4. Discussion

The above-presented results reveal a consistent pattern. It appears that in response to the reform medium educated mothers of three- and four-year-old children are less often observed in high-skilled or high-paying occupations, while medium educated mothers of school-aged children are more often observed in high-skilled or high-paying occupations. These results might be driven by several factors.

First, the skill-composition of employed mothers might have changed with the reform. Second, mothers returning to the labor market sooner after childbirth might accumulate more tenure with their current employer by the time they are captured by this analysis than mothers returning later. Third, mothers returning to the labor market sooner after childbirth lose less of their human capital during the time off than mothers returning later.²³ The design of the reform and different

²² Lower precision of estimates using the average occupation wage as the dependent variable may be driven by the fact that in some occupations wages are more compressed, while in others wages are highly dispersed and their distribution is possibly skewed, what limits the representativeness of the average wage.

²³ Increased representation of the employed mothers in high-skill occupations might be also a consequence of better positions held before childbirth. When the expected time spent out of employment after childbirth is shortened, more future mothers might sort to skill-demanding occupations. However, for this effect to be observed in the data a longer observation period would be needed. Currently available data only allows to test whether the

pieces of evidence provided in this paper provide partial guidance with respect to these potential channels.

Recall that for the vast majority of mothers the reform created strong incentives to collect parental benefits over the period of three years rather than four, as before the reform. As was documented in Section 5.2 this has significantly increased maternal employment levels at three and four years after childbirth. Employment rates among high-school educated mothers with school-aged children were not affected. Moreover, as the analysis in Section 5.1 reveals, these were mothers with less than college education holding low-skill positions before childbirth who were mainly motivated by the reform to shorten their parental leave duration. Consequently, the skill composition of employed mothers with young children differs between pre- and post-reform periods with more low-skilled mothers observed in employment after the reform. This composition effect might be the main reason why after the reform a lower share of employed three- and four-year-olds' mothers is observed in a high-skill positions. The composition effect could also pertain to older child ages if lower-skilled mothers activated by the reform maintain higher employment rates than before the reform as their children get older. This, however, seems not to be the case.

After the reform we observe the increased probability that a high-school educated working mom is observed in a high-skill occupation seven and eight years after childbirth. At the same time employment rates among mothers of seven- and eight-year-olds were not affected by the reform. This suggests that the observed change in occupational allocation is not driven by different composition of mothers observed in employment, but rather by higher level of work-related skills

reform has affected occupational allocation of young childless women. A difference-in-differences analysis using either young childless men or older women as control groups does not identify any change in occupational allocation of young women in response to the reform (results available on request).

possessed by the affected mothers. This could be attributed to a longer period of post-birth human capital accumulation while employed or a shorter period of human capital depreciation while on leave among mothers returning to the labor market earlier.²⁴ The available data does not allow for disentangling these two channels.

The above findings extend the relevant literature in several dimensions. First, I show that although employment effects of shortened parental leave perish few years after childbirth — similar conclusion is reached by Schonberg and Ludsteck (2014) and by Dahl et al. (2018)— the effects on maternal occupational allocation persist at least until the early school years of their children. Such medium-run effects of the time spent on the parental leave have not yet been documented in the related literature, which has so far only explored the relationship between the length of the childcare leave and maternal employment rates or wages finding either zero or minor medium-run effects (Lalive and Zweimuller, 2009; Schonberg and Ludsteck, 2014; Dahl et al., 2016).

Second, the results presented in this paper speak to the discussion of gender occupational segregation (Blau and Kahn, 2017). I show that the time spent on parental leave does to a significant extent influence occupational allocation of mothers several years after childbirth. This implies that not only specific requirements towards job amenities but also employment breaks can explain occupational segregation by gender.

²⁴ Observing more mothers of school-aged children in high-skill occupations might be also driven by increased pre-leave sorting to high-skill occupations.

5. Conclusion

In this paper I analyze the relationship between the parental leave length and mothers' careers as revealed through their occupational allocation taking advantage of a reform of the parental benefit system in the Czech Republic that effectively shortened the period of parental benefit collection.

The analysis is performed in two steps. First, I show that the reform has motivated a significant share of mothers to resume work earlier than they would have before the reform. This is in line with previous studies (Bicakova and Kaliskova 2016; Mullerova 2016) showing that Czech mothers are responsive to changes in the parental benefit system even if the length of job-protected parental leave remains unchanged. Second, I estimate the intention-to-treat (ITT) effects of shortened time spent on parental leave in mothers' occupational allocation. Occupational allocation is quantified using two measures: the high-skill indicator of an occupation or by the average level of occupation-specific hourly wage.

I show that medium-educated mothers affected by the reform are on average employed in lower-skilled and less-paying occupations just after the leave than mothers not affected by the reform. It is argued in the paper that this might be driven by the composition of mothers who were motivated by the reform to shorten their parental leave. Medium-run effects of the reform appear to be positive in that medium-educated mothers of seven-year-olds have four percentage points higher and mothers of eight-year-olds seven percentage points higher probability of being employed in a high-skilled occupation than before the reform. It remains to be investigated whether these effects pertain till higher child ages.

The presented results suggest that the time spent on parental leave does affect mothers' careers several years after childbirth. This finding is important from the policy perspective, especially in the context of population ageing and increased pressure on the working population to save for

their future retirement. Motivating mothers to spend less time off the labor market after childbirth might improve their labor market position, earnings and future retirement.

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References

Adda, Jerome, Christian Dustman, and Katrien Stevens (2017). “The Career Cost of Children”, *Journal of Political Economy*, 125(2), 293-337.

Akgunduz Y.E. and Plantenga J. (2013) Labour market effects of parental leave in Europe, *Cambridge Journal of Economics*, 37, pp. 845-862.

Baert, S., Cockx, B., & Verhaest, D. (2013). Overeducation at the start of the career: stepping stone or trap?. *Labour Economics*, 25, 123-140.

Bicakova, A., & Kaliskova, K. (2016). Career Breaks after Childbirth: The Impact of Family Leave Reforms in the Czech Republic (No. 10149). Institute for the Study of Labor (IZA).

Blau, F. D., & Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3), 789-865.

Chevalier A, 2003. Measuring over-education, *Economica*, 70: 509–531.

Dahl, G. B., Løken, K. V., Mogstad, M., & Salvanes, K. V. (2016). What is the case for paid maternity leave?. *Review of Economics and Statistics*, 98(4), 655-670.

Edin, P. A., & Gustavsson, M. (2008). Time out of work and skill depreciation. *ILR Review*, 61(2), 163-180.

Grolich D., de Grip A. (2009) Human capital depreciation during hometime, *Oxford Economic Papers*, 91: i98-i121.

Haskova H., Gyóry A., Szikra D. (2012) How did we get the ‘magic 3’? The timing of parental leaves and child care services in the Visegrád-countries, mimeo.

Lai, Y. C., & Masters, S. (2005). The effects of mandatory maternity and pregnancy benefits on women's wages and employment in Taiwan, 1984–1996. *ILR Review*, 58(2), 274-281.

Lalive R., Zweimuller J. (2009) How Does Parental Leave Affect Fertility And Return To Work? Evidence From Two Natural Experiments, *The Quarterly Journal of Economics*, 1363-1402.

Mincer J., Polachek S. W. (1978), The theory of human capital and the earnings of women: Women's earnings reexamined, *The Journal of Human Resources* 13(1), 118-134.

Mullerova, A. (2016). Mind the employment gap: an impact evaluation of the Czech “multi-speed” parental benefit reform. *EconomiX Working Paper* 2016-30.

Mullerova, A. (2017). Family policy and maternal employment in the Czech transition: a natural experiment. *Journal of Population Economics*, 1-26.

Olivetti, C., & Petrongolo, B. (2017). The economic consequences of family policies: lessons from a century of legislation in high-income countries. *Journal of Economic Perspectives*, 31(1), 205-30.

Polachek, S. W. (1981). Occupational self-selection: A human capital approach to sex differences in occupational structure. *The review of Economics and Statistics*, 60-69.

Puhani, P. A., & Sonderhof, K. (2011). The effects of parental leave extension on training for young women. *Journal of Population Economics*, 24(2), 731-760.

Schonberg, U., Ludsteck, J. (2014) Expansions in Maternity Leave Coverage and Mothers' Labor Market Outcomes after Childbirth. *Journal of Labor Economics*, 32(3): 469-505.

Appendix to the paper

**Parental Leave Length and Mothers' Careers:
What Can Be Inferred from Occupational Allocation?**

APPENDIX A: STRUCTURE OF THE INTERNATIONAL STANDARD CLASSIFICATION OF OCCUPATIONS (ISCO-08)

Major and sub-major groups

1 Managers

- 11 Chief Executives, Senior Officials and Legislators
- 12 Administrative and Commercial Managers
- 13 Production and Specialized Services Managers
- 14 Hospitality, Retail and Other Services Managers

2 Professionals

- 21 Science and Engineering Professionals
- 22 Health Professionals
- 23 Teaching Professionals
- 24 Business and Administration Professionals
- 25 Information and Communications Technology Professionals
- 26 Legal, Social and Cultural Professionals

3 Technicians and Associate Professionals

- 31 Science and Engineering Associate Professionals
- 32 Health Associate Professionals
- 33 Business and Administration Associate Professionals
- 34 Legal, Social, Cultural and Related Associate Professionals
- 35 Information and Communications Technicians

4 Clerical Support Workers

- 41 General and Keyboard Clerks
- 42 Customer Services Clerks
- 43 Numerical and Material Recording Clerks
- 44 Other Clerical Support Workers

5 Services and Sales Workers

- 51 Personal Services Workers
- 52 Sales Workers

53 Personal Care Workers

54 Protective Services Workers

6 Skilled Agricultural, Forestry and Fishery Workers

61 Market-oriented Skilled Agricultural Workers

62 Market-oriented Skilled Forestry, Fishery and Hunting Workers

63 Subsistence Farmers, Fishers, Hunters and Gatherers

7 Craft and Related Trades Workers

71 Building and Related Trades Workers (excluding Electricians)

72 Metal, Machinery and Related Trades Workers

73 Handicraft and Printing Workers

74 Electrical and Electronic Trades Workers

75 Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers

8 Plant and Machine Operators and Assemblers

81 Stationary Plant and Machine Operators

82 Assemblers

83 Drivers and Mobile Plant Operators

9 Elementary Occupations

91 Cleaners and Helpers

92 Agricultural, Forestry and Fishery Labourers

93 Labourers in Mining, Construction, Manufacturing and Transport

94 Food Preparation Assistants

95 Street and Related Sales and Services Workers

96 Refuse Workers and Other Elementary Workers

0 Armed Forces Occupations

01 Commissioned Armed Forces Officers

02 Non-commissioned Armed Forces Officers

03 Armed Forces Occupations, Other Ranks

APPENDIX B: Detailed methodology outline

B1. Before-after analysis of the effect of the reform on parental leave length

I take advantage of the panel subsample of the available data to conduct a simple before-after analysis of the relationship between the reform and parental leave length. Unlike in the full sample, in a panel subsample parental leave length can be retrieved provided the mother is observed during transition from leave to labor market activity. Using these data, I estimate the following equation:

$$leave_length_{it} = X_{it}\beta + after_t + \varepsilon_{it}, \quad (2)$$

where $leave_length_{it}$ measures the time since birth of the youngest child till terminating parental leave in years with precision to a quarter, X_{it} captures control variables such as age of the mother, her education level, marital status and total number of children, $after_t$ is a dummy equal to one for all mothers whose youngest children were born in or after 2008 and zero for mothers whose youngest children were born before 2006, and ε_{it} is the idiosyncratic shock. As the reform has also to some extent affected mothers whose children were born in 2007 and 2006 – either because they could not choose from all the available options of parental benefit payments, or because they were not fully aware of their options – I exclude mothers with children born in these years from the analysis. However, a robustness check including mothers of children born in the second half of 2007 shows similar results.

B2. Difference-in-differences analysis of the effect of the reform on mothers' employment rates, high-skill occupation status and average occupation wage

Difference-in-differences analysis is used in this paper to identify the relationship between the time spent on parental leave and mothers' labor market outcomes such as employment status and

occupational allocation. For each of these outcomes the identification strategy is the same and can be summarized by the following equation:

$$y_{it} = \beta_0 + X_{it}\beta + \gamma_1 treat_i + \gamma_2 after_t + \gamma_3(treat_i \times after_t) + \delta_t + \varepsilon_{it}, \quad (1)$$

where y_{it} is the analyzed outcome (employment dummy, high-skill status of occupation, or occupation-year-specific average wage) for mother i in period t , X_{it} captures control variables such as age of the mother, her education level, marital status and total number of children, $treat_i$ is a treatment dummy equal to one for treated mothers, i.e. mothers of 3-, 4-, 5-, 6-, 7- or 8-year olds, depending on the analyzed cohort; $after_t$ is a dummy indicating the post-reform period (i.e. treated mothers with children born after January 1, 2008 and control mothers observed in the same calendar years as the treated mothers)²⁵, δ_t represents calendar year fixed effects, and ε_{it} captures the idiosyncratic shock.

Inclusion of a treatment group in the analysis is expected to capture time-specific changes in the labor market that affect the analyzed group of mothers and are independent of the reform. Thus, the control group should be as similar as possible to the treatment group and not be affected by the reform. In the baseline specification the control group specific for each treatment group is used. It is composed of mothers whose children are three to four years older than the treated mothers' children and are born before 2006. Mothers with older children must be used in the context of this analysis, because the investigated reform affected all mothers with children born after January 1, 2008.

²⁵ Example: When analyzing the effects of the reform on mothers of 3-year-olds, the treatment group is composed of mothers of three-year olds and control group is composed of mothers of 6-7 year olds in any year. The dummy $after_t$ takes value 1 for observation years 2011 and 2012, and value 0 for observation years 2008 and earlier. Years 2009 and 2010 are omitted from the analysis because this is when 3-year-old children born in 2006 and 2007, who were partially affected by the reform, are observed.

Using mothers whose youngest children are just few years older than the treated mothers' children assures similarity between the treated and control group mothers. However, this approach allows for including only two post-reform years for each treatment group in the analysis and does not allow for direct comparability of results across treatment groups. As the reform has also to some extent affected mothers whose children were born in 2007 and 2006 – either because they could not choose from all the available options of parental benefit payments, or because they were not fully aware of their options – they cannot be included in the control group. I also exclude these mothers from the treatment group in the baseline specification. Table B1 below summarizes treatment and control groups used in the baseline analysis. In robustness checks mothers of children born in the second half of 2007, who in principle could fully benefit from the reform, are added to the treated post-reform group. In another robustness specification mothers of all children born in 2006 and 2007 are added to the treated post-reform group. The results of these analyses are qualitatively the same as the baseline results (available on request from the author).

Table B1: Summary of treatment and control groups used in the baseline analysis

Treated mothers (defined by their youngest child age)	Control mothers (defined by their youngest child age)	Pre-reform years	Post-reform years
3	6-7	2002, 2003, 2004, 2005, 2006, 2007, 2008	2011, 2012*
4	7-8	2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009	2012, 2013*
5	8-9	2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010	2013, 2014*
6	9-10	2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011	2014, 2015*
7	10-11	2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012	2015, 2016*
8	11-12	2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013	2016

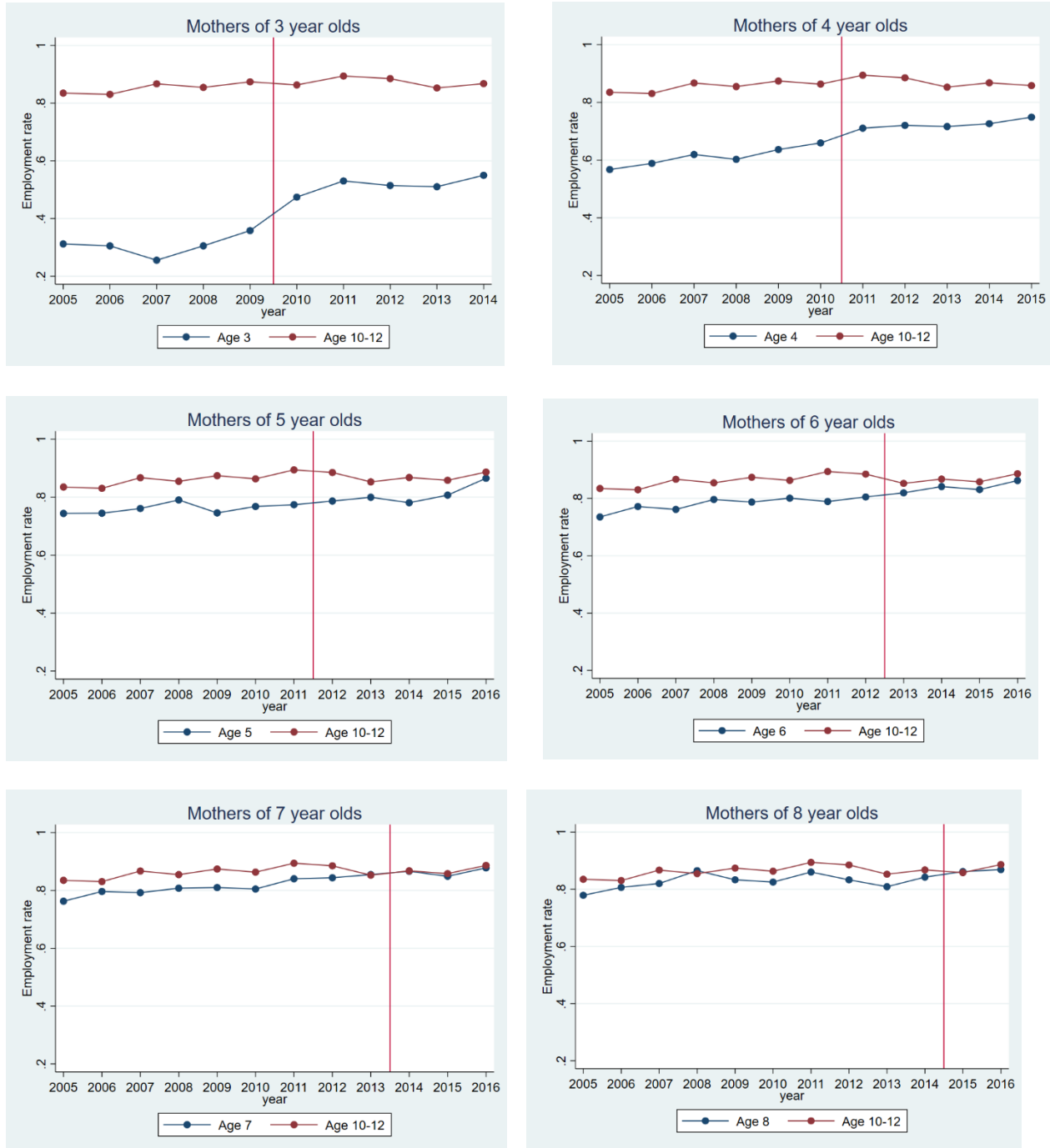
* the youngest age cohort of control mothers is excluded in this year, as their children were born in the partially affected year 2006

In a sensitivity analysis an alternative control group is used. It is the same for all treatment groups, to assure comparability, and consists of mothers whose youngest child is 10–12 years old. This group of mothers was not eligible for a parental leave both before and after the reform. Moreover, over the entire analyzed period children aged 10–12 were born before the reform²⁶. All children in this age group are in compulsory school education for several years and their mothers' employment rates correspond to childless women's employment rates (see the Appendix Figure C2). Finally, while labor market outcomes of mothers with 10–12-year-old children are different than labor markets outcomes of mothers with younger children, we observe a parallel evolution of their outcomes before the reform. This is verified by a series of regressions with interactions between treatment dummy and pre-treatment year dummies as in Autor (2003).

²⁶ Children born in 2006, i.e. in the first birth cohort that was partially affected by the reform, were ten years old in 2016. Mothers whose youngest child is 10 in 2016 are excluded from the control group in 2016.

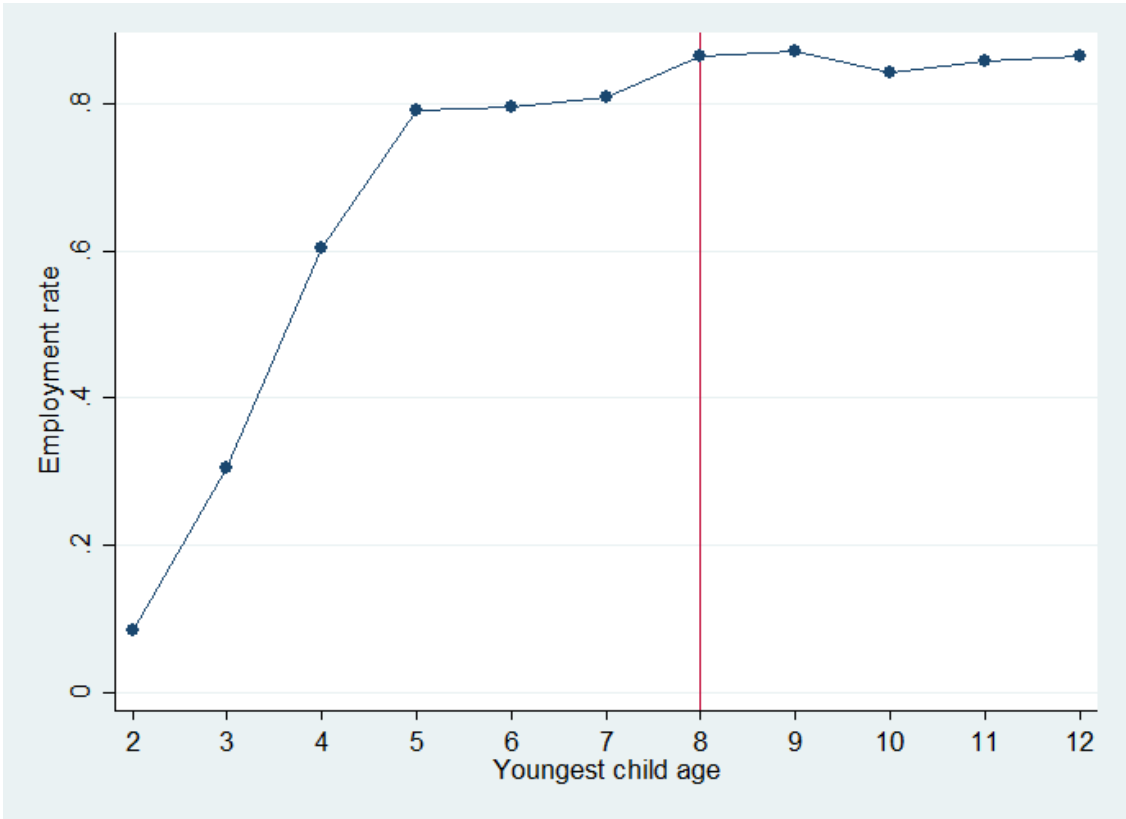
APPENDIX C: Additional Figures

Figure C1: Graphic analysis of maternal employment rates



Note: Each panel plots evolution of average employment rates of prime-age mothers whose youngest child belongs to the indicated age category (blue line) and prime-age control mothers whose youngest children are 8-12 years old (red line). Vertical lines indicate the year after which blue-line mothers are affected by the reform of parental benefits system.

Figure C2: Pre-reform employment rates of mothers by youngest child age



Note: Graph plots employment rates of prime age mothers observed in years 2002-2007 by the age if their youngest child. Statistics based on Czech Labor Force Survey microdata.

APPENDIX D: Additional Tables

Table D1: Testing for common pre-treatment trend assumption in the probability of working in a high-skill occupation regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Treated mothers whose youngest child is					
	8-year-old	7-year-old	6-year-old	5-year-old	4-year-old	3-year-old
Treated	0.038** (0.018)	0.055*** (0.018)	0.037** (0.018)	0.084*** (0.018)	0.143*** (0.018)	0.200*** (0.022)
Treated x (-10)	0.037 (0.027)					
Treated x (-9)	0.004 (0.025)	-0.016 (0.027)				
Treated x (-8)	-0.026 (0.025)	0.029 (0.025)	-0.040 (0.027)			
Treated x (-7)	0.044* (0.025)	0.057** (0.025)	-0.062** (0.025)	-0.081*** (0.027)		
Treated x (-6)	0.063** (0.025)	0.023 (0.025)	0.047* (0.025)	-0.056** (0.025)	-0.101*** (0.029)	
Treated x (-5)	0.008 (0.025)	0.046* (0.025)	0.007 (0.025)	-0.007 (0.025)	-0.096*** (0.026)	-0.062* (0.034)
Treated x (-4)	-0.013 (0.025)	-0.053** (0.025)	-0.020 (0.025)	-0.043* (0.025)	-0.033 (0.026)	-0.048 (0.032)
Treated x (-3)	-0.008 (0.025)	0.025 (0.025)	-0.003 (0.025)	-0.009 (0.025)	-0.007 (0.026)	-0.003 (0.031)
Treated x (-2)	-0.003 (0.026)	0.016 (0.025)	0.071*** (0.025)	0.001 (0.025)	-0.038 (0.026)	-0.018 (0.032)
Year (-10)	0.061*** (0.014)					
Year (-9)	0.062*** (0.013)	0.089*** (0.013)				
Year (-8)	0.069*** (0.013)	0.090*** (0.012)	0.095*** (0.013)			
Year (-7)	0.042*** (0.013)	0.076*** (0.012)	0.090*** (0.013)	0.011 (0.012)		
Year (-6)	0.033** (0.013)	0.066*** (0.013)	0.056*** (0.013)	0.004 (0.013)	0.009 (0.010)	
Year (-5)	0.036*** (0.013)	0.068*** (0.013)	0.082*** (0.013)	-0.011 (0.013)	-0.007 (0.014)	-0.011 (0.013)
Year (-4)	0.057*** (0.013)	0.073*** (0.013)	0.086*** (0.013)	0.001 (0.013)	0.014 (0.014)	0.014 (0.013)
Year (-3)	0.020 (0.013)	0.063*** (0.013)	0.067*** (0.013)	0.013 (0.014)	0.008 (0.013)	0.053*** (0.013)
Year (-2)	-0.028* (0.013)	0.046*** (0.013)	0.054*** (0.013)	-0.040*** (0.013)	0.010 (0.014)	0.024* (0.013)
Year (-1)	-0.029** (0.013)	0.013 (0.013)	0.042*** (0.013)	-0.026* (0.014)	-0.042*** (0.013)	0.013 (0.013)
<i>N</i>	47622	43436	39006	34758	29935	23564
<i>R</i> ²	0.030	0.035	0.038	0.042	0.052	0.065

Note: The dependent variable is dummy for working in a high-skilled occupation (occupation belonging to broad ISCO category 1-3). Sample of employed prime-age mothers with high school diploma observed before the reform. The treatment (*Treated*) group consists of mothers whose youngest child is 3, 4, 5, 6, 7 or 8-years-old, for each column respectively. The control group consists of mothers whose children are three to four years older than the treated mothers' children and are born before 2006. Year dummies correspond to distance to the year when treatment group becomes affected by the reform. Control variables include mother's age, total number of children, and marital status. Standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D2: Testing for common pre-treatment trend assumption in average occupation wage regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Treated mothers whose youngest child is					
	8-year-old	7-year-old	6-year-old	5-year-old	4-year-old	3-year-old
Treated	4.606** (1.927)	6.862*** (1.874)	3.728** (1.861)	9.127*** (1.811)	9.855*** (1.856)	17.737*** (2.185)
Treated x (-10)	-3.771 (2.677)					
Treated x (-9)	-5.324* (2.746)	-2.772 (2.643)				
Treated x (-8)	-1.337 (2.725)	-1.022 (2.655)	-5.260** (2.595)			
Treated x (-7)	2.133 (2.750)	-4.067 (2.611)	1.060 (2.589)	-7.826*** (2.773)		
Treated x (-6)	-0.744 (2.700)	4.177 (2.647)	-0.512 (2.614)	-3.298 (2.590)	-5.967** (2.918)	
Treated x (-5)	-2.889 (2.757)	-3.922 (2.623)	-0.026 (2.641)	-3.125 (2.550)	-0.584 (2.646)	-5.764* (3.476)
Treated x (-4)	-3.455 (2.720)	1.240 (2.662)	-3.305 (2.622)	-2.866 (2.577)	-1.469 (2.662)	4.020 (3.240)
Treated x (-3)	0.444 (2.752)	-2.044 (2.650)	4.996* (2.625)	-2.436 (2.582)	-3.799 (2.633)	-4.200 (3.165)
Treated x (-2)	-0.461 (2.754)	1.943 (2.657)	5.062* (2.579)	-1.781 (2.542)	-0.725 (2.633)	2.614 (3.197)
Year (-10)	-4.992*** (1.464)					
Year (-9)	-6.048*** (1.367)	-3.932*** (1.408)				
Year (-8)	-0.353 (1.367)	-2.955** (1.306)	5.305*** (1.408)			
Year (-7)	2.270 (1.400)	0.604 (1.315)	0.533 (1.349)	10.134*** (1.397)		
Year (-6)	6.781*** (1.412)	5.321*** (1.360)	2.757** (1.364)	1.022 (1.384)	-4.233*** (1.456)	
Year (-5)	6.759*** (1.439)	8.369*** (1.367)	9.796*** (1.390)	4.050*** (1.394)	-2.118 (1.373)	-15.352*** (1.352)
Year (-4)	9.302*** (1.441)	9.736*** (1.371)	13.546*** (1.404)	9.754*** (1.392)	3.749*** (1.384)	-14.390*** (1.252)
Year (-3)	4.692*** (1.441)	9.909*** (1.367)	14.142*** (1.385)	16.470*** (1.406)	8.262*** (1.367)	-8.774*** (1.239)
Year (-2)	-2.833* (1.441)	6.746*** (1.367)	13.548*** (1.385)	14.011*** (1.406)	15.927*** (1.367)	-4.669*** (1.239)

	(1.431)	(1.373)	(1.394)	(1.383)	(1.383)	(1.232)
Year (-1)	-4.293***	0.072	9.882***	14.825***	11.527***	-3.772***
	(1.427)	(1.371)	(1.394)	(1.404)	(1.365)	(1.278)
<i>N</i>	44629	40643	36521	32482	27936	22023
<i>R</i> ²	0.038	0.048	0.060	0.072	0.085	0.097

Note: The dependent variable is average wage observed in the relevant calendar year in the same 3-digit occupation where mother is employed. Sample of employed prime-age mothers with high school diploma observed before the reform. The treatment (*Treated*) group consists of mothers whose youngest child is 2, 3, 4, 5, or 6-years-old, for each column respectively. The control group is the same across columns and it consists of mothers of 8-12 year olds. Year dummies correspond to distance to the year when treatment group becomes affected by the reform. Control variables include mother's age, total number of children, and marital status. Standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D3: Difference-in-differences estimates of the effect of the reform on maternal employment rates by the age of the youngest child – alternative treatment definition

	(2) All	(3) Low educ	(4) Medium educ	(5) High educ
<i>Panel A: Mothers of 3-year-olds</i>				
Reform effect	0.212*** (0.013)	0.163*** (0.021)	0.221*** (0.020)	0.229*** (0.033)
Treated	-0.567*** (0.009)	-0.601*** (0.013)	-0.555*** (0.014)	-0.475*** (0.027)
Born after reform	0.019 (0.014)	0.002 (0.028)	0.037** (0.017)	0.043 (0.027)
<i>N</i>	62746	28310	26297	8137
<i>R</i> ²	0.291	0.275	0.281	0.228
<i>Panel B: Mothers of 4-year-olds</i>				
Reform effect	0.125*** (0.013)	0.098*** (0.024)	0.130*** (0.020)	0.102*** (0.027)
Treated	-0.271*** (0.009)	-0.303*** (0.015)	-0.257*** (0.014)	-0.196*** (0.023)
Born after reform	0.029** (0.014)	0.021 (0.027)	0.037** (0.018)	0.044* (0.026)
<i>N</i>	61685	28087	25504	8093
<i>R</i> ²	0.115	0.084	0.079	0.059
<i>Panel C: Mothers of 5-year-olds</i>				
Reform effect	0.050*** (0.013)	0.047* (0.024)	0.045** (0.018)	0.049** (0.025)
Treated	-0.118*** (0.008)	-0.133*** (0.014)	-0.110*** (0.012)	-0.090*** (0.018)
Born after reform	0.040*** (0.013)	0.036 (0.025)	0.054*** (0.017)	0.025 (0.025)
<i>N</i>	61105	27938	25332	7832
<i>R</i> ²	0.059	0.022	0.019	0.023
<i>Panel D: Mothers of 6-year-olds</i>				
Reform effect	0.057*** (0.014)	0.087*** (0.026)	0.038** (0.019)	0.013 (0.024)
Treated	-0.101*** (0.008)	-0.126*** (0.013)	-0.084*** (0.010)	-0.054*** (0.016)
Born after reform	0.035*** (0.013)	0.026 (0.026)	0.054*** (0.017)	0.016 (0.024)
<i>N</i>	60706	28195	25012	7498
<i>R</i> ²	0.057	0.021	0.013	0.015
<i>Panel E: Mothers of 7-year-olds</i>				
Reform effect	0.048*** (0.015)	0.112*** (0.029)	0.010 (0.020)	-0.013 (0.026)
Treated	-0.073*** (0.007)	-0.105*** (0.012)	-0.051*** (0.009)	-0.034** (0.013)
Born after reform	0.027** (0.013)	0.005 (0.027)	0.058*** (0.016)	0.018 (0.023)
<i>N</i>	60407	28039	25101	7266
<i>R</i> ²	0.053	0.016	0.010	0.011

	(2) All	(3) Low educ	(4) Medium educ	(5) High educ
<i>Panel F: Mothers of 8-year-olds</i>				
<i>Reform effect</i>	0.017 (0.020)	0.081** (0.038)	-0.034 (0.029)	-0.016 (0.024)
<i>Treated</i>	-0.045*** (0.007)	-0.059*** (0.011)	-0.041*** (0.009)	-0.008 (0.011)
<i>Born after reform</i>	0.025* (0.014)	0.002 (0.029)	0.047*** (0.017)	0.040* (0.023)
<i>N</i>	59707	27959	24752	6995
<i>R2</i>	0.049	0.013	0.007	0.007

Note: The dependent variable is dummy for employment as the main labor force status. The treatment group consists of mothers whose youngest child is 3, 4, 5, 6, 7, 8-years-old, for each panel respectively. The control group is the same across panels and it consists of mothers of 10-12 year olds. Control variables include mother's age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D4: Difference-in-differences estimates of the effect of the reform on high-skill occupation status of employed mothers by the age of the youngest child – alternative treatment definition

	(1) All	(2) Low educ	(3) Medium educ	(4) High educ
<i>Panel A: Mothers of 3-year-olds</i>				
<i>Reform effect</i>	-0.022** (0.010)	0.026** (0.012)	-0.038** (0.018)	-0.012 (0.018)
<i>Treated</i>	0.031*** (0.008)	-0.026*** (0.009)	0.064*** (0.014)	0.023 (0.015)
<i>Born after reform</i>	-0.120*** (0.011)	-0.037*** (0.011)	-0.229*** (0.020)	-0.030 (0.021)
<i>N</i>	44607	17776	20053	6777
<i>R2</i>	0.381	0.010	0.035	0.017
<i>Panel B: Mothers of 4-year-olds</i>				
<i>Reform effect</i>	-0.007 (0.008)	0.023** (0.009)	-0.030* (0.016)	0.004 (0.015)
<i>Treated</i>	0.008 (0.006)	-0.021*** (0.006)	0.038*** (0.011)	-0.002 (0.013)
<i>Born after reform</i>	-0.108*** (0.010)	-0.046*** (0.010)	-0.203*** (0.019)	-0.014 (0.019)
<i>N</i>	48807	19790	21652	7364
<i>R2</i>	0.384	0.009	0.042	0.019
<i>Panel C: Mothers of 5-year-olds</i>				
<i>Reform effect</i>	-0.003 (0.008)	0.003 (0.009)	0.012 (0.016)	-0.045*** (0.015)
<i>Treated</i>	0.001 (0.005)	-0.012** (0.005)	0.011 (0.010)	0.005 (0.011)

Born after reform	-0.126*** (0.009)	-0.043*** (0.010)	-0.226*** (0.018)	-0.056*** (0.018)
<i>N</i>	50549	20861	22359	7326
<i>R2</i>	0.383	0.010	0.037	0.024
<i>Panel D: Mothers of 6-year-olds</i>				
Reform effect	0.019** (0.009)	0.007 (0.010)	0.052*** (0.017)	-0.033** (0.016)
Treated	-0.002 (0.005)	-0.005 (0.005)	0.002 (0.009)	0.003 (0.011)
Born after reform	-0.116*** (0.009)	-0.035*** (0.010)	-0.224*** (0.018)	-0.032* (0.018)
<i>N</i>	50683	21349	22273	7060
<i>R2</i>	0.385	0.010	0.032	0.020
<i>Panel E: Mothers of 7-year-olds</i>				
Reform effect	0.013 (0.010)	0.018 (0.012)	0.025 (0.020)	-0.017 (0.017)
Treated	0.012*** (0.004)	0.003 (0.005)	0.019** (0.009)	0.014 (0.009)
Born after reform	-0.118*** (0.009)	-0.037*** (0.010)	-0.219*** (0.018)	-0.043** (0.018)
<i>N</i>	50873	21461	22543	6868
<i>R2</i>	0.384	0.007	0.030	0.017
<i>Panel F: Mothers of 8-year-olds</i>				
Reform effect	0.038*** (0.014)	0.003 (0.016)	0.074*** (0.028)	0.005 (0.022)
Treated	0.007 (0.004)	-0.002 (0.004)	0.017** (0.008)	0.006 (0.009)
Born after reform	-0.114*** (0.010)	-0.031*** (0.011)	-0.224*** (0.020)	-0.028 (0.018)
<i>N</i>	50576	21627	22279	6669
<i>R2</i>	0.383	0.005	0.028	0.012

Note: The dependent variable is dummy for working in a high-skilled occupation (occupation belonging to broad ISCO category 1-3). Sample of employed prime-age mothers. The treatment group consists of mothers whose youngest child is 3, 4, 5, 6, 7, 8-years-old, for each panel respectively. The control group is the same across panels and it consists of mothers of 10-12 year olds. Control variables include mother's age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D5: Difference-in-differences estimates of the effect of the reform on average occupation wage of employed mothers by the age of the youngest child – alternative treatment definition

	(1) All	(2) Low educ	(3) Medium educ	(4) High educ
<i>Panel A: Mothers of 3-year-olds</i>				
Reform effect	-2.322* (1.218)	0.636 (1.427)	-1.398 (1.852)	-10.903** (4.436)
Treated	3.466*** (0.955)	-1.592 (1.059)	3.802*** (1.431)	16.449*** (3.865)
Born after reform	20.764*** (1.288)	21.429*** (1.319)	14.845*** (2.059)	38.133*** (5.230)
<i>N</i>	41888	17554	18772	5561
<i>R</i> ²	0.295	0.033	0.031	0.027
<i>Panel B: Mothers of 4-year-olds</i>				
Reform effect	-1.688* (0.998)	-0.479 (1.088)	-2.586 (1.584)	-4.969 (3.737)
Treated	-0.049 (0.706)	-2.581*** (0.699)	0.957 (1.118)	7.041** (3.133)
Born after reform	21.318*** (1.177)	19.140*** (1.219)	17.066*** (1.897)	42.643*** (4.709)
<i>N</i>	45821	19523	20305	5993
<i>R</i> ²	0.302	0.033	0.041	0.035
<i>Panel C: Mothers of 5-year-olds</i>				
Reform effect	-1.999** (0.978)	-0.215 (1.066)	1.460 (1.559)	-14.730*** (3.750)
Treated	-1.208* (0.621)	-2.293*** (0.615)	-1.972** (0.989)	7.076** (2.893)
Born after reform	19.267*** (1.113)	19.465*** (1.165)	14.769*** (1.789)	36.278*** (4.633)
<i>N</i>	47473	20598	20959	5913
<i>R</i> ²	0.301	0.038	0.036	0.027
<i>Panel D: Mothers of 6-year-olds</i>				
Reform effect	-2.777*** (1.064)	-2.847** (1.194)	3.620** (1.698)	-19.093*** (4.018)
Treated	-1.026* (0.573)	-0.913 (0.573)	-2.882*** (0.915)	6.609** (2.723)
Born after reform	20.537*** (1.121)	20.257*** (1.192)	14.819*** (1.802)	38.154*** (4.733)
<i>N</i>	47587	21063	20832	5691
<i>R</i> ²	0.302	0.037	0.036	0.029
<i>Panel E: Mothers of 7-year-olds</i>				
Reform effect	-3.086** (1.226)	-1.521 (1.401)	-1.874 (1.988)	-13.083*** (4.359)
Treated	0.248 (0.534)	-0.972* (0.554)	-0.817 (0.861)	9.555*** (2.385)
Born after reform	20.634*** (1.133)	21.425*** (1.227)	14.829*** (1.854)	37.921*** (4.590)
<i>N</i>	47707	21154	21063	5489
<i>R</i> ²	0.303	0.035	0.035	0.034

	(1) All	(2) Low educ	(3) Medium educ	(4) High educ
<i>Panel F: Mothers of 8-year-olds</i>				
<i>Reform effect</i>	0.497 (1.646)	-4.243** (1.881)	3.774 (2.756)	-7.874 (5.618)
<i>Treated</i>	-0.156 (0.499)	-1.570*** (0.519)	-1.517* (0.808)	11.057*** (2.272)
<i>Born after reform</i>	19.911*** (1.189)	21.592*** (1.315)	13.734*** (1.934)	34.684*** (4.813)
<i>N</i>	47445	21336	20829	5279
<i>R2</i>	0.308	0.034	0.038	0.031

Note: The dependent variable is average wage observed in the relevant calendar year in the same 3-digit occupation where mother is employed. Sample of employed prime-age mothers. The treatment group consists of mothers whose youngest child is 3, 4, 5, 6, 7, 8-years-old, for each panel respectively. The control group is the same across panels and it consists of mothers of 10-12 year olds. Control variables include mother's age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D6: Before-after estimates of reform's effect on maternal employment rates

	(2)	(3)	(4)	(5)
	All	Low educ	Medium educ	High educ
Mothers of 2-year-olds	0.015* (0.008)	0.021** (0.010)	0.017 (0.013)	-0.006 (0.023)
<i>N</i>	19085	7467	8321	3297
<i>R</i> ²	0.028	0.005	0.007	0.016
Mothers of 3-year-olds	0.182*** (0.013)	0.164*** (0.018)	0.209*** (0.020)	0.157*** (0.032)
<i>N</i>	16622	6978	7088	2556
<i>R</i> ²	0.128	0.063	0.059	0.036
Mothers of 4-year-olds	0.090*** (0.013)	0.076*** (0.022)	0.109*** (0.020)	0.078*** (0.027)
<i>N</i>	14179	5999	5825	2354
<i>R</i> ²	0.093	0.036	0.027	0.010
Mothers of 5-year-olds	0.022* (0.013)	0.012 (0.023)	0.028 (0.018)	0.042* (0.025)
<i>N</i>	12304	5099	5168	2037
<i>R</i> ²	0.055	0.019	0.005	0.013
Mothers of 6-year-olds	0.033** (0.014)	0.047* (0.026)	0.031 (0.019)	0.021 (0.026)
<i>N</i>	10393	4350	4341	1702
<i>R</i> ²	0.053	0.014	0.003	0.023
Mothers of 7-year-olds	0.025* (0.015)	0.072** (0.029)	0.017 (0.021)	-0.031 (0.027)
<i>N</i>	8772	3642	3814	1316
<i>R</i> ²	0.051	0.010	0.002	0.029
Mothers of 8-year-olds	-0.016 (0.024)	0.037 (0.042)	-0.057 (0.040)	-0.024 (0.030)
<i>N</i>	7044	2984	3090	970
<i>R</i> ²	0.042	0.002	0.009	0.002

Note: Each row corresponds to a separate regression on a sample of mothers whose youngest child is of the relevant age. The dependent variable is dummy for employment as the main labor force status. The reported coefficients correspond to the “After” variable equal to one for mothers whose youngest child was born in 2008 or later, and zero for mothers whose youngest child was born prior to 2006. Control variables include mother’s age, education level (in column 1 only), total number of children, marital status, and year and quarter fixed effects. Low education group consists of individuals with less than high school diploma (i.e. high school dropouts and apprenticeship school graduates), medium education group consists of individuals with high school diploma, and high education group consists of college-educated individuals. Standard errors reported in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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