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Childcare Availability and Maternal Labour Supply in Russia

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Non-Technical Summary

Public childcare is expected to help mothers maintain a work-family life balance. Indeed, in many countries, empirical evidence shows that an affordable and accessible childcare system can play a significant role in helping mothers of young children to increase their labour force participation, but these findings considerably differ across time and countries. This paper provides new empirical evidence on the relevance of childcare availability for maternal labour supply in the case of Russia, where childcare availability increased from 55% to 66.2% in the time-period 2000-2015.

To evaluate the impact of childcare availability expansion on mothers' labour market outcomes, I rely on the fact that an increase in childcare availability was rolled out unequally across the Russian regions over time – between 2000 and 2015, enrolment rates have increased by less than 1% in some regions and by up to 35% in other regions. This allows me to compare changes in maternal labour supply in regions where childcare availability increased considerably with those where it did not.

The study is based on a combination of survey data from the Russian Longitudinal Monitoring Survey with administrative data on the number of enrolled children at each age in every region provided by the Federal State Statistic Service. To take into account regional factors other than childcare availability that may affect maternal labour supply, I employ rich administrative data, including regional expenditures on different policies and demographic and labour market characteristics.

I find that an increase in childcare availability has positive and statistically significant effects on various maternal labour market outcomes. The estimates imply that the expansion of childcare availability in Russia between 2000 and 2015 has increased maternal labour force participation by 3.4%, maternal employment by 2.9% and maternal full-time employment by 2.2%. I also find that the effect of childcare availability on labour force participation of single mothers is significantly lower than on mothers with partners. This result diverges from results found for other countries, where childcare growth has a significantly higher effect for single mothers or that the effect exists solely for single mothers. A possible explanation is that single mothers in Russia are driven by financial constraints to use informal childcare arrangements to allow them to work. In this case, expanding childcare availability crowds out informal care without significant changes in maternal employment.

Childcare availability and maternal labour supply in Russia

Yuliya Kazakova*

Abstract

Over the past 15 years, Russia experienced an increase in childcare enrolment from 55% to 66.2%, reflecting an increase in childcare availability that was rolled out unequally across the Russian regions - the enrolment rate has increased from less than 1% in some regions to almost 35% in other regions. Exploiting a substantial variation in childcare availability across regions over time, this paper uses the Russian Longitudinal Monitoring Survey to evaluate the impact of extending childcare availability on mothers' labour outcomes. I find that an increase in childcare availability has a positive and significant effect on maternal employment both at the intensive and the extensive margins and the effects are higher for partnered mothers. A set of robustness checks confirm the validity of the identification strategy and the results.

JEL classification: J13, J22

Keywords: Maternal labour supply, public childcare

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1. Introduction

In Russia, the employment rate of women has traditionally been high (in 2016, 73.4% among working-age women). However, like in most developed countries, childbirth interrupts a woman's career. So, after childbirth, a mother has a choice – either to enter/re-enter the labour market or be a stay-at-home parent. A number of factors influence women's decisions. On the one hand, as the child grows, supporting them becomes less time-consuming, but requires more financial investments (Becker, 1964; Mincer and Polachek, 1974). Thus, the need for women to return to the labour market may be caused by their family's level of financial stability. A wide range of studies have shown that in Russia children and families with children are at the highest risk of poverty (Pishnyak and Popova, 2011). Moreover, according to the Federal State Statistic Service of Russian Federation (FSSS), more than half of low-income households are households with children.[1] On the other hand, when taking the decision to enter/re-enter the labour market, a woman faces a number of barriers. In Russia, in particular, there is a lack of part-time or jobs with flexible working hours, mothers receive lower wages compared to childless women (Arzhenovskiy and Artamonova, 2007; Biryukova and Makarentseva, 2017), and there are difficulties with child placement in childcare centres, amongst other issues.

In many countries, the female labour force is significantly influenced by childcare policies. Over the past decades, many developed countries have introduced policies to increase public childcare provision and availability. There are two main goals behind this: first, to help mothers maintain a work-family life balance and, subsequently, to increase their labour force participation and, second, to promote early childcare education and development. Indeed, in many countries, research shows that an affordable and accessible childcare system can play a significant role in helping mothers of young children to increase their labour force participation (Cattan, 2016).

During the last 25 years, the Russian childcare system has been facing many challenges. After the disintegration of the USSR, the number of pre-school organisations offering childcare has decreased significantly from 87,573 in 1991 to 51,329 in 2000.[2] This was partly due to a sharp reduction in the fertility rate and partly due to the financial and economic crisis in the country. Under the Soviet Union, it was common that public sector

[1] Russian statistical yearbook, 2017. http://www.gks.ru/bgd/regl/b17_13/Main.htm

[2] Social and Economic indicators of the Russian Federation www.gks.ru/free_doc/doc_2016/year/pril-year_2016_eng.xls

employers had their own social services such as childcare. However, the crisis, which took place right after the end of the Soviet Union, forced public organisations to abandon social services. Thus, childcare became the responsibility of the local municipalities, and as they did not have enough funds, many nurseries were shut down.

In 2000, the fertility rate in Russia started recovering, but the reduction in childcare provision continued.[3] This implied that the availability of childcare turned out to be one of the most important problems for families with small children. The importance of this problem is reflected in the number of children who are waiting to get a place in childcare: in 2014, 2.8 out of 12.2 million children aged 0-6 were on a waiting list; that is about 1 in 4 children under the age of 6 years.

Due to the large scale of the problem, the government has put efforts into extending childcare availability. From 2000 to 2015, the share of children aged 0-6 covered by childcare services increased from 55.0% to 66.3% or, if these figures are broken down by age groups, increased from 64.1% to 83.4% for children aged between 3 and 6 and slightly decreased from 20.9% to 18.4% for children under the age of 3 years.

The effect of childcare availability on maternal employment has been investigated in many European countries, as well as in the US, Argentina and Israel. However, the literature is scarce on Russia. The history of the USSR and contemporary Russia and its features such as lack of part-time jobs, low enforcement of employment rights for pregnant women and women with young children, relatively low family and maternal benefits and a critical shortage in childcare places make Russia a unique case study that differs from many western countries.

The aim of this paper is to provide new empirical evidence on the relevance of childcare for maternal labour supply in Russia. To evaluate the impact of childcare availability expansion on mothers' labour market outcomes, I rely on the fact that there were no centralised childcare policies in place regarding the increase in childcare availability at the national level and so the regions had to cope with this issue independently. In 2013, the Government launched a program called "The Modernisation of Federal Preschool Childcare System" that mandated full enrolment for preschool education of children aged 3-7, but the regions were fully responsible for drawing federal subsidies and organisational

[3] Social and Economic indicators of the Russian Federation www.gks.ru/free_doc/doc_2016/year/pril-year_2016_eng.xls

implementation of it. This generated a large variation in childcare coverage, both between regions and across time – during the last 15 years enrolment rates have increased by less than 1% in some regions and up to 35% in other regions. However, it is important to emphasise that regional policy decision about extending childcare availability is a choice variable and potentially may be endogenous. To address this issue, I explore the variation across regions and over time in childcare availability conditioning on a rich set of regional socio-demographic and economic time-varying characteristics, including regional expenditures on different policies, demographic and labour market characteristics and generosity of regional welfare policies.

To measure childcare availability in the presence of shortages, I assume that childcare availability is equal to the enrolment rate (i.e. the number of children age 0 to 6 who are enrolled in childcare organisations, divided by the total number of children aged 0-6). Since the private childcare system is very marginal (in 2015, only 1.4% children covered by childcare were in private childcare), when mentioning childcare availability, I refer to the number of available places only in public childcare. To calculate the enrolment rates, I use a unique dataset on the number of enrolled children at each age in every region provided by the Federal State Statistic Service. Furthermore, the analysis is based on individual-level data from the Russian Longitudinal Monitoring Survey – Higher School of Economics (RLMS-HSE)[4] which is a national representative split panel of households in Russia.

I find that an increase in childcare availability has positive and statistically significant effects on various maternal labour market outcomes. More precisely, the baseline specification suggests that a 10 pp growth in childcare enrolment leads to an increase in the probability of maternal labour force participation by 3.0 pp, the probability to be employed by 2.6 pp and the probability to be in full-time employment by 2.0 pp. In other words, the estimates imply that in Russia between 2000 and 2015 the expansion of childcare availability increased maternal labour force participation by 3.4%, maternal employment by 2.9% and maternal full-time employment by 2.2%. Interestingly, the effect on the labour force participation is smaller among single mothers while in some western countries an opposite effect has been found.

[4] "Russia Longitudinal Monitoring survey, RLMS-HSE", conducted by National Research University "Higher School of Economics" and OOO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences. (RLMS-HSE web sites: http://www.cpc.unc.edu/projects/rlms-hse, http://www.hse.ru/org/hse/rlms)

This paper adds to the existing literature in the following ways. First, it demonstrates the impact of childcare system expansion on female labour outcomes in the case of Russia. Second, as shown in Lovász (2016), the institutional background of Russia is similar to some Central and Eastern European countries, thus my results are likely to give some valuable insights for other post-socialist countries that are interested in childcare expansion. Third, I also argue that understanding the effects of childcare reforms on maternal employment is highly policy relevant as Russia is in a phase of rapid population ageing, which increases pressure on economic growth. Thus, understanding the potential consequences of changes in childcare policies can provide some insights into how mothers with young children can be brought back into the labour market that in turn can contribute to sustainable economic development.

The rest of this paper is organised as follows: Section 2 summarises the existing literature. Section 3 describes the institutional background of the female labour market, welfare benefits and childcare system in Russia. Section 4 and 5 present the dataset and the empirical strategy, respectively. Section 6 presents the results and heterogeneity analysis. Section 7 provides robustness checks, and Section 8 concludes.

2. Related Literature

Research on the effect of childcare on maternal labour supply faces an endogeneity problem, for example, women may have unobserved traits that make them both more likely to choose to use childcare and to work. To minimise the endogeneity problem, recent empirical studies use different quasi-experimental identification strategies that exploit exogenous variation in childcare availability and prices. There are two main approaches that are commonly used for these purposes. The first one is based on using day-of-birth cut-off rules for eligibility for educational programs. The second one is based on variation in availability across geographic units over time, which usually comes from the different speed of expansion of childcare services. The existing evidence based on these approaches is mixed across time and countries.

One of the first studies based on a quasi-experimental strategy to estimate a causal effect of childcare enrolment on maternal labour supply was conducted by Gelbach (2002). Gelbach uses the access rule to free public preschool for five-year-old children and the quarter of birth of these children using the 1980 US Census. Comparing those who are just eligible for public school and those who are not because they were born just after the cut-off date, he finds a significant positive effect of public school enrolment on maternal labour

supply for cases where the five-year-old child is the youngest child in the family. Later US studies show slightly different results. Cascio (2009), evaluating the staggered introduction of free childcare places for five-year-olds mainly in the 1960s and 1970s by using a difference-in-difference approach, finds a significant positive effect only for single mothers whose youngest child was five. Further, Fitzpatrick (2010, 2012) repeats Gelbach's identification strategy (Gelbach, 2002) but using younger cohorts from the 2000 US Census and finds effects of the availability of universal childcare on the maternal labour supply only for single mothers where the five-year-old child is the youngest child. Fitzpatrick suggests that the difference in the results among different studies arise due to demographical, labour market and lifecycle changes over time. These studies show us that the impact of childcare can vary between single and married women, over time within one country, and also depends on whether a child is the youngest or not.

Significant positive effects of childcare availability on maternal labour supply for both single and married mothers have been found in Argentina (Berlinski and Galiani, 2007; Berlinski et al., 2011), Quebec (Baker et al., 2008; Lefebvre and Merrigan, 2008; Lefebvre, Merrigan and Verstraete, 2009), Spain (Nollenberger and Rodriguez-Planas, 2015), Germany (Bauernschuser and Schlotter, 2015) and in the United Kingdom for full-day childcare (Brewer, Cattan, Crawford, Rabe, 2016). Evidence from France (Goux and Maurin, 2010) and Israel (Schlosser, 2011) show that an increase in childcare availability has a significant positive effect only for some subgroups of mothers, for example, among single mothers or more educated mothers (in the case of France, the effect is positive and significant but very small). Finally, studies conducted in Sweden (Lundin, Mork and Ockert, 2008), the UK (Brewer and Crawford, 2010) and Norway (Havnes and Mogstad, 2011) demonstrate little, if any, effects of childcare availability on maternal labour outcomes.

Cattan (2016) summarises findings from different countries and argues that significant differences across countries and periods can be explained by policy parameters and the country-specific context. She suggests four main driving factors that affect the magnitude of the effect of childcare availability on maternal labour market outcomes. The first one is the initial maternal employment rate. The effect of childcare expansion can be substantial in those countries where the initial level of female employment is low. This argument generally works in absence of other barriers for female employment such as slow economic growth or lack of flexible and part-time work opportunities for mothers. The second factor is the difference in nonparental care use. The effect of the introduction of free preschool places can have no effect (or an effect that is smaller than the increase in childcare attendance) in

countries where there is a well-developed private childcare system or parents intensively use informal childcare. In this case, parents switch from informal/unsubsidised to formal/subsidised childcare and we observe just a crowding out effect without significant changes in maternal labour market outcomes. The third driving factor behind the variation in results among countries is differences in mothers' non-labour income and welfare benefits. As described previously, single mothers can be affected more due to the fact that relatively smaller non-labour income forces them to join the labour market. Also, countries with more generous welfare systems for parents experience lower changes in maternal employment rate in response to expanding childcare availability because mothers have less financial need to come back into the labour market. Finally, one of the most obvious factors is the differences in policies. Policies in different countries are aimed at children of different ages, at different social groups, and provide different amounts of free education.

Post-socialist countries in Central and Eastern Europe are distinct along these 4 dimensions from Western European, Anglo-Saxon, Nordic and North American countries so that childcare availability could potentially have very different effects from those seen in these countries. However, the literature is scarce on Central and Eastern European countries. Lovász (2016) analyses potential childcare expansion and mothers' employment in post-socialist countries in Central and Eastern Europe. Whilst comparing backgrounds and experiences of different European countries, she argues that the maternal labour market in post-socialist countries could gain a lot from childcare expansion because of the current low labour force participation of mothers whose children are under three and low childcare coverage rates for children under three. However, Lovász emphasises that post-socialist countries have some common characteristics such as inflexible labour markets, very long or very short maternal leave and unsupportive social views on employment of mothers with young children that could prevent effective increase in maternal employment if childcare expansion occurs without any other policies changes. A study on Hungary, a post-socialist country, on the effect of childcare availability confirms Lovász's arguments (Lovász and Szabó-Morvai, 2013).

A few papers investigate the effect of childcare availability on female labour market outcomes in Russia. The majority of these studies estimates associations between childcare availability and maternal employment (Savinskaya, 2011; Karabchuk and Nagernyak, 2013) however some studies attempt to estimate the causal effect. Lokshin (2004) evaluates the childcare price elasticity of female labour supply. He shows that fully subsidizing family spending on pre-schools can increase the female employment rate by 11.4% from 50.0% to

55.7%. However, the paper is based on data from 1994-1996 and may not reflect the current situation in Russia. Levin and Oshchepkov (2013) investigate the relationship between using childcare and maternal employment based on a more recent and relevant time period (RLMS-HSE 2000-2009). To overcome the endogeneity problem, they use a system of two simultaneous probit equations (a probit-model for being employed and a probit-model for using childcare) with three instrumental variables in the second equation – a dummy variable for having a pre-school in a city/town/village, the number of enrolled children per 100 places (the pre-schools functioning capacity), and a dummy variable equal to one if the number of enrolled children per 100 places is more than 100. The results show that if all children that are on the waiting list get a place in childcare (around 35% of children in 2009) the probability to be employed for women increases by 8.5-12.5 pp.[5]

My paper differs from Levin and Oshchepkov (2013) in several aspects. Exploring the variation across regions and over time in childcare availability, I attempt to evaluate the effect of regional childcare expansion, which is a policy relevant parameter that can be useful for further childcare reforms. By implementing this empirical strategy, I avoid using the variable of childcare use which is underreported in the dataset that I use. Also, I use a longer period of time (2000-2015) and nine different labour market outcomes. In addition, I use a unique dataset on childcare enrolment for each age between 0 and 6 at the regional level that increases accuracy in measuring childcare availability.

3. Institutional background in Russia

This section reports the institutional background in Russia based on four points that Cattan (2016) finds to be the main driving factors that affect the way that expansion of childcare availability affects maternal labour market outcomes. In particular, this section describes the following aspects: the situation of the female labour market, the welfare benefits system in Russia, informal childcare use, the childcare system and the policy set up. An understanding of these key elements can provide valuable insights into the expected effects of childcare policy changes in the case of Russia.

[5] A weakness of this analysis comes from using a variable of childcare use that is underreported. According to my estimates based on RLMS-HSE, childcare use is 20-25 pp lower than the federal statistics.

a. Female labour market

The Soviet Union had high levels of female employment. The highest proportion of women aged 16 to 54 (the working age in the Soviet Union countries and in Russia until 2019) who were employed was 89.7% in 1970 (Shapiro, 1992). After the fall of the Soviet Union, due to the economic crisis the situation changed significantly – the employment rate for working-age women dramatically fell from 77.6% in 1992 to 63.5% in 1998. After that, overall economic growth in Russia led to an increase in the female employment rate up to 72.6% in 2015.

Similarly to many countries, maternal employment in Russia varies considerably according to the age of youngest child. However, the gap between the employment rate of mothers whose youngest child is aged 0-2 and the employment rate of mothers whose youngest child is aged 3-6 is significantly larger than in most OECD countries (Figure 1). In 2014, the employment rate of Russian mothers whose youngest child was aged 3-6 was relatively high (78.4%) and Russia performed extremely well compared to OECD countries. At the same time, Russia was in the group of countries with the lowest employment rate of mothers whose youngest child was aged 0-2 – Russia with 25.7%, Estonia with 23.7%, Czech Republic with 22.3%, Turkey with 21.7%, Slovakia with 16.7% and Hungary with 13.4%. Thus, in Russia the gap in maternal employment between these two groups was 52.7 pp with only two counties such as Estonia and Hungary showing a larger gap (57.4 pp and 54.5 pp respectively). It is important to note that all these countries, with the exception of Turkey, are post-socialist countries of Central and Eastern Europe, which emphasizes some similarities between these countries.

Also of note is the difference in maternal employment between partnered and single mothers. Figure 2 shows substantial variation across countries in the employment rate of these two groups. Among OECD countries, around one third of the countries tend to have higher employment rate of single mothers than partnered, ranging from a massive gap of 31.3 pp in Mexico to 1.4 pp in Greece. Russia also demonstrates a significant gap of 6.7 pp between maternal employment of single and partnered women. Moreover, Russia is among the top countries showing the highest level of single mothers' employment rate – the employment rate of single mothers is equal to 86.3% in Switzerland, to 85.3% in Luxemburg and to 77.7% in Russia (versus 70.9% for partnered mothers).

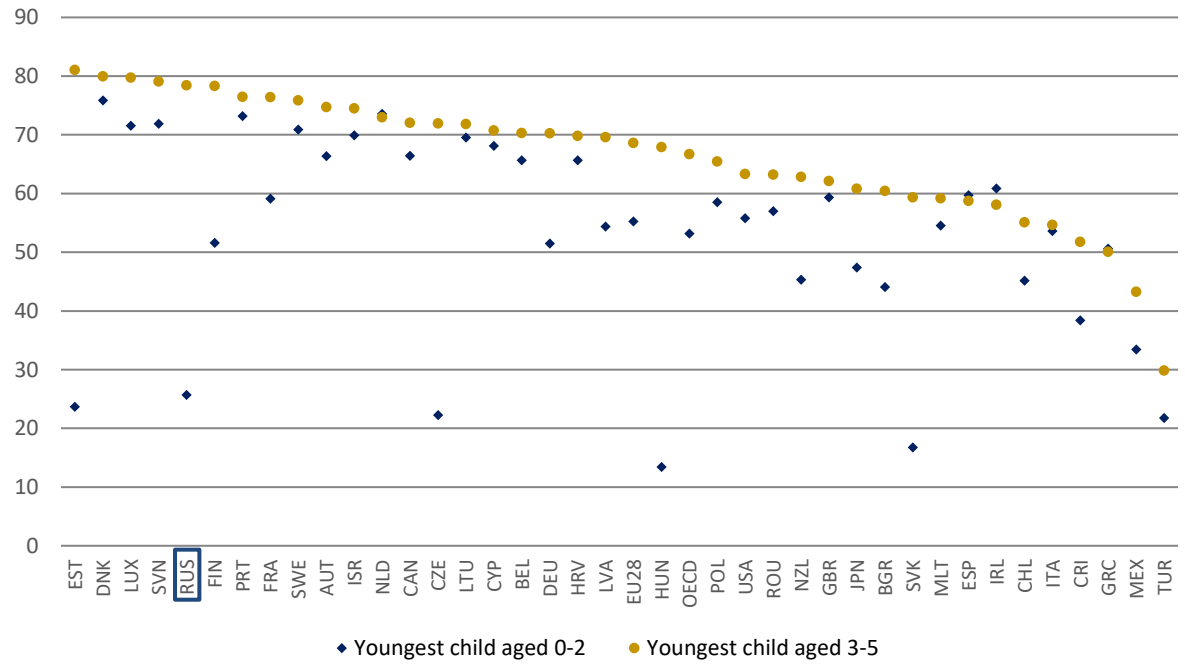

Figure 1 – Maternal employment (%) by age of youngest child in 2014

Note: The employment rate of women 15-64 years old. For Russia the age of women is 16-54 since it is their working age. For Russia the children age groups are 0-2 and 3-6.
Source: OECD Family Dataset. Online at: http://www.oecd.org/els/family/database.htm; Chart LMF1.2.C. Employment rates for Russia is calculated by author.

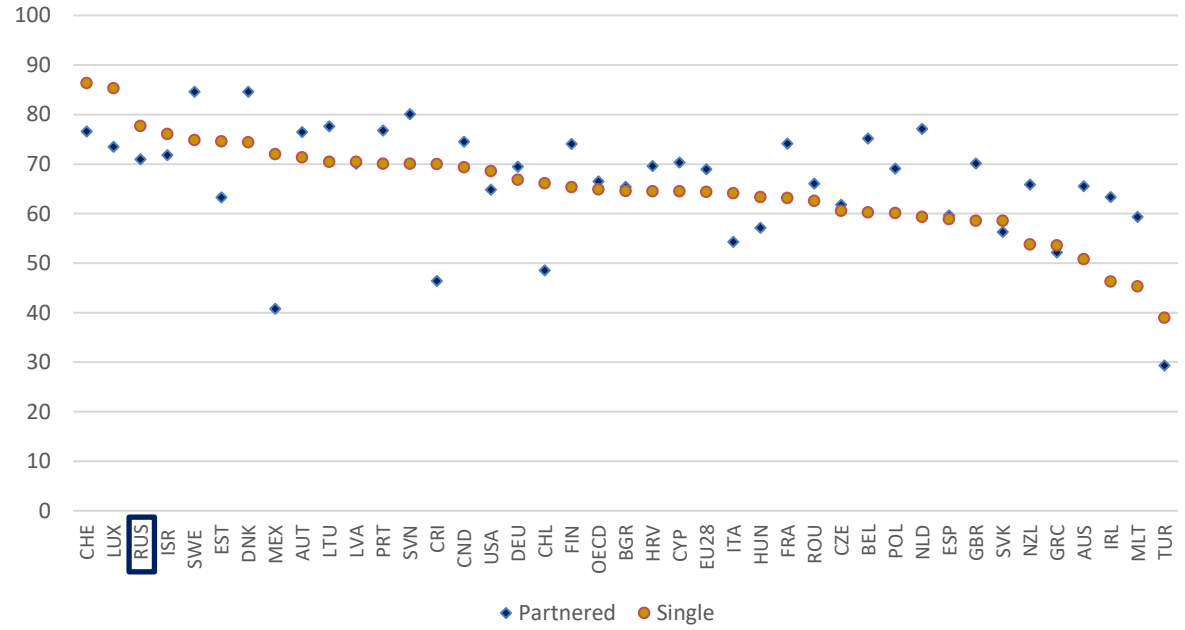

Figure 2 – Employment rates (%) for partnered mothers and single mothers with at least one child aged 0-14, 2014 or latest available

Note: The employment rate of women 15-64 years old; for Sweden, women aged 15-74. Data for Denmark and Finland is to 2012, and for Chile, Germany, and Turkey to 2013. For Canada, children aged 0-15, for Sweden children aged 0-18, and for the United States children aged 0-17.
Source: OECD Family Dataset. Online at: http://www.oecd.org/els/family/database.htm; Chart LMF1.3.A.

One of the explanations of low maternal employment when the youngest child is under the age of 3 years is the low availability of part-time jobs. Like in most post-socialist countries, the Russian labour market is relatively inflexible. Part-time employment (less than 30 hours per week) is rare: among women in 2014, only 6.5% of working women had part-time jobs. This figure is even lower for childbearing age women – 5.2% in the 20-29 age group, 4.8% in the 30-39 age group and 5.3% in the 40-49 age group. Russia is significantly lagging behind other developed countries in this respect with only a few countries such as Bulgaria, Macedonia and Romania performing worse (Figure 3). Again, we can see that the right tale of the distribution is represented mainly by post-socialist countries, which indicates that there are institutional similarities between these countries.

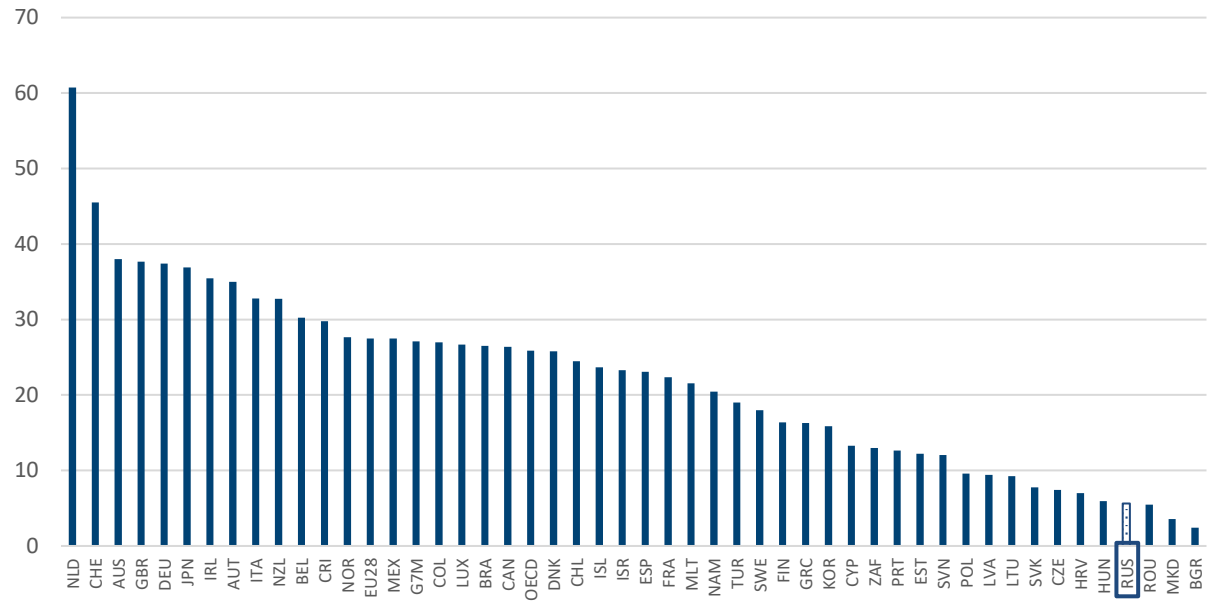

Figure 3 – Proportion of women employed part-time among all employed women, 2015

Note: Part-time employment is defined as people in employment (whether employees or self-employed) who usually work less than 30 hours per week in their main job. Employed people are those aged 15 and over who report that they have worked in gainful employment for at least one hour in the previous week or who had a job but were absent from work during the reference week while having a formal job attachment.
Source: OECD (2017), Part-time employment rate (indicator). doi: 10.1787/f2ad596c-en (Accessed on 25 September 2017).

Also, it is important to mention that there is low enforcement of labour laws for pregnant women and women with young children. According to the Russian Labour Code, pregnant women and women with children under the age of 3 years have a rich set of social guarantees. For instance, employed pregnant women are provided with maternity (70 days before and 70 days after childbirth) and parental leave (three years after childbirth); for pregnant women and women with children under the age of 3 years it is prohibited to work at

night, to do overtime work and go on business trips; women with children the age of 1.5 years have the right to take extra breaks during working hours to feed their children, which are included in working hours and paid in line with average earnings and so on (Sinyavskaya, O. *et al*., 2015). Although the Russian laws protect the employment rights of pregnant women and women with young children, these laws are rarely followed, especially in the private sector, and courts often dismiss claims of unfair treatment in the workplace (Sinyavskaya, O. *et al*., 2007; World Bank, 2014). In addition, although the Labour Code guarantees the same employment rights for pregnant women and women with children under 3, women face difficulties securing a job as employers are reluctant to hire women who have working restrictions (Karabchuk and Nagernyak, 2013).

b. Welfare benefits

In Russia, family and maternal financial support comes from both the State and regional governments. The main forms of support are maternity allowance, a lump-sum payment to women who register in a hospital during early stages of pregnancy, a lump-sum payment at the child's birth or in case of adoption, adoption of a disabled child, a monthly payment for child care, a monthly payment to disabled children, a payment to ensure healthy nutrition of pregnant women, breastfeeding mothers and children under the age of 3 years, a monthly payment to low income families, and a lump-sum payment to families with 3 and more children. Although the number of different types of social benefits for families with young children is huge, social benefits play a rather important role only for families with three or more children under the age of 18 years where the share of social benefits in total income is almost a fifth (Table 1).[6] For families with children under the age of 3 years the share is 16.6%. Single-parent families seem to be financially unprotected, with social benefits corresponding to just 8.1% of the total household income.

Investigating family benefits in Russia, Sinyavskaya et al. (2015) show that although the maximum post-natal leave is three years and the first 18 months are paid, most of these months are paid at a relatively low rate. Popova (2013) and Kolosnitsyna and Philippova (2017) have found that these benefits are not well targeted, the system suffers from leakages, significant gaps in coverage and low efficiency. Also, children and families with children have the highest risk of poverty among all socio-demographic groups and the risk of falling

[6] Here total social benefits include all types of social support except pensions. Thus, the proportion of family and children benefits is even lower.

into poverty increases with the number of children in the family (Pishnyak and Popova, 2011). In 2015, 63% of poor households were households with children.

Table 1 – Household (HH) income composition by source of income in 2015, %

	Source of income				
	Wages	Income from properties	Pension	Social benefits (without pension)	Others
All HH	76.7	1.1	14.9	4.5	2.8
HH with families that have children under the age of 18 years	81.1	0.7	7.1	7.2	3.9
among them with					
1 child	85.2	0.7	7.6	3.1	3.5
2 children	77.0	0.9	6.1	11.8	4.2
3 and more children	67.6	0.6	7.4	19.1	5.3
HH with families that have children under the age of 3 years	71.6	0.6	6.8	16.6	4.4
HH with young families	87.7	0.2	3.5	4.3	4.2
HH with single-parent families	66.1	0.8	17.9	8.1	7.0
HH with families that do not have children up to 18 years old	74.1	1.3	19.7	2.8	2.1

Source: Statistical Survey of Income and Participation in Social Programs 2016.

Comparing to other OECD countries, Russia is among those that spend less than 1% of GDP on benefits for families and children (Figure 4). In 2013, total family benefits were 0.9% of GDP. It is important to note that this figure includes spending on Maternal Capital programs that are administrated in the form of a certificates that can be used three years after a child is born or adopted on housing improvements, education and the mother's future funded pension (Elizarov and Levin, 2015). Expenditure on benefits for families and children without spending on the Maternal Capital program is half as much and puts Russia even further away from other developed countries (in 2013 it was 0.5% of GDP).

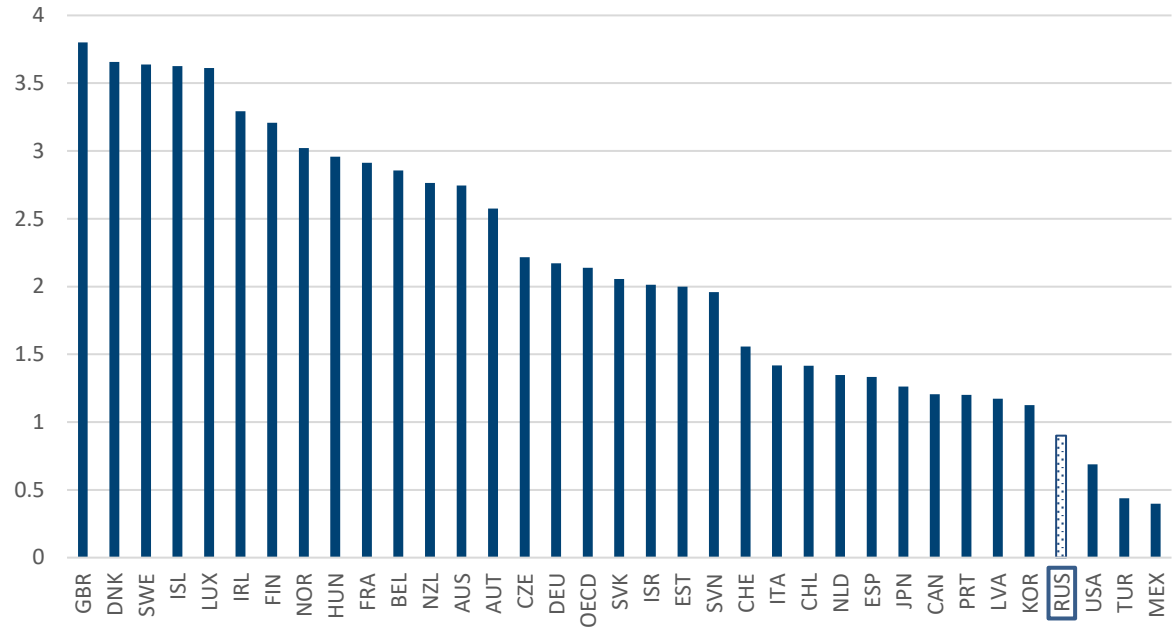

Figure 4 – Family and child benefits public spending in 2013, percentage of GDP

Note: Family benefits spending refer to public spending on family benefits, including financial support that is exclusively for families and children. Spending recorded in other social policy areas, such as health and housing, also assist families, but not exclusively, and it is not included in this indicator.
Source: OECD (2017), Family benefits public spending (indicator). doi: 10.1787/8e8b3273-en (Accessed on 27 September 2017). FSSS (2014), Social provision and standards of living in Russia.

c. *Informal childcare use*

As discussed in the following section, the main features of the Russian childcare system are the place shortage in the formal childcare system and a relatively small private childcare system. These force mothers to resort to informal childcare if they want to come back to the labour market. Informal childcare includes help from relatives that can live at the same or different household, friends, neighbours or other people who do not work in childcare. In Russia, traditionally, grandmothers tremendously facilitate combining mothers' work and their family obligations even though grandparents' assistance is becoming more irregular (Cherkashina, 2011). As an example, Table 2 shows how parents allocate childcare time by childcare providers in families with one child. Clearly, the amount of informal care depends on the child's age. Parents of very young children use only informal care and exclusive use of formal care does not exist. As a child grows, parents use less informal care and rely more and more on both types of childcare, but they still use some informal care. Very often, parents cannot fully exclude informal care because the majority of childcare organisations work until 5-6pm and parents have to make arrangements to pick up their children. Pelikh and Tyndik

(2014) confirm that informal childcare compliments the formal provision rather than substitute it.

Table 2 – Consumption of informal and formal childcare by single-child households (2007)

Age	Only Informal Care	Only Formal Care	Both
0-1.5	98.3	0	1.7
1.5-3	43.4	0	56.6
3-6	17.6	2.3	80.1

Source: Sukhova, 2011.

d. Childcare system

Availability of childcare

After the end of the Soviet Union in 1990, the fertility rate in Russia fell dramatically (Da Vanzo and Famsworth, 1996; The Demographic Yearbook of Russia, FSSS 2002, 2015): from 1.9 in 1990 to 1.3 in 1995 and to 1.2 in 2000 (Figure 5).[7] The decline in the fertility rate led to a sharp decrease in the number of preschool age children enrolled into childcare. Due to this reduction, the number of childcare providers and the number of places in the public childcare system shrank. Moreover, at this time many childcare services were transferred from public organizations to municipalities, which were forced to close childcare services due to lack of funds. The total number of places in childcare system fell from 8,109 thousand in 1991 to 5,232 thousand in 2000. From 2000, the fertility rate began to increase, and subsequently there was an increase in the number of children enrolled into childcare. However, the reduction in places in the childcare system continued until 2007 (Figure 5). While the number of places in childcare started increasing from 2008, it was not enough to cover demand. It is worth noting that there was a lack of part-time public childcare – only 2.4% of children covered by childcare attended part-time nurseries in 2015.[8]

As a result of shortages in the childcare system there are long waiting lists to get a place. Due to the lack of places, parents have to apply for a place straight after the child's birth, but even this does not guarantee getting a place on time. The number of children waiting for a place increased from 2.6% in 2000 to 23.3% in 2014 (Figure 6). The situation was exacerbated by a lack of private childcare. In 2015, among all childcare providers, only 2% were private organisations, which only covered 1.4% of children in childcare. One of the

[7] The fertility rate decrease started much earlier than at the end of the USSR but the decrease during the previous 30 years was less significant than in 10 years after 1990 (from 2.5 in 1960 to 1.9 in 1990).
[8] Indicators of Education in the Russian Federation: 2017. Data Book.

reasons for the lack of private providers is the strict requirements for buildings, equipment, qualifications of the staff and considerable bureaucratic barriers. After overcoming these obstacles, providers have to set high prices for childcare that parents mostly cannot afford.

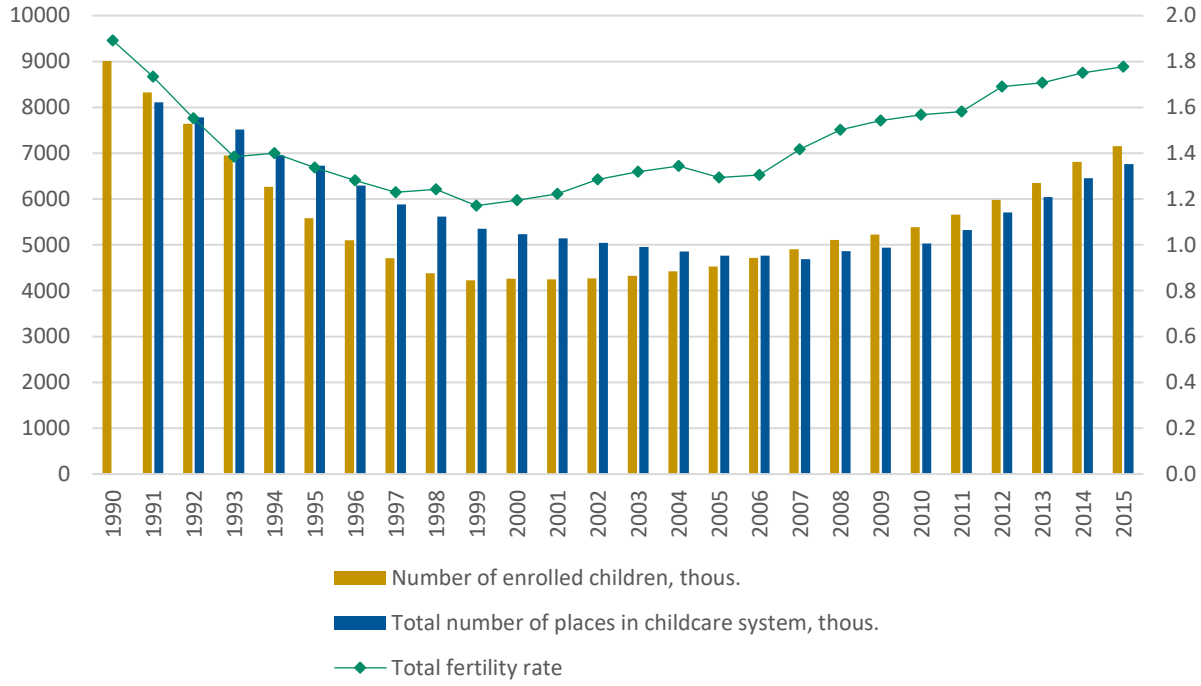

Figure 5 – Main trends in the childcare system in Russia

Note: The left vertical axis corresponds to the number of children enrolled into childcare system and the number of places in childcare system. The right vertical axis corresponds to the total fertility rate.
Source: Country-level data from the Federal State Statistic Service of Russian Federation - Social provision and standards of living in Russia in 1999, 2015. Data on total number of places in childcare system is not available before 2000.

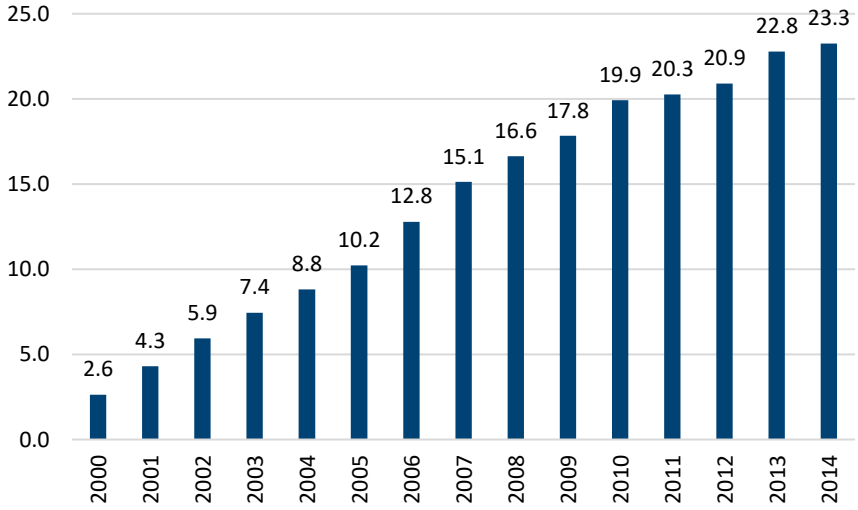

Figure 6 – Share of children aged 0-6 in the waiting list to get a place in kindergarten

Source: The indicator is calculated by author using country-level data on number of children in the waiting lists from the Federal State Statistic Service of Russian Federation.

Until 2013, there were no federal policies to solve the problem of the shortage in childcare places. Moreover, the childcare system was financed almost only from regional and municipality budgets – the share of federal spending on childcare system in total spending was not more than 2% between 2000 and 2013.[9] In this situation every region had to expand public childcare in order to cope with an increase in demand without support from the central government. To compensate partly for high childcare demand, childcare providers started to enrol children above capacity. As is apparent from Figure 5, from 2007 the total number of enrolled children exceeds the total number of places in the public childcare system. Moreover, since 2010, childcare providers could do this officially because maximum group size rules changed.[10] Before 2010, the maximum number of children per class could not exceed 15 for children under the age of 3 years and 20 for 3- to 7-year-olds. After 2010, the maximum number of children per class is calculated by building size – a childcare provider has to ensure that there are 2.5 square meters per child aged under 3 and 2 square meters per child aged 3-7. To calculate the number of potential places the whole surface area of a childcare organisation is included (bedrooms, dining rooms, play areas and so on). As a result, the capacity within one childcare organisation could increase without changing the actual size of the childcare facility. Notice that, despite these changes, over-enrolment has remained a concern in Russia both in urban and rural areas (Table 3).

Table 3 – Proportion of childcare organisations where the number of enrolled children is higher than the maximum ceiling, %

	2000	2005	2010	2011	2012	2013
Total	28.2	41.9	54.5	52.0	48.1	48.0
Urban area	39.3	58.3	71.6	66.8	61.0	60.1
Rural area	14.1	20.2	29.9	29.9	28.9	30.2

Source: Higher School of Economics Data Book on Education in Russia 2014.

The expansion of current childcare organisations and the intensity of the creation of new places in the childcare system varied considerably both across regions and over time and depended on existing coverage and on regional budget policies and financial priorities. In order to describe the expansion of childcare services by region, Figure 7 gives two maps, which show the enrolment rate in all the Russian regions in 2000 and 2015. In 2000 the

[9] Education in Russia 2014. Higher School of Economics Data Books.
[10] Decree of the Chief State Sanitary Doctor of the Russian Federation from 22.07.2010 N91.

enrolment rate varied from 3.8% to 80.7%. The increase in the enrolment rates over the time ranges from a minimum of 0.1 pp to a maximum of 34.6 pp. Thus, in 2015 the enrolment rates varied from 17.4% to 91.9%. In total, the proportion of children covered by the childcare system in Russia increased from 55% to 66.2%.[11]

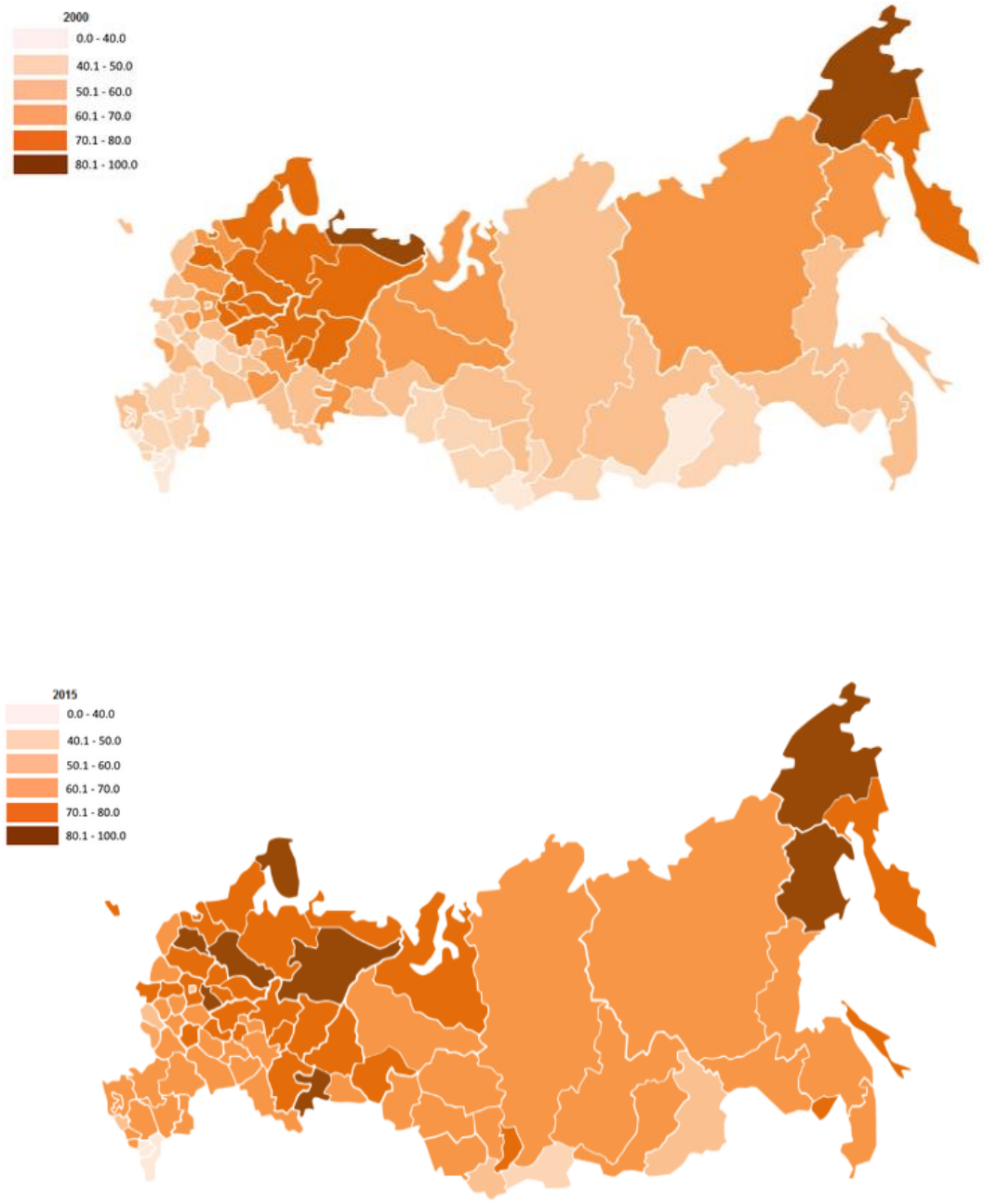

Figure 7 – Childcare enrolment rate among Russian regions in 2000 and 2015

Note: Childcare enrolment rate varies from 0 to 100%. Darker colour means a higher level of enrolment rate.
Source: Country-level data from the Federal State Statistic Service of Russian Federation.

[11] FSSS, Social provision and standards of living in Russia in 1999, 2015

Childcare prices

According to the Federal Law No. 273-FZ "Education in Russian Federation", the childcare system can provide two types of services – early child education and childcare. Public childcare providers offer a combination of educational and childcare services. While the educational part is free for children of all ages, childcare services are not. The childcare services cost includes the cost of essential needs like food or personal hygiene. Public childcare providers set a fee for childcare services by themselves once a year and the fee cannot be more than the municipality-level ceiling established by regional government. The government provides federal subsidies to help parents to afford childcare. Parents can get back 20% of childcare fees for the first child, 50% for the second child, and 70% for the third and subsequent children. Also, before 2013, parents were responsible only for 20% of the actual cost of provided services and 80% of childcare costs were subsidized by federal and local governments.

The price of childcare can play important role in understanding the effect of childcare on maternal labour supply if prices are high and represent a significant barrier for women who want to enter/re-enter the labour market. In this paper, I do not take childcare prices into account because childcare fees include only essential components that parents would pay anyway. Moreover, parents receive a "discount" in the form of federal subsidies. Also, according to Table 4 that shows the distribution of children aged between 3 and 6 who did not attend childcare in 2014 by reasons of non-attendance in Russia and across federal districts, it appears that the price of childcare is the last reason not to attend childcare (4.5%). In total, around 36.0% of children had to stay at home due to the lack of places or childcare providers around, and in every federal district the absence of places or childcare providers is a more acute problem than are high prices.

Summing up the different aspects of the institutional background in Russia described above, I highlight the main features and some speculations about expected effects of childcare expansion in these circumstances.

First, maternal employment varies substantially with the age of youngest child, with the employment rate of mothers whose youngest child is 0-2 years old being very low (25.7%), and that of mothers whose youngest child is 3-6 years old being very high (78.4%). The employment rate is considerably higher among single mothers and relatively high in comparison to other countries. Low maternal employment of mothers whose youngest child is aged 0-2 can be partly explained by the very low availability of part-time jobs and also by low enforcement of labour laws for pregnant women and women with young children.

Table 4 – Distribution of children aged between 3 and 6 who did not attend childcare in 2014 by reasons of non-attendance, %

	No places	High prices	No childcare providers around	It is better to stay at home	Due to health issues	Other reasons
Russian Federation	23.4	4.5	12.6	38.9	6.4	14.3
Central federal district	13.9	2.3	15.8	42.0	9.8	16.2
North-West federal district	7.9	1.5	3.3	78.2	3.4	5.8
South federal district	24.3	2.2	15.9	34.4	8.4	14.9
North Caucasus federal district	14.7	3.0	7.0	54.1	4.9	16.4
Volga federal district	27.6	11.6	9.2	36.2	6.4	9.1
Ural federal district	38.9	7.1	3.0	24.7	5.8	20.5
Siberia federal district	34.7	6.0	10.1	25.4	6.1	17.7
Far East federal district	24.6	0.6	14.0	38.6	5.0	17.3

Source: Russian Comprehensive monitoring of living conditions in 2014.

Expanding childcare availability should generate an increase in maternal employment, particularly for mothers whose youngest child is aged 0-2. However, the inflexibility of the labour market can dampen the effect.

Second, family and child benefits in Russia are relatively low and the welfare system is not very efficient. It is theoretically possible to find positive effects on maternal employment rate because in this case work incentives are high and financial needs can force mothers to join the labour market, especially single mothers. However, these single mothers already show high employment rates and this can reduce the potential effect.

Third, parents intensively use informal childcare. In this case, expanding childcare availability could motivate parents to shift from informal childcare arrangements to subsidised formal ones, which would lead to crowding out effect without significant changes in maternal employment.

Last, the current childcare system is characterized by a tremendous lack of places and an absence of private and part-time providers. All else equal, by providing more subsidized childcare places, the theoretical effects of childcare expansion on the extensive margin are unambiguously non-negative: the maternal rate should not fall and would likely rise. But all the circumstances described above can prevent effective increases in maternal employment. Thus, it is ambiguous how maternal employment would react to childcare expansion – different dimensions could strengthen or hinder the effectiveness of the policy.

As mentioned above, the case study of Russia can be beneficial for other post-socialist countries that have some similarities related to the institutional background that may affect the impact of childcare expansion on maternal employment. Table 5 shows some of these key characteristics for 11 post-socialist countries from Central and Eastern Europe and for Russia. While there is substantial variation in some characteristics, there are some similarities. With the notable exception of Slovenia and Lithuania, in most post-socialist countries maternal employment rates are relatively low. Like in Russia, in the Czech Republic, Estonia, Hungary and the Slovak Republic there is a significant gap between maternal employment rates of mothers whose youngest child is aged 0-2 and whose youngest child is aged 3-5. The labour markets of these countries can be characterized as inflexible due to the small proportion of women employed part-time. In all countries except Hungary and the Czech Republic, family benefits are lower than the average of OECD countries. The last common characteristic is low levels of childcare coverage for children under the age of three. Despite these similarities it is important to note that the results for Russia cannot be directly applied for other countries due to different historical contexts, different views on traditional gender roles, and cultural norms that also influence the formation of preferences regarding work and use of childcare. The results from this paper can give some insight into direction of childcare availability expansion that should be cautiously interpreted.

Table 5 – Institutional characteristics in post-socialist countries

	Maternal employment (%), 2014		Proportion of women employed part-time (%), 2015	Family benefits public spending in 2013, percentage of GDP	Formal childcare coverage (%), 2014	
	Youngest child aged 0-2	Youngest child aged 3-5			Under age 3	Ages 3-5
Bulgaria	44.1	60.4	2.4	n/a	11.2	82.1
Croatia	65.7	69.8	7.0	n/a	16.9	56.7
Czech Republic	22.3	71.9	7.4	2.2	5.6	80.5
Estonia	23.7	81.1	12.2	2.0	23.2	89.6[b]
Hungary	13.4	67.9	5.9	2.9	14.5	89.7
Latvia	54.4	69.6	9.4	1.2	24.0	91.0
Lithuania	69.5	71.8	9.3	n/a	28.8	82.6
Poland	58.5	65.5	9.6	1.2[a]	11.0	74.1
Romania	57.0	63.2	5.5	n/a	12.4	84.2
Russia	**25.7**	**78.4**	**5.6**	**0.9**	**18.0**	**83.4**
Slovak Republic	16.7	59.4	7.8	2.0	6.4	73.0
Slovenia	71.9	79.1	12.0	1.9	40.3	87.2

Note: a. 2012, b. 2013. For Russia the children age groups are 0-2 and 3-6.
Source: OECD Family database.

4. Data

Dataset

This paper is based on data from the Russian Longitudinal Monitoring Survey – Higher School of Economics (RLMS-HSE). The RLMS-HSE is a nationally representative split panel[12] of households in the Russian Federation. Although the dataset includes only 32 regions out of 89, the dataset represents the country well in terms of gender, education and type of settlement. The survey was designed to monitor the effects of Russian reforms on the health and economic welfare of households and individuals in the Russian Federation. The RLMS-HSE is conducted by the National Research University Higher School of Economics and ZAO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS.

Data has been collected from 1992 until now. On average, every year the dataset includes around 12,000 individuals from approximately 4,000 households. It includes variables such as socio-demographical information and family structure, precise measurement of household-level expenditures and service utilization, and a collection of relevant community-level data, including region-specific prices and community infrastructure data.

For the analysis, I construct a sample of mothers aged 20-49 who have at least one child aged between 0 and 6 in the period between 2000 and 2015. The unit of observation is the mother. I adopt this strategy because I ultimately want to investigate the impact of the childcare extension at the region level on maternal labour market outcomes. For the period between 2000-2015, I have a sample of 17,575 mother-year observations. Of these 17,575 observations I lost 131 observations (0.7%) due to missing information on the explanatory variables, so the final sample was reduced to 17,444 mother-year observations.

In addition, I use data from the Federal State Statistic Service of Russian Federation that provides a vast range of regional characteristics for every year and every region and also a unique dataset on the number of enrolled children at each age in every region. Moreover, I use data from the Federal Treasury on detailed regional budget accounts linked to survey by region.

[12] Split (supplemental) panel surveys are a combination of a panel and a repeated panel survey. These surveys are designed to follow a particular group of sample units for a specified period of time and to introduce new groups of sample units at each time point during the specified period.

Key treatment variable

According to the existing literature, the number of children covered by childcare (or the enrolment rate) is the most appropriate way to measure childcare availability in the presence of shortages in the availability. For the case of Russia, the use of enrolment rates can be doubted because as shown in Figure 5 during some years the number of enrolled children is less than the total number of places. It suggests that not all available places were taken. However, the main reason to justify using enrolment rates to measure childcare availability in Russia is that waiting lists have operated in every region and in every year. From 2000, in every region there were parents who wanted to use childcare services but had to wait for a place (Figure 6). This could be because there is an allocation rule under which parents can apply to only three (in some regions, five) nurseries within their city/town. This means that if parents apply to three nurseries where there are no free places this application goes to the waiting list even if places are available at other nurseries. It may be that some parents avoid this allocation rule by direct informal communication to nursery's director. However, available places must be within accessible distance; it may be impossible to reallocate children from one village/town without free childcare places to another village/town with available places. Distance is an important factor, especially in rural areas where towns and villages are often located very far from each other. Thus, even if there are some available places in the suburb, municipality, or region, these places are not always available to people due to the allocation rule or distance from home to childcare facilities, which leads to the child being put on the waiting list. Due to these reasons, the childcare enrolment rate appears to be an appropriate measure for childcare availability. Yet, in Section 7, I check my results by excluding the period between 2000-2006 from the analysis when the number of enrolled children was less than the total number of places. Enrolment rates are equal to the proportion of children aged between 0 and 6 that are actually enrolled in the childcare system and varies from 0 to 100%.

Data for enrolment rates has been provided by the Federal State Statistic Service of Russian Federation for every region and every year between 2000 and 2015. Moreover, from 2007 there is more detailed information on the enrolment rate – for every region there is information on how many children at each age from 0 to 6 were enrolled. To get more detailed data before 2007, I use the existing information on enrolment rate by age in 2007 and total regional enrolment rates during each year between 2000-2006 and apply age proportions observed in 2007 backwards to the previous years, assuming pre 2007 years had the same

distribution as in 2007. In section 7, I show that my estimates are robust to excluding the 2000-2006 time period from the analysis.

Labour market outcomes

I use a wide range of labour market outcomes in order to capture the impact of changes in childcare availability, defined as follows:

- Labour force participation (LFP) is a dummy variable equal to 1 if the mother is currently employed or unemployed or 0 otherwise.
- Employment is a dummy variable equal to 1 if the mother is currently working or is on paid/unpaid leave (except maternity or parental leave) or 0 otherwise.
- Hours of work: (1) Hours of work per week is a continuous variable equal to a duration of usual work week (the question is "how many hours is your usual work week"); (2) Part-time job is a dummy variable equal to 1 if the mother is currently working up to 30 hours per week or 0 otherwise; (3) Full-time job is a dummy variable equal to 1 if the mother is currently working 31-45 hours per week or 0 otherwise; (4) Over-employment is a dummy variable equal to 1 if the mother is currently working more than 45 hours per week or to otherwise. These variables take a value zero if the mother does not work.
- Informal employment is a dummy variable equal to 1 if in the last 30 days the mother was engaged in some kind of work for which she was paid (or will be paid) except her primary work (for example, sewed someone a dress, gave someone a ride in a car, assisted someone with apartment or car repair, looked after a sick person, sold purchased food or goods in a market or on a street and so on) or 0 otherwise.
- Job search is a dummy variable equal to 1 if in the last 30 days the mother applied anywhere or asked anyone for a job or 0 otherwise.
- Training is a dummy variable equal to 1 if during the last 12 months the mother studied or is studying now courses for the improvement of professional skills, or any other courses, including courses of foreign language and education at the work place, or 0 otherwise.

Descriptive statistics

Table 6 provides main descriptive statistics for the final sample. 57.3% of women are in the labour force and 53.1% are currently working while 4.7% are looking for a job. On average, women work 21.1 hours per week but among those who are actually in work, the average duration of working week is 41.4 hours. Women more often work full-time (63%) and a quarter of employed women are overemployed. Interestingly, only 12.1% of employed mothers with young children work part-time. Only 4.6% of all women are doing some work that can be identified as informal employment and 6.0% are either taking some courses now or were enrolled during the last year to improve their professional skills. On average, women are 29.4 years old and the majority of them have a partner (87.2%). Around half of women estimate their health as satisfactory, the second half as good. More often women have higher education (32.9%) and a little less often secondary school (29.4%) or vocational training education (27.1%). The rest of the women did not finish secondary education. On average, there are 1.15 children aged up to 6 in a family. The average age of the youngest child is 2.9 years. Moreover, there is an unemployed grandmother in 3.7% of households and there is at least one unemployed female relative older than 18 except an unemployed grandmother in 16.2% of households. I take into account these two variables because this could be a source of informal help within the household.

Figure 8 shows that women who have at least one preschool age child work less compared to those who do not have children of this age. However, the gap is significantly different between women whose youngest child is aged 0-2 and women whose youngest child is aged 3-6. The employment rate is 50-55 pp less for women with children aged 0-2 compared to women without young children. For women with children aged 3-6 the employment rate is on average 4 pp lower compared to women without young children with a bigger gap (around 7 pp) present during 2000-2004 that narrowed to 2-4 pp after 2004. Also, the employment rate considerably varies by age of the youngest child and by socio-economic group (Figure 9). It significantly increases with age of the youngest child until the child reaches the age of 4; after that, the employment rate is fairly stable. This relationship is similar for both single and low-educated mothers. Single mothers work particularly more when the age of the youngest child is less than 3 years. In total, when the youngest child reaches the age of 6, the employment rate is equal to 80% among all women and to 85% and 73% among single and low-educated mothers, respectively.

Table 6 – Descriptive statistics of the final sample

	Mean	SD	N
In labour force	0.573	0.495	17,570
In work	0.531	0.499	17,570
Part-time work (1-30 hrs/wk)	0.062	0.241	16,817
Full-time work (31-45 hrs/wk)	0.322	0.467	16,817
Overemployment (46+ hrs/wk)	0.126	0.332	16,817
Usual weekly hours	21.12	22.41	16,817
Looking for work	0.047	0.217	17,570
Informal employment	0.046	0.211	17,563
Training	0.060	0.237	16,896
Mother's age	29.37	5.453	17,444
Mother's has a partner	0.872	0.334	17,444
Health			
Very bad	0.001	0.031	17,444
Bad	0.025	0.155	17,444
Satisfactory	0.487	0.500	17,444
Good	0.470	0.499	17,444
Very good	0.020	0.135	17,444
Education			
Incomplete secondary	0.106	0.308	17,444
Secondary school	0.294	0.455	17,444
Vocational training	0.271	0.445	17,444
Higher	0.329	0.470	17,444
Household composition			
Age of youngest child	2.853	1.928	17,444
Number of children 0-6	1.146	0.399	17,444
Number of children 7-10	0.185	0.418	17,444
Number of children 11-18	0.183	0.390	17,444
Unemployed grandmother in HH	0.037	0.188	17,444
Unemployed female relatives older than 18 in HH	0.162	0.427	17,444
Settlement type			
Regional center	0.396	0.489	17,444
City	0.284	0.451	17,444
Town	0.055	0.228	17,444
Village	0.265	0.441	17,444
Labour marker characteristics for those who are in work			
Part-time work (1-30 hrs/wk)	0.121	0.326	8,585
Full-time work (31-45 hrs/wk)	0.630	0.483	8,585
Overemployment (46+ hrs/wk)	0.249	0.431	8,585
Usual weekly hours	41.38	12.07	8,585

Note: Sample consists of mothers aged 20-49 who have at least one pre-school age child (0-6 years old) between 2000 to 2015.
Source: Russian Longitudinal Monitoring Survey – Higher School of Economics Dataset.

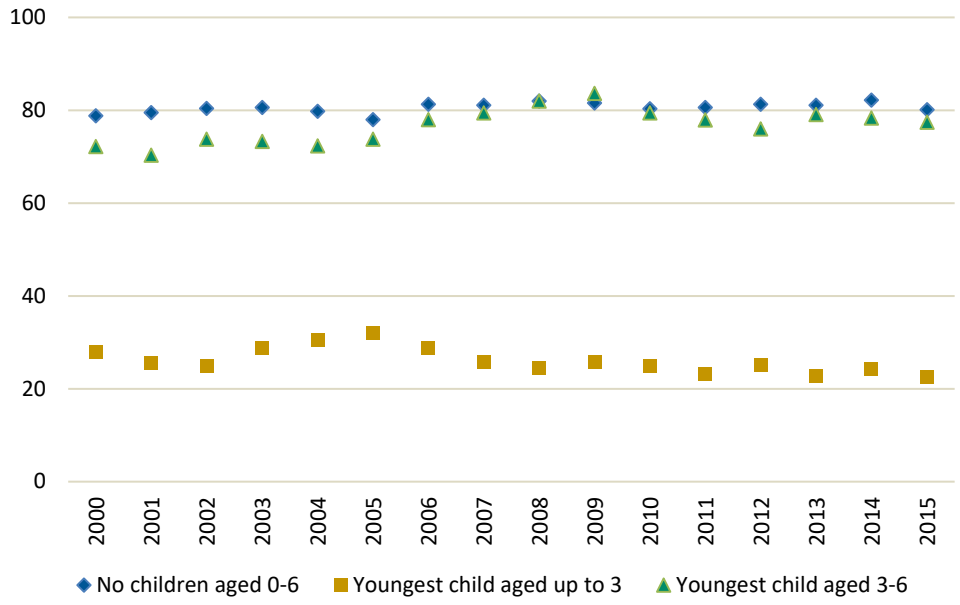

Figure 8 – Percentage of women in work with and without children aged 0-6

Note: Woman is defined "in work" if she is currently working or is on paid/unpaid leave except maternity or parental leave
Source: Author's calculations based on Russian Longitudinal Monitoring Survey – Higher School of Economics Dataset.

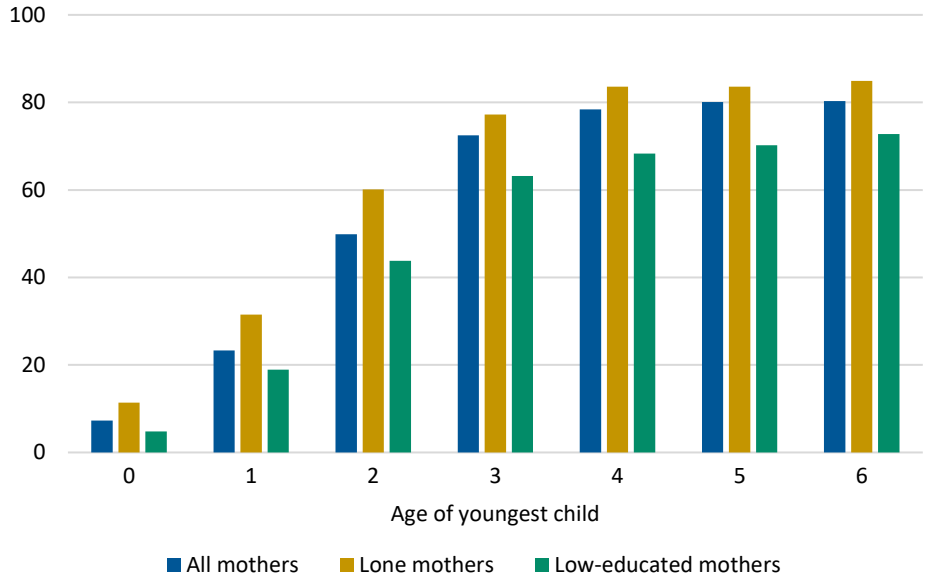

Figure 9 – Percentage of mothers in work by age of youngest child

Note: Mother is defined as single if she is not married and does not have a partner. Mother is defined as having low education if her highest qualification is secondary school education or below.
Source: Author's calculations based on Russian Longitudinal Monitoring Survey – Higher School of Economics Dataset.

5. Empirical strategy

Econometric specification

To identify the effect of childcare availability on mothers' labour outcomes, I explore geographic and temporal variations in childcare coverage caused by the fact that the availability of public childcare system developed at different rates in different regions. The main assumption behind this method is that the expansion of childcare across regions and over time is independent to other time-varying and region-specific characteristics that might affect labour market outcomes. To implement this strategy, I use a generalised difference-in-difference technique that allows me to use a continuous treatment variable.

In the absence of good quality data on childcare usage in the RLMS-HSE[13], the strategy I use allows me to estimate the Intention-To-Treat effect of expansion of childcare availability on maternal labour market outcomes. The existing literature shows that any effects of public childcare should be stronger among mothers for whom the child getting childcare is the youngest one (Berlinski et al., 2011, Nollenberger and Rodriguez-Planas, 2015, Bauernschuser and Schlotter, 2015). In the main part of the analysis I consequently estimate the impact of childcare availability for the youngest child in the household. Further in Section 7, I present the results of the same model for mothers of children aged 0-6 who are not the youngest in the household.[14]

My main specification is defined at the mother-level and presented as follows:

$$Y_{itr} = \beta_1 Availability_{tr(age)} + \beta_2 X_{it} + \beta_3 Z_{tr} + \eta_t * Availability2000_{r(age)} + \mu_r + \eta_t + \xi_{itr} \quad (1)$$

where:

- Y_{it} is one of the labour market outcome for woman *i* in region *r* in year *t;*
- $Availability_{tr(age)}$ is an indicator of childcare availability in year *t* and region *r* for the youngest child in the family. To measure childcare availability, I use age-specific enrolment rates which vary from 0 to 100%;
- $\boldsymbol{X}_{it}$ is a vector of mother's individual and family characteristics: age, education, health, marital status, number of children in the age bands 0-6, 7-10, 11-15, age of the youngest child, unemployed grandmother in the household, other female unemployed household members as well as settlement type;

[13] According to my estimates, childcare use is significantly underreported in the RLMS-HSE.

[14] Berlinski et al. (2011) suggest to estimate the model separately for those who are the youngest in the household and for those who are not the youngest in the household because the effect of childcare attendance on maternal labour market outcomes could differ between these two groups.

- $\boldsymbol{Z}_{tr}$ is a vector of region-specific characteristics that may affect mother's labour market outcomes and vary over the time;
- η_t*$Availability2000_{r(age)}$ is an interaction between year dummies and levels of childcare availability (enrolment rate) in 2000 which is the first year of the studied time period. Including these interaction terms allows to control for primary regional levels of childcare availability;
- μ_r is a region fixed effect which controls for time-invariant unobserved region characteristics;
- η_t is a year fixed effect capturing year-specific differences;
- ξ_{itr} are standard errors that are clustered at the regional level.

I use a rich set of regional socio-demographic and economic characteristics, $\boldsymbol{Z}_{tr}$, because one might be concerned about confounding the effect of childcare expansion with other regional policy choices taking place at the same time that could also have affected the female labour market outcomes. It includes information on a region's population age structure (share of women aged 20-34, share of women aged 35-54, share of children under the age of 6 years), between-region migration, rate of marriages[15] and divorces[16] to capture local demographics; information on male employment, female unemployment in year *t-1* and share of employees of the "female" economic sectors[17] in total number of employees to capture local labour market circumstances. I also include a wide range of regional expenditure on different policies per capita to capture time-varying difference in local public finance, which reflect current regional priorities, such as expenditure on health system, on higher education, on professional training, on youth policy[18], on social security, on family and childhood security policy[19] and on labour market support. Furthermore, I control for the

[15] Level of marriages shows number of marriages per 1000 people.
[16] Level of divorces shows number of divorces per 1000 people.
[17] In 2015, the "Female" economic sectors (with corresponding proportions of women in these sectors in parentheses) are Education (82%), Health and Social Services (79%), Hotels and Restaurants (76%), Other Public and Social Services (68%), Wholesale and Retail Trade (61%). These five sectors covered 58.3% of employed women in 2015.
[18] Youth policy is system of priorities and measures aimed at creating conditions and opportunities for successful socialisation and effective self-realisation of young people, to develop their potential for the benefit of the socio-economic and cultural development of the country, ensuring their competitiveness and enhancing national security.
[19] Family and childhood security is the system of measures aimed at ensuring the health of mothers and children, strengthening families, promoting motherhood, creating the most favourable conditions for the children upbringing, their physical, intellectual and moral development.

GDP per capita in period *t-1* and average proportion of social benefits in household income to capture region's wealth and generosity. Controlling for this set of different regional characteristics helps to minimise the problem of confounding the effect of other regional policies and exploit only the growth in childcare availability.

To get an idea as to how much regions differ and consequently to check the assumption that childcare expansion is independent of other regional characteristics that vary over time and across regions that might affect our outcomes I follow Havnes and Mogstad (2011) and Blanden *et al.* (2016) by comparing treatment and comparison regions. According to this strategy, I divide all regions in Russia into two groups depending on the percentage point increase in enrolment rates. The 50% of regions with the highest increase are in the treatment group while the 50% of regions with the lowest increase are in the comparison group. For this analysis, I use only the 32 representative regions contained in the RLMS-HSE dataset in order to be confident that the assumptions hold for this sub-sample. Figure 10 shows the trends in childcare coverage in these treatment and comparison groups. The expansion in places between 2000 and 2015 was 16.3 pp in the treatment group and 7.1 pp in the comparison group.

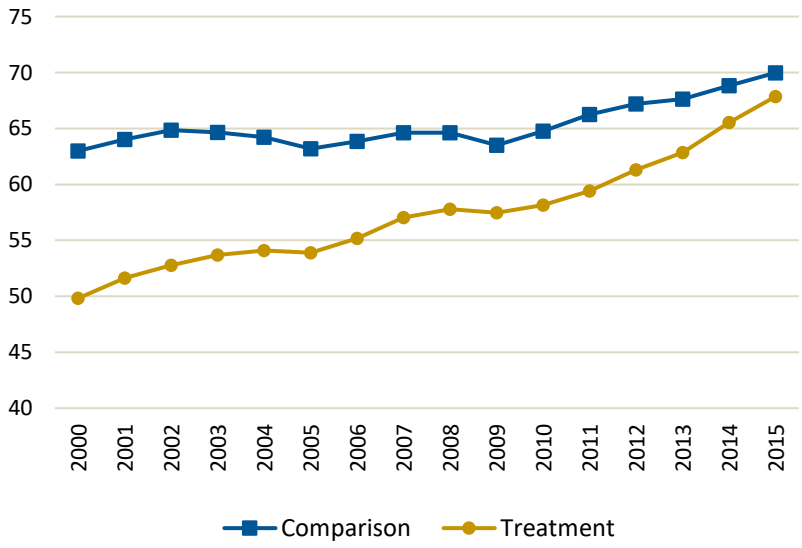

Figure 10 – Expansion of childcare places across Russia, 2000-2015

Note: The graph shows expansion of childcare places in treatment and comparison groups. The treatment group is the top 50% regions with the highest increase in enrolment rate while the comparison group is the bottom 50% between 2000 and 2015. Enrolment rate is a proportion of children aged 0-6 in total number of children at this age group. Enrolment rate varies from 0 to 100%.
Source: Regional-level data from the Federal State Statistic Service of Russian Federation.

Figures 11-14 show trends in main regional characteristics in the treatment and comparison groups and, in particular, in factors that can affect mothers' labour outcomes. More specifically, I look at regional expenditures on different policies, regional demographic characteristics, labour market characteristics and region's wealth and generosity characteristics. As shown, the treatment and comparison groups experience similar trends in most regional socio-demographic and economic characteristics between 2000 and 2015. An exception is expenditure on professional training. However, in this case it is not an issue as expenditure is lower in the treatment group. It is particularly important to emphasise that expenditures on family and childhood security policies are the same in the two groups and this means that work incentives do not differ. Between-region migration should also be considered. One of the potential issues is sorting of families into regions with higher childcare availability that could lead to a correlation between childcare availability and mothers' labour outcomes. Comparing between-region migration in the treatment and control groups displays very similar trends, which means that regions with higher childcare availability do not attract more families.[20] This descriptive analysis does not indicate that there is a need to be concerned about different trends in socio-demographic and economic time-varying characteristics, although I control for all these regional variables in the regression analysis.

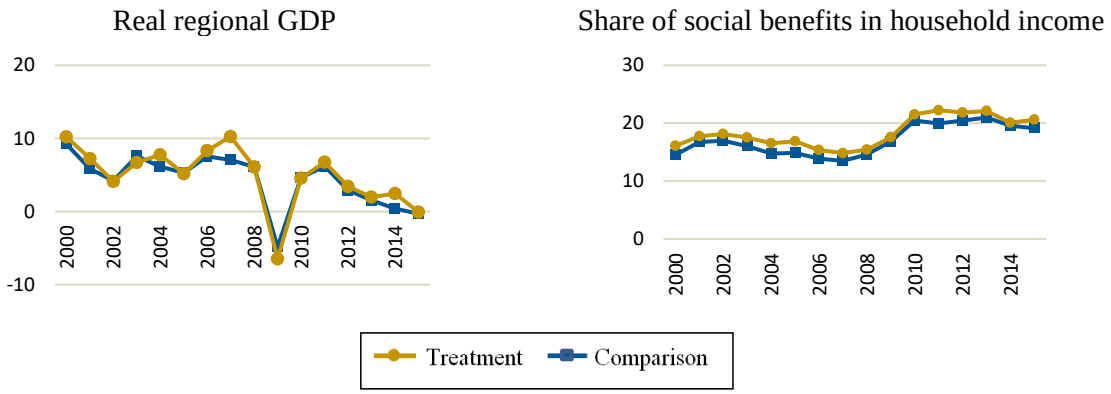

Figure 11 – Dynamics of region's wealth and generosity characteristics in treatment and comparison groups

Note: See notes to Figure 10 for the definition of treated and comparison groups. The real regional GDP is measured in growth rates compared to previous years. Social benefits include all type of benefits as well as pensions, scholarships, insurance compensations and others.
Source: Country-level data from the Federal State Statistic Service of Russian Federation.

[20] Also, the literature on interregional migration in Russia does not allocate childcare availability as a separate potential factor that affects migration flows. This indirectly confirms that people do not adjust the place they live according to childcare availability expansion.

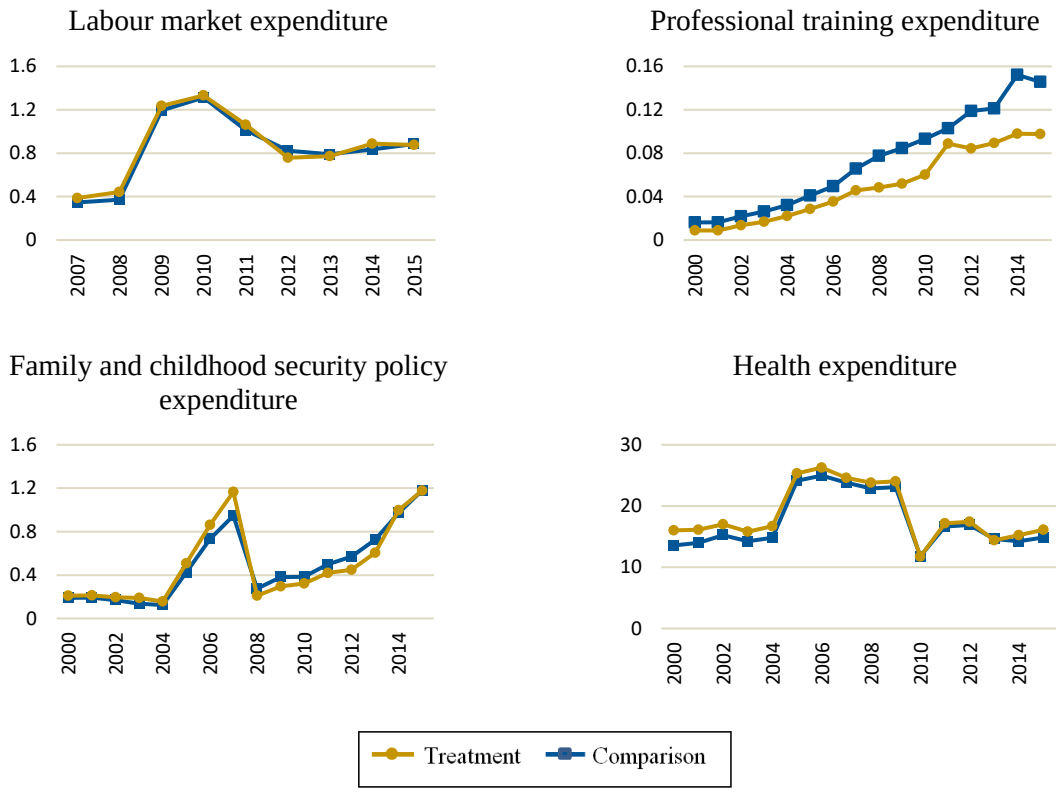

Figure 12 – Dynamics of regional expenditures on different policies in treatment and comparison groups (thousand rubbles per capita)

Note: See notes to Figure 10 for the definition of treated and comparison groups.
Source: Author's calculations based on the region-level data on budgets accounts from the Federal Treasury.

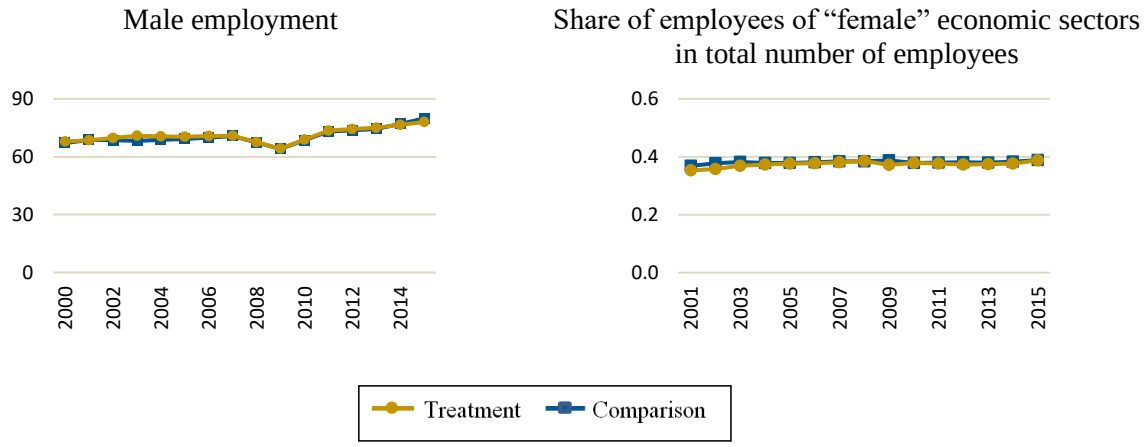

Figure 13 – Dynamics of regional labour market characteristics in treatment and comparison groups

Note: See notes to Figure 10 for the definition of treated and comparison groups. Male employment is presented for working age people (16-59 years old in Russia). In 2015, the "female" economic sectors with corresponding proportions of women in these sectors in parentheses are Education (82%), Health and Social Services (79%), Hotels and Restaurants (76%), Other Public and Social Services (68%), Wholesale and Retail Trade (61%). These five sectors covered 58.3% of employed women in 2015.
Source: Regional-level data from the Federal State Statistic Service of Russian Federation.

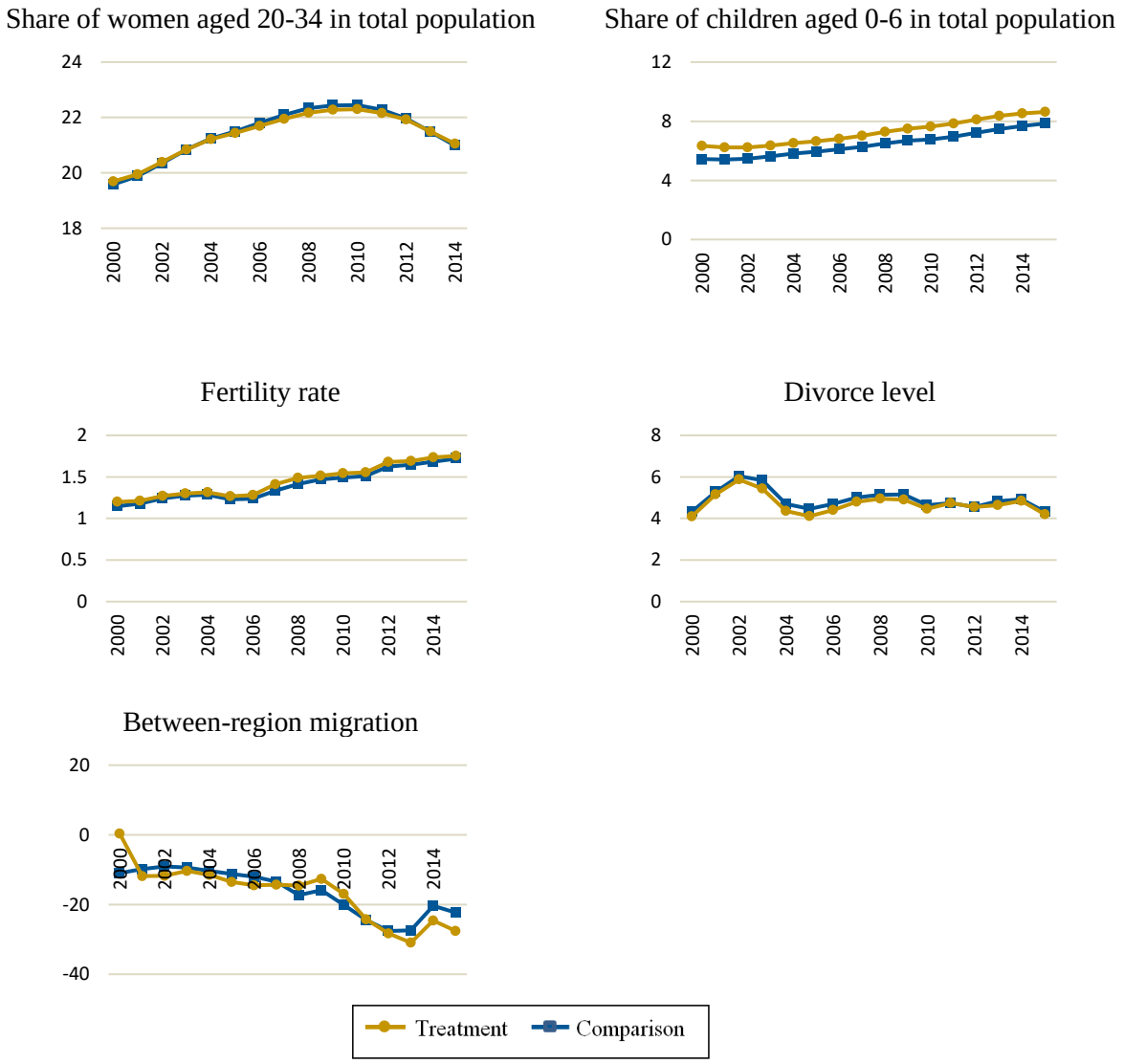

Figure 14 – Dynamics of regional demographic characteristics in treatment and comparison groups

Note: See notes to Figure 10 for the definition of treated and comparison groups. Divorce level shows the number of divorces per 1000 people. Between-region net migration rate shows the difference the number of persons entering and leaving a region during the year, per 10,000 persons.
Source: Regional-level data from the Federal State Statistic Service of Russian Federation.

6. Results

Table 7 shows my main results based on Eq. (1), where each row shows the result of a separate regression for the nine labour market outcomes while columns correspond to different specifications of the main equation. Column (1) presents results of a model that controls for year and regional fixed effects as well as individual and family characteristics. In column (2) I control for the interaction of year fixed effects with childcare availability during the first year of the observation period. In column (3) I add regional controls capturing

regional socio-demographic and economic conditions and regional policy decisions how to distribute regional budgets among different policies. The model that includes all listed covariates is used as a baseline specification. For the baseline model, I adjust the p-values for multiple inference correction following Anderson (2008), Table A.1.

Column (1) shows that when I control for year and region fixed effects as well as individual and family characteristics the effect of the childcare expansion on LFP, employment, full-time job and hours of work is relatively high and statistically significant while the effect on part-time job, over-employment, job search and training is also statistically significant but small. These results rely on the identification assumption that there are no omitted time-varying and region-specific effects correlated with the childcare expansion. Column (2) shows the results of a model that takes into account that the allocation of childcare in regions could be an explicit function of the childcare availability in the region in 2000, the first year of the studied time period. Including the interactions of year fixed effects with starting levels of childcare availability in the regions in 2000 makes most estimates smaller, suggesting that starting levels of childcare availability are correlated with the childcare availability expansion. In Column (3), I add in region-level controls which do not change point estimates much. Overall, the results change only between Columns (1) and (2). This indicates the importance of controlling for starting levels of enrolment rates because it may be correlated with the childcare expansion and affect labour market outcomes.

The baseline specification, displayed in Column (5), shows positive and statistically significant effects of childcare expansion on some maternal labour market outcomes. More specifically, if there is a 10 pp increase in childcare enrolment, the probability of maternal labour force participation increases by 3.0 pp and the probability to be employed increases by 2.5 pp. This magnitude of expansion in childcare availability also leads to increase the extensive margin of full-time employment by 2.2 pp and informal employment by 0.7 pp but these effects are statistically significant only at the 10% level. The intensive margin of maternal labour supply reacts by 1.24 hours increase per week in response to a 10 pp growth of childcare availability.

To assess the magnitude of these results, I consider a total increase in childcare availability from 55% to 66.2% between 2000 and 2015 which is equal to 11.2 pp. Assuming linearity of the results, I argue that overall childcare expansion increased the total maternal labour force participation by an average of 3.4%, an extensive margin of maternal employment by an average of 2.8%, an extensive margin of full-time employment by an

average of 2.5% and an intensive margin of maternal labour supply by an average of 1.4 hours per week between 2000 and 2015.

Table 7 – Effect of childcare availability on mothers' labour market outcomes

Outcome:	(1)	(2)	(3)	N
Labour force participation	0.0062***	0.0027**	0.0030**	17,084
	(0.000)	(0.001)	(0.001)	
Employment	0.0055***	0.0021*	0.0025**	17,084
	(0.000)	(0.001)	(0.001)	
Part-time job	0.0005**	-0.0002	-0.0002	16,358
	(0.000)	(0.001)	(0.001)	
Full-time job	0.0039***	0.0015	0.0022*	16,358
	(0.000)	(0.001)	(0.001)	
Over-employment	0.0011***	0.0007	0.0005	16,358
	(0.000)	(0.001)	(0.001)	
Hours of work	0.2286***	0.1004**	0.1242**	16,358
	(0.015)	(0.046)	(0.045)	
Informal employment	0.00002	0.0005	0.0007*	17,076
	(0.000)	(0.000)	(0.000)	
Job searching	0.0006***	0.0008*	0.0004	17,084
	(0.000)	(0.000)	(0.000)	
Training	0.0005***	-0.0002	-0.0000	16,436
	(0.000)	(0.000)	(0.000)	
Year fixed effect	Yes	Yes	Yes	
Regional fixed effect	Yes	Yes	Yes	
Individual and family characteristics	Yes	Yes	Yes	
Availability2000*Year FE	No	Yes	Yes	
Regional characteristics	No	No	Yes	

Note: The sample includes mothers aged 20-49 whose youngest child is aged between 0 and 6. All regressions are linear regressions. Key treatment variable is enrolment rate that varies from 0 to 100%. Standard errors of the means are reported in parentheses. The first column regression includes a vector of mothers' individual and family structure characteristics such as age, education, health, marital status, number of children in the age bands 0-2, 3-6, 7-10, 11-15, age of youngest child, dummy for unemployed grandmother in the household, dummy for another female unemployed household members. In the second column, regression interaction between year dummies and levels of childcare availability (enrolment rate) in 2000 is also added. The third column specification includes all previous controls plus regional characteristics such as male employment, female unemployment in period *t*-1, share of employees of "female" economic sectors in total number of employees, regional migration, level of marriages, level of divorces, share of women aged 20-34, share of women aged 35-54, share of population under the age of 6 years, regional expenditure on health per person, regional expenditure on higher education per person, regional expenditure on professional training per person, regional expenditure on youth policy per person, regional expenditure on social security per person, regional expenditure on family policy per person, regional expenditure on labour market support per person, average proportion of social benefits in household income at the regional level, GDP per capita in period *t*-1, settlement type. Finally, the forth and the fifth columns present regressions with all previous controls plus regional and year fixed effects respectively. The fifth specification that includes all listed covariates is used as a baseline specification. The regression sample sizes are sometimes slightly different from column to column. This is because there is different amount of missing data for different variables. As a rule, for each specification I drop observation that is either missing the dependent variable or missing all of the independent variables. The last column shows the number of observations for the final specification. Standard errors are clustered at the regional level. *p<0.10, **p<0.05, ***p<0.001.

Table 8 shows that the estimated impact varies across different groups of mothers. Panel A displays the difference in the impact between single and partnered mothers; Panel B shows the difference between low- and high-educated mothers; and Panel C reports the difference between the group of mothers whose youngest child is aged 0-2 and the group of mothers whose youngest child is aged 3-6. By low-educated mothers, I consider those who at most have secondary education. For every difference I adjust the p-values for multiple inference correction following Anderson (2008), Table A.2.

Panel A shows results that diverge from the existing literature, which often underlines that childcare growth has significantly higher effect for single mothers or the effect exists only for single mothers. In the case of Russia, the effect of childcare availability on the labour force participation of single mothers is significantly lower than on mothers with partners. We observe that a 10 pp growth in childcare enrolment increases labour force participation by 3.1 pp among mothers with partners and by 2.1 pp among single mothers. One potential explanation for this is that single mothers experience higher financial needs, which force them to come back to the labour market even in the absence of public childcare. As a consequence, these mothers have to find alternative methods of childcare for their children. Also, there is a minor but significant difference in terms of probability to be employed and informal employment.

Panel B demonstrates that there are also some significant differences between low- and high-educated mothers in the effect of childcare availability. It seems that childcare expansion affects low-educated mothers less than high-educated ones in terms of labour force participation, employment and working full-time. But, again, these differences are indistinguishable from zero except the probability of having a full-time job. A 10 pp growth in childcare enrolment increases probability of being employed full-time by 3.0 pp among high-educated mothers while for low-educated mothers the effect is equal to 1.3 pp and it is not statistically significant. At the same time it is observed that there is a minor positive and statistically significant effect on over-employment among low-educated mothers whereas there is no effect on over-employment among high-educated mothers.

Panel C shows some differences in the effect of childcare availability between the group of mothers whose youngest child is aged 0-2 and the group of mothers whose youngest child is aged 3-6. For example, the effect on labour force participation is bigger for mothers whose youngest child is aged 0-2, but the probability to work full-time is higher among those mothers whose youngest child is aged 3-6. However, these differences are not statistically significant.

Table 8 – Heterogeneity analysis: Effect of childcare availability on mothers' labour market outcomes

	Panel A			Panel B			Panel C		
	Partnership status			Education			Youngest child age is 0-2		
Outcome:	Single (1)	Partnered (2)	Δ (3)	Low (4)	High (5)	Δ (6)	0-2 (7)	3-6 (8)	Δ (9)
LFP	0.0021*	0.0031**	-0.0010**	0.0027**	0.0033**	-0.0007**	0.0033***	0.0021**	-0.0013
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Employment	0.0020*	0.0026**	-0.0006*	0.0021**	0.0029**	-0.0008**	0.0027**	0.0022**	-0.0005
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Part-time job	-0.0006	-0.0001	-0.0005**	-0.0002	-0.0001	-0.0001	0.0001	-0.0007	-0.0009***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Full-time job	0.0021*	0.0022*	-0.0001	0.0013	0.0030**	-0.0017***	0.0016	0.0026**	0.0010
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Over-employment	0.0006	0.0005	0.0001	0.0010*	0.0002	0.0008**	0.0007	0.0002	-0.0005
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Hours of work	0.1151**	0.1253**	-0.0102	0.1158**	0.1342**	-0.0184	0.1234**	0.1117**	-0.0117
	(0.042)	(0.046)	(0.016)	(0.046)	(0.044)	(0.011)	(0.052)	(0.038)	(0.035)
Informal employment	0.0004	0.0007*	-0.0004**	0.0008*	0.0007	0.0001	0.009*	0.0007	-0.0002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Job searching	0.0000	0.0005	-0.0005**	0.0005	0.0003	0.0002**	0.0007*	-0.0003	-0.0009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Training	-0.00008	-0.00005	-0.00003	-0.0004	0.0003	-0.0007***	0.0000	-0.0003	-0.0003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)

Note: See notes to Table 5 for details in baseline specification. All regressions are linear regressions. Key treatment variable is enrolment rate that varies from 0 to 100%. Standard errors of the means are reported in parentheses. Mother is defined as single if she is not married and does not have a partner. Mother is defined as having low education if at most she has secondary school education. *p<0.10, **p<0.05, ***p<0.001.

7. Robustness checks and extension

Table 9 reports a number of robustness checks based on the Eq. (1), demonstrating that the effect of childcare availability on maternal labour market outcomes is very similar to the baseline results (Column (1)) across different specifications. For every specification test I adjust the p-values for multiple inference correction following Anderson (2008), Table A.3.

More precise control for regional time-varying characteristics

The main assumption for the strategy I use in this paper is that the expansion of childcare across all regions in Russia and over time is independent of other possible region-specific and time-varying characteristics that could potentially affect maternal labour market behaviour. Even after controlling for the rich set of regional characteristics this still might be an issue. Thus, I follow Duflo (2001) and add interactions between all regional characteristics at the starting point in 2000 and year fixed-effect. Column (2) of Table 9 shows that after

controlling for this extra set of regional characteristics results stay very similar to the baseline that are reported in Column (1).

Excluding 2014 and 2015 from the analysis

There are two reasons to exclude 2014 and 2015 from the analysis. The first is that in 2013 the government launched the program on preschool childcare system modernisation and regions began to get federal subsidies. Thus, exclusion of 2014 and 2015 from the analysis shows the effect of the childcare expansion without taking the national reform into account.

The second reason is methodological. In 2014, the methodology for data collection on childcare providers changed. Before 2014 all information on childcare providers was based only on those organisations that provide childcare exclusively. In 2014, the number of organisations that were obliged to provide information expanded. Since that time it is not only those organisations that specialise in providing childcare services but also those organizations that specialise in the formal education in general (schools, colleges, universities and so on) and additionally provide services for preschool age children. This should not change the derivation of the dataset for the enrolment rate because all children covered by childcare system should be taken into account regardless of whether they attend just childcare or a college that additionally provides childcare services. To be sure that this does not affect the results, I estimate the baseline model without these two years. Column (3) of Table 9 demonstrates that the effect of the childcare expansion on maternal labour outcomes is nearly the same for all outcomes except full-time job.

Excluding the 2000-2006 time period from the analysis

There are two reasons to exclude the period of time between 2000 and 2006. First, as mentioned in Section 3, between 2000 and 2007 the number of enrolled children was less than the total number of places in childcare system. It means that not all available places were taken and it can affect the method I use to define childcare availability. Second, as described in Section 4, detailed information on the enrolment rate by age exists only from 2007. To fill the gap between 2000 and 2007, I use the existing information on enrolment rates by age in 2007 and apply this backwards in time to the total regional enrolment rates during the period of 2000-2006. To check whether the results are sustainable I drop this time period and run the baseline model only for the period of 2007-2015. Column (4) of Table 9 reports that the results do not change.

Excluding five regions with extremely large increases in the female employment rate

During the period of 2000-2015, there are five regions that experienced a very high female employment growth – 43.0 pp in the Krasnoyarsk region, 23.0 pp in the Nizhny Novgorod region, 21.7 pp in the Penza region, 16.6 pp in the Orenburg region and 13.5 pp in the Republic of Chuvash. I drop these regions from the analysis to be sure that the main results are not driven by these outliers. Column (5) of Table 9 shows that the results are robust to this check.

Excluding rural areas from the analysis

Despite the fact that the over-enrolment problem was always a concern both in urban and rural areas (see Table 2 in Section 3), in rural areas the average number of enrolled children per 100 places was less than 100 between 2000 and 2015. These contradictory circumstances possibly arise because of the distance issue that is described in Section 4. The fact that the total number of available places was higher than the total number of enrolled children could put into question the use of the definition of childcare availability that is equal to enrolment rates. Although in Section 4 I describe why we still could use enrolment rates as a measure of childcare availability, I drop rural areas at the sub-regional level from the analysis as a robustness check. Column (6) of Table 9 reports that the results do not change much.

Probit model estimation

So far I have used OLS regressions for all outcomes. Nevertheless, because 8 out of 9 labour market outcomes are binary variables, I estimate Eq. (1) as a probit regression model. Column (7) of Table 9 reports marginal effects what look very similar to the baseline results with small change in the probability to have a full-time job which is 1 pp higher with a higher level of statistical significance.

Panel data estimation

The longitudinal nature of the data allows controlling for mother fixed effects that enable the removal of any time-invariant difference in labour market outcomes between mothers from different regions with different level of childcare exposure. The results from Column (8) of Table 9 show that using mother fixed effects is in line with the baseline results, indicating unobservable characteristics are not an issue.

Analysis for mothers of children who are not the youngest in the household

All previous results are based on the model which estimates the impact of childcare availability expansion for the youngest child in the households. Theoretically the effect could be different for those who are the youngest in the household and for those who are not the youngest in the household. Column (9) of Table 9 presents results based on the same baseline model, but for mothers of children aged between 0 and 6 who are not the youngest in the household. There are some significant effects on a mode of work (part-time/full-time/overemployment) but these coefficients are extremely small. In general, in line with the previous literature there is no evidence of changes in employment or hours of work in response to childcare availability expansion for children who are not the youngest in the household.

8. Conclusion

This paper provides the first evidence of the effects of public childcare expansion on maternal labour market outcomes in Russia. While in many countries during the last decades childcare expansion was on the top of the policy agenda, the Russian government until recently did not pay much attention to this issue. This led to a substantial excess demand for childcare. In this context, Russian regions had to solve the problem without financial support from the central government, which resulted in significant variations in childcare availability across regions over time. I exploit this variation, conditioning on a rich set of economic time-varying regional characteristics, to establish causality.

Using a wide range of labour market outcomes, the estimates reveal that there is a significant positive effect of childcare expansion. A 10 pp growth in childcare availability increases the probability to participate in the labour force by 3.0 pp, the probability to be employed by 2.5 pp and the probability to have a full-time job by 2.2 pp among mothers whose youngest child is under the age of 6 years. In addition, it leads to increase hours of work by 1.4 hours per week. Several robustness checks corroborate the validity of these results. The effects are significantly smaller for single mothers and this is in line with extremely high level of employment among single mothers in Russia.

To sum up, the results show that an expansion of public childcare is an effective policy to increase employment of mothers of young children. The demographic processes that are currently taking place in Russia, the ageing population in particular, increase the share of pensioners in the country while the share of working people is declining. This results in high risks for the Russian social system. Under these circumstances, the creation of appropriate

conditions for maternal employment is one of the potential mechanisms in mitigating these problems.

Similarities between Russia and other post-socialist countries in Central and Eastern Europe, such as low maternal labour supply rates, lack of part-time jobs and low childcare coverage rates of children under the age of three, suggest a potential positive effect of childcare expansion on maternal employment in these countries as well. However, it is crucial to keep in mind that mothers' labour market behaviour is a complex phenomenon and that to help mothers to join the labour market other changes are required. This could include creating flexible and part-time job opportunities or increasing the quality and flexibility (such as more flexible hours) of childcare.

Table 9 – Robustness checks: alternative specifications and samples

	Baseline model (1)	Economic controls2000 * year FE (2)	Without 2014 and 2015 (3)	Without 2000-2006 (4)	Without five regions (5)	Only urban area (6)	Probit-model (7)	Mother FE (8)	Not the youngest children in HH (9)
Labour force participation	0.0030***	0.0037**	0.0029**	0.0029**	0.0035**	0.0032**	0.0032**	0.0037***	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment	0.0025**	0.0032**	0.0025*	0.0026**	0.0028**	0.0028**	0.0030**	0.0031***	0.0003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Part-time job	-0.0002	0.0001	0.0002	-0.0002	0.0001	-0.0006	0.0000	0.0003	0.0004**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Full-time job	0.0022*	0.0023*	0.0013	0.0021*	0.0022*	0.0021**	0.0030***	0.0018**	-0.0013**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Over-employment	0.0005	0.0008	0.0010	0.0006	0.0005	0.0015**	0.0005	0.0007	0.0008**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Hours of work	0.1242**	0.1493**	0.1241**	0.1302**	0.1302**	0.1731**	-	0.1303***	0.0035
	(0.047)	(0.050)	(0.052)	(0.050)	(0.049)	(0.058)	-	(0.040)	(0.021)
Informal employment	0.0007*	0.0007	0.0007	0.0007	0.0007	0.0004	0.0006	0.0008**	0.0005*
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Job searching	0.0004	0.0005	0.0004	0.0004	0.0008*	0.0003	0.0003	0.0005	0.0002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Training	-0.0000	0.0002	0.0003	0.0001	0.0005	-0.0001	0.0003	0.0004	0.0002
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
N	17,084	17,084	14,395	11,784	14,551	11,579	17,084	17,084	2,086

Note: See notes to Table 5 for details in baseline specification. All regressions are linear regressions. A key treatment variable is enrolment rate that varies from 0 to 100%. Standard errors of the means are reported in parentheses. Results in Column (1) are baseline model. Results in Column (2) control more precise for regional time-varying characteristics adding interactions between all regional characteristics at the starting point in 2000 and year fixed effects. Results in Column (3) are without 2014 and 2015 years. Results in Column (4) are without 2000-2006 time period. Results in Column (5) are without five regions with extremely high increase in female employment rate. Results in Column (6) are without rural area. Results in Column (7) use probit model instead of OLS. Results in Column (8) are with mother fixed effects. Results in Column (9) are for mothers of children who are not the youngest in the household. Standard errors are clustered at the LEA level. *p<0.10, **p<0.05, ***p<0.001

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Appendix

Table A.1 – Effect of childcare availability on mothers' labour market outcomes - Table of p-values and q-values.

Outcome:	P-values of the baseline model
Labour force participation	**0.010**
	0.045
	0.048
Employment	**0.022**
	0.066
	0.055
Part-time job	0.665
	0.749
	0.499
Full-time job	**0.055**
	0.124
	0.090
Over-employment	0.302
	0.389
	0.209
Hours of work	**0.009**
	0.045
	0.048
Informal employment	**0.093**
	0.168
	0.126
Job searching	0.277
	0.389
	0.209
Training	0.994
	0.994
	0.635

First row: standard p-values.

Second row: q-values introduced by Benjamini and Hochberg (1995).

Third row: sharpened two-stage q-values introduced by Benjamini, Krieger, and Yekutirli (2006).

Note: This is a table of p-values and q-values corresponding to Column (5) of Table 7. Q-values are p-values that are adjusted for the number of multiple hypotheses being tested. I adjust them considering all hypotheses tested in Table 7, following Anderson (2008).

Table A.2 – Heterogeneity analysis: Effect of childcare availability on mothers' labour market outcomes - Table of p-values and q-values.

	Difference between single and partnered mothers	Difference between low- and high-educated mothers	Difference between mothers whose youngest child aged 0-2 and 3-6
LFP	**0.008**	**0.006**	0.145
	0.036	**0.011**	0.327
	0.038	**0.007**	0.341
Employment	**0.098**	**0.001**	0.505
	0.177	**0.003**	0.569
	0.113	**0.002**	0.485
Part-time job	**0.004**	0.290	**0.010**
	0.036	0.311	**0.045**
	0.038	0.116	**0.042**
Full-time job	0.737	**0.000**	0.121
	0.816	**0.001**	0.327
	0.570	**0.001**	0.341
Over-employment	0.681	**0.001**	0.226
	0.816	**0.003**	0.407
	0.570	**0.002**	0.463
Hours of work	0.528	0.111	0.739
	0.792	0.143	0.739
	0.544	0.050	0.686
Informal employment	**0.045**	0.311	0.419
	0.102	0.311	0.539
	0.073	0.116	0.485
Job searching	**0.019**	**0.011**	**0.000**
	0.057	**0.017**	**0.001**
	0.047	**0.010**	**0.001**
Training	0.816	**0.000**	0.417
	0.816	**0.001**	0.539
	0.570	**0.001**	0.485

First row: standard p-values.

Second row: q-values introduced by Benjamini and Hochberg (1995).

Third row: sharpened two-stage q-values introduced by Benjamini, Krieger, and Yekutirli (2006).

Note: This is a table of p-values and q-values corresponding to Column (3), (6) and (9) of Table 8. Q-values are p-values that are adjusted for the number of multiple hypotheses being tested. I adjust them considering all hypotheses tested in Table 8, following Anderson (2008).

Table A.3 – Robustness checks: alternative specifications and samples - Table of p-values and q-values.

	Baseline model	Economic controls2000 * year FE	Without 2014 and 2015	Without 2000-2006	Without five regions	Only urban area	Probit-model	Mother FE	Not the youngest children in HH
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(9)
Labour force participation	**0.010**	**0.009**	**0.038**	**0.038**	**0.015**	**0.033**	**0.012**	**0.000**	0.511
	0.045	**0.030**	0.159	0.129	**0.068**	**0.099**	**0.035**	**0.001**	0.723
	0.048	**0.031**	0.190	0.133	**0.073**	**0.097**	**0.034**	**0.001**	0.671
Employment	**0.022**	**0.010**	**0.053**	**0.043**	**0.033**	**0.029**	**0.013**	**0.000**	0.642
	0.066	**0.030**	0.159	0.129	**0.099**	**0.099**	**0.035**	**0.001**	0.723
	0.055	**0.031**	0.190	0.133	**0.084**	**0.097**	**0.034**	**0.001**	0.671
Part-time job	0.665	0.884	0.638	0.783	0.817	0.279	0.994	0.461	**0.064**
	0.749	0.884	0.638	0.806	0.817	0.419	0.994	0.461	0.144
	0.499	0.418	0.483	0.559	0.373	0.229	0.816	0.258	0.127
Full-time job	**0.055**	**0.053**	0.217	**0.070**	**0.099**	**0.094**	**0.004**	**0.034**	**0.011**
	0.124	0.120	0.326	0.158	0.179	0.170	**0.032**	**0.065**	**0.059**
	0.090	**0.087**	0.278	0.149	0.135	0.119	**0.034**	**0.046**	**0.063**
Over-employment	0.302	0.186	0.159	0.250	0.342	**0.047**	0.284	0.298	**0.013**
	0.389	0.279	0.326	0.375	0.385	0.106	0.450	0.382	**0.059**
	0.209	0.184	0.278	0.264	0.217	0.104	0.323	0.205	**0.063**
Hours of work	**0.009**	**0.005**	**0.019**	**0.013**	**0.012**	**0.006**	-	**0.001**	0.868
	0.045	**0.030**	0.159	0.117	**0.068**	**0.054**	-	**0.003**	0.868
	0.048	**0.031**	0.190	0.133	**0.073**	**0.058**	-	**0.003**	0.932

	Baseline model	Economic controls2000 * year FE	Without 2014 and 2015	Without 2000-2006	Without five regions	Only urban area	Probit-model	Mother FE	Not the youngest children in HH
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(7)	(9)
Informal employment	**0.093**	0.144	0.213	0.125	0.127	0.374	0.122	**0.036**	**0.053**
	0.168	0.260	0.326	0.225	0.191	0.481	0.244	**0.065**	0.144
	0.126	0.169	0.278	0.177	0.146	0.272	0.180	**0.046**	0.127
Job searching	0.277	0.257	0.406	0.363	0.077	0.524	0.393	0.268	0.546
	0.389	0.331	0.522	0.467	0.174	0.590	0.450	0.382	0.723
	0.209	0.225	0.483	0.291	0.131	0.356	0.323	0.205	0.671
Training	0.994	0.728	0.630	0.806	0.211	0.964	0.392	0.339	0.587
	0.994	0.819	0.630	0.806	0.272	0.964	0.450	0.328	0.723
	0.635	0.387	0.483	0.559	0.021	0.720	0.323	0.205	0.671

First row: standard p-values.

Second row: q-values introduced by Benjamini and Hochberg (1995).

Third row: sharpened two-stage q-values introduced by Benjamini, Krieger, and Yekutirli (2006).

Note: This is a table of p-values and q-values corresponding to Table 9. Q-values are p-values that are adjusted for the number of multiple hypotheses being tested. I adjust them considering all hypotheses tested in Table 9, following Anderson (2008).