THE IMPACT OF THE 2007 MATERNITY CAPITAL POLICY IN THE RUSSIAN FEDERATION

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Abstract

Between the fall of the Soviet Union in 1991 and 2008, the population of the Russian Federation declined as mortality rates surged and fertility rates fell below replacement. In 2007, Russia's federal government implemented a pro-natalist policy in an attempt to address what Vladimir Putin called "the most acute problem of contemporary Russia", demographic crisis (Putin 2006). Women who gave birth to a second or higher order child between 2007 and 2016 were eligible for "maternity capital" monetary assistance (initially 250,000 rubles) which could be put toward housing, education, or the mother's pension. Assessing the impact of such `baby-bonus' policies can assist the design of future interventions and provide an opportunity to estimate the responsiveness of fertility to prices. In this paper, we implement a quasi-experimental strategy by forming treatment and control groups defined by time and family type. We also perform analysis of vital statistics, including cross-country comparisons. We find mixed evidence regarding the impact of the policy.

1 Introduction

Russian fertility has been among the lowest in the world in recent history, with a total fertility rate (TFR) of 1.3 births per woman in 2006, well below the replacement rate of 2.1 (The World Bank 2018a). Between 1991 and 2008, the population of the Russian Federation declined from 149 million to 143 million as fertility rates fell below replacement (The World Bank 2018b). In his 2006 State of the Nation address, President Vladimir Putin stated that demographic decline is "the most acute problem of contemporary Russia" (Presidential Executive Office 2010).

National fertility rates below the replacement level put downward pressures on general wellbeing through the adverse effects related to a shrinking workforce and rapidly aging population (Ezeh, Bongaarts, and Mberu 2012; Drago et al. 2011). In response to below-replacement fertility rates, several governments have implemented pro-natalist policies including subsidized childcare, special tax treatment for families with children, and paid parental leave (Ezeh et al. 2012; Milligan 2005; Drago et al. 2011). More recently, some governments have used direct financial incentives in attempts to lift fertility rates. Baby bonus schemes are those which provide a sum of money to parents of a newborn baby or adopted child (Denisova and Shapiro 2013). Russia, Canada, Australia, Italy (Denisova and Shapiro 2013), Poland (Easton 2005), and Singapore (Ministry of Social and Family Development, `Baby Bonus Scheme') have offered such baby bonuses to parents.

Russia has a history of pro-natalist policies dating back to the 1930s, when pro-family propaganda erupted under Stalinism, abortion was outlawed, and laws were enacted to encourage pregnancy and childbirth. Historical Russian pro-natalist policies have included awarding the title of "Mother Heroine" between 1944 and 1991 for bearing and raising a large family, a 1981 policy which included the introduction of partially paid parental leave (Frejka and Zakharov 2013), and the less conventional establishment of the Day of Conception in the region of Ulyanovsk (Weaver, 2007). In December 2006, the government passed the Federal Law of the Russian Federation No. 256-FZ "On Additional Measures of State Support of Families with Children" in a further attempt to lift the birthrate and halt demographic decline. This law provides "maternity capital" (MC) assistance to mothers, available in the event of a birth or adoption of a second or higher

order child between January 1, 2007 and December 31, 2016. The maternity capital, initially set at 250,000 rubles, may be put toward improving housing conditions, education, or the mother's pension (Miljkovic and Glazyrina 2015). The size of the incentive is large, amounting to double the 2006 reported mean annual wage in Russia (Denisova et al. 2013, 19). In total, 9 million maternity capital certificates were issued between 2007 and 2018. By 2018, 6.4 million families had received maternity capital, and 62.2% (5.6 million) of the issued certificates were fully spent (Pension Fund of the Russian Federation 2018). Over the 12 years of the maternity capital policy, total support distributed amounted to 2.34 trillion rubles.

Following the announcement of the policy, Gary Becker wrote that, due in part to the generous size of the bonus and because the payment is in the form of a cash bonus rather than a stream of payments, he "would guess that Russian fertility would increase by about 10-20 per cent from current levels, or from the present total fertility rate of 1.28 to perhaps as high as 1.55" (Becker 2006). However, Richard Posner wrote that, contrary to Becker, he believes that "Putin's plan will fail" (Posner 2006) due to the lack of credibility.

By 2014, Russia's TFR had lifted to 1.75, where it held for the following two years (World Bank 2018a). The government attributed this lift in the birth rate to the MC policy. In April 2008, Health and Social Development Minister Tatyana Golikova noted that Russia experienced a "real demographic explosion" over the 15 months since the policy commenced, which she attributed to the Russian government's pro-natalist strategies generally (Bernstein 2008). However, demographers including Frejka and Zakharov are more skeptical, stating that "Russia's pro-natalist family policies appear to be a failure" (Frejka et al., 644) and arguing that the policy caused a lowering of the age of birth and shortening of birth intervals as opposed to an increase in completed birth rates.

Several studies investigate the effect of financial incentives on fertility. In Russia, Slonimczyk and Yurko (2013) estimate the 2007 MC policy increased long-run fertility by around 0.15 children per woman and Miljkovic et al. (2015) estimate a 0.04 increase in TFR as a result of that policy. Outside of Russia, Milligan (2005) estimates the 1988-1997 Allowance for Newborn Children policy in the Canadian province of Quebec resulted in an increase in fertility of up to 25 per cent for families eligible for the full cash payment.

In Australia, Gans and Leigh (2009) find that over 1,000 births were "moved" to ensure eligibility for the 2004 Australian Baby Bonus, while Drago et al. (2011) find that this bonus "exerted a small though positive and significant effect on fertility" (2013, 395), and Sinclair et al. (2012) estimate that approximately 108,000 births between 2005 and 2009 are attributable to the policy. In the north-eastern Italian region of Friuli-Venezia Giulia (FVG), Boccuzzo et al. (2008) estimate around 1,000 additional births between 2001 and 2004 were due to the 2000-2005 FVG baby bonus policy.

There are two major challenges related to evaluating the impact of the MC policy. First, the Russian government made changes to other fertility-related policies around the same time that the MC policy was introduced, including maternity leave and child benefits (Slonimczyk et al. 2013). Second, permanent fertility behaviour of the women affected by the policy will only be fully observable after they complete their fertile period. Before this time, it is difficult to distinguish a permanent increase in fertility from a transitory shift of birth timing within the fertile period (Frejka et al. 2013). Further, the policy has undergone several significant changes since 2007, including changes to restrictions on MC. In addition, while the policy was initially slated to end in 2017, it has been extended twice and is now scheduled to end in December 2020. This means that we cannot yet use a cancellation of the policy for a quasi-experimental analysis.

In order to partially address these issues, we implement a difference-in-difference approach to assess the impact of the MC Policy on fertility rates in Russia. We exploit the structure of the policy, which allows for the formation of treatment and control groups defined by time and family type. This controls for most, but not all, overlapping fertility related policies. It does not control for some minor aspects of changes to child benefits which are also a function of birth order (Slonimczyk et al. 2013). We also gather additional evidence from vital statistics to support a permanent rather than transitory shift in fertility behaviour, as recommended by Milligan (2005).

Although this is still a preliminary assessment of the policy, we build on existing literature and make use of an additional 7-8 years of data that were not available to earlier researchers. Furthermore, we propose an economic model of fertility as a basis for econometric analysis. The model we estimate builds on previous quasi-experimental analysis of baby

bonus schemes, including the assessment of the Quebec baby bonus by Milligan (2005), the assessment of the Australian baby bonus by Drago et al. (2011), and the assessment of the Russian MC Policy by Slonimczyk et al. (2013).

Our econometric and graphical analyses do not find convincing evidence for an effect of the MC policy on the probability of a woman giving birth. We propose a number of reasons for the lack of responsiveness:

1. As highlighted by Borozdina et al. (2016), families may experience barriers and difficulties accessing the policy which make maternity capital less valuable
    a. Recipients must have sufficient financial resources to utilize the maternity capital to improve their housing conditions. A study based on 130 interviews with recipients of maternity capital found that many respondents were unable to use maternity capital because of economic restrictions. (Russkikh, 2018).
    b. Recipients face additional bureaucratic costs to applying for the MC policy (Borozdina, 2016)
2. There are restrictions on how MC can be used, reducing its value to recipients. There is significant supporting evidence for this:
    a. The most common complaints are that the purchase of vehicles and land are prohibited (Russkikh, 2018).
    b. Economic theory states that payments in kind are less valuable to individuals than a cash transfer of the same value, and the MC payment constrains the behaviour of the recipients (Currie and Gahvari 2007).
    c. Russkikh (2018) finds evidence of illegal uses of maternity capital to circumvent the restrictions to using it, such as using agencies to cash maternity capital to purchase a tractor.

There is some evidence of heterogeneous responses to the policy.

Previous researchers have found a small, positive, significant response to the Russian Maternity Capital Policy. Unlike previous studies, however, we do not find evidence of hetereogeneous responses by income level. The literature has seen mixed results in regard

to policy responsiveness by income level, with some researchers finding that higher income families are more responsive to baby bonus schemes (Milligan 2005), and others finding that lower income families are more responsive to such schemes (Slonimczyk et al. 2013; Drago et al. 2011). Additional complicating issues, highlighted by Borozdina et al. (2016) include the point that lower income families may have fewer opportunities to use the benefit (66) and that "parents from lower social backgrounds encountered significant difficulties when trying to understand and following the stipulations of the family policy arrangements" (67).

The paper is structured as follows. Section two discusses the structure of the policy and issues evaluating its impacts. Section three discusses economic models of fertility that inform the econometric analysis. Section four describes evidence from vital statistics, including graphical analysis and changes in cohort fertility. Section five presents evidence from the Russian Longitudinal Monitoring Survey. Section six discusses the 2018 policy package. Section seven presents potential extensions of this research. Section eight concludes.

2 The Maternity Capital Policy

We employ a quasi-experimental estimation strategy to assess the impact of the 2007 Maternity Capital Policy on fertility. In this section, we give further background on that policy, focussing on its candidacy for quasi-experimental analysis.

2.1 The 2007 Maternity Capital Policy

To lift the birth rate and halt demographic decline, the government passed the Federal Law of the Russian Federation No. 256-FZ "On Additional Measures of State Support of Families with Children." This law provides "maternity capital" assistance to families with children, which is available in the event of a birth or adoption of a second or higher order child between January 1, 2007 and December 31, 2016. The maternity capital, initially set at 250,000 rubles, can be put towards improving housing conditions, education, the mother's pension, or social adaptation and integration of children with disabilities (Miljkovic and Glazyrina 2015).

The MC policy was announced in President Vladimir's Putin's annual address to the Federal Assembly on 10 May 2006 (Presidential Executive Office 2010). This was the first announcement of the maternity capital policy. Thus, the MC policy was most likely unanticipated. In 2008, participants in the Russia Longitudinal Monitoring Survey (RLMS) were asked several questions about the MC Policy. Of those surveyed, 47.7% of males and 64.8% of females reported that they `know "something" about MC' (Russia Longitudinal Monitoring survey). This suggests that information about the MC Policy was somewhat widespread, increasing the credibility of the quasi-experimental strategy.

Unfortunately for further research, the end of the first round of the MC policy is not a candidate for quasi-experimental analysis, as the policy was revised and expanded rather than terminated. The maternity capital policy was expanded in 2018, as part of additional measures taken by the Russian government to stem demographic decline (Pension Fund of the Russian Federation 2018). Under the expanded policy, low income families are entitled to 18 monthly payments of maternity capital in the event of a birth or adoption of a second child after January 1, 2018. The size of the payment "amounts to the children's subsistence minimum" (PFRF 2018). Maternity capital certificates are still issued, amounting to 453,000 rubles in 2018. A comprehensive list of these changes is in Table 1 of the Appendix.

2.2 Challenges in Evaluating the Impact of the 2007 Maternity Capital Policy in Russia

Two major challenges face evaluation of the impact of the MC policy. First, the Russian government made changes to other policies around the same time as that the MC policy was introduced which may influence fertility rates, including maternity leave and child benefits (Slonimczyk et al. 2013). The 2007 MC Policy was announced as part of a wider fertility related package (Presidential Executive Office 2010). Employed women are eligible for 140 days of fully compensated maternity leave, and can opt for extended paid leave (40% of the mother's salary) until the child is 1.5 years of age, subject to minimum and maximum benefits over the period. Non-employed women are also eligible for the minimum benefit. Second, permanent fertility behaviour of the women affected by the policy will only be observable upon completion of their fertile period. Before this point, it is difficult to distinguish a permanent increase in fertility from a transitory shift (Frejka et

al. 2013). Further, the policy has undergone several significant changes since 2007, including changes to restrictions on MC. In addition, while the policy was initially slated to end in 2017, the policy has been extended twice and is now scheduled to end in December 2020.

2.3 Methodological Strategy

This paper takes steps to partially address the two challenges identified in the previous section. This paper implements a difference-in-differences estimate of the effect of the reform, exploiting the fact that the MC policy targets second and higher order births, while the majority of other overlapping policies target all births. This strategy, however, is not without problems. It is important to note that minimum benefits depend on birth order. Although these amounts are "relatively low and only a small minority of women with a regular job have earnings that fall in the range where the birth order distinction is relevant" (Slonimczyk et al. 2013, 6), this will contribute to a slight upward bias in results, as benefits for non-employed and a minority of very low-income women increase with birth order.

Furthermore, even though we use 6-7 additional years of data not available to earlier researchers, we still do not have sufficient data to calculate completed cohort fertility. This means that we cannot eliminate the possibility that changes in fertility were a result of changes in birth timing. To provide evidence for a permanent rather than transitory shift, we use completed cohort fertility for some of the oldest cohorts affected by the policy, and explore changes in cohorts lowering age at second birth.

3 Economic Models of Fertility

Economic models of fertility largely originate from Gary Becker's (1960) pioneering article `An economic analysis of fertility', which proposes that fertility behaviour can be analysed as a utility maximization problem subject to prices and a budget constraint. Economic models of fertility following Becker (1960) study the influence of the cost of children on fertility decisions. Willis (1973) develops a model relating labour supply to fertility decisions, where the presence of young children leads women to take time out of the work force. Women with a higher opportunity cost of being out of the work force face a higher price of children, so they are expected to have fewer children.

This paper's model is based on Milligan's (2005) model of fertility, which is in turn based on Becker's (1991) model. In Milligan's model, a family utility function is defined over the consumption of two goods, the number of children Q, and a composite good, Z. The price of a child is p_q, the price of the composite good is 1, and the family has income of I. The family receives a per-child subsidy of t, meaning that the problem faced by the family is to maximize utility subject to the budget constraint:

$$\max_{q,z} U = U(Q,Z)$$
$$s.t.\ (p_q - t)Q + Z = I$$

Rather than a family utility function, we define a utility function for a woman of childbearing age. The MC policy targets mothers. For example, the financial assistance can be put toward the mother's pension, but not the father's (Pension Fund of the Russian Federation 2017). We further adapt the model to account for limitations on eligibility for the bonus and constraints on how the bonus can be spent. Economic principles suggest that the MC payment will have a lower impact on utility than a cash transfer of the same amount, because the MC payment constrains the behaviour of the recipients (Currie and Gahvari 2007). Given these constraints, the price faced by the mother is not $(p_q - t)$ because the bonus cannot compensate the mother for costs such as foregone income or additional food or clothing for the child, meaning that the certificate may not offset the price of the child by t. Denisova and Shapiro (2013) find evidence to support this by examining online discussions on "gray" and "black" market schemes for cashing in the certificates. To account for this, we introduce a variable $\rho \in [0,1]$ which represents the proportion of the payment that directly reduces the cost of an additional child. Further, an extensive study of citizen use of and attitudes towards the MC policy by Borozdina et al. (2016) suggests that the variable ρ may be higher for lower income families, as the authors find that "families from low-resource groups … often had fewer actual opportunities to use the benefit" (66).

Therefore, the problem solved by the woman of childbearing age is to maximize utility in subject to the budget constraint:

$$\max_{q,z} U = U(Q,Z)$$
$$s.t.\ p_q r - (\rho.\tilde{t} - c).D_{MC} + p_q s + Z = I$$

The woman has r children before they are eligible for the policy, one child when they are eligible, and a further s children, such that $r + 1 + s = Q$.

As in Milligan (2005), this defines a demand function for Q which depends on p_q, ρ, t and I.

$$Q^* = Q^*(p_q, \rho, t, I)$$

Assuming children are not Giffen goods, demand for children will be increasing in the value of the subsidy, so long as $\rho \neq 0$ and the woman is eligible for the policy. This model also indicates that the policy will further influence the indirect utility functions of women who have not yet given birth, because they may be incentivized to have a first child in order to receive the subsidy upon the birth of their second child.

Economic models of fertility related to the MC policy should account for the Russian citizenry's potentially "deep distrust of the program" (Borozdina et al. 2016) and bureaucratic obstacles to accessing the maternity capital. Borozdina et al. (2016) finds that "State support was viewed by citizens as a certain temporal `bonus' on which one could not count on in a long-term perspective" (71). As discussed by Posner (2006), a lack of credibility will reduce the impact of the policy, as features of the policy are uncertain. Posner believed that this would be sufficient to cause the policy to fail. This distrust brings uncertainty into the model, as mothers do not have assurance that t will be the amount promised by the government, which will reduce expected responsiveness to the policy. Borozdina et al. (2016) also find that many eligible women have not applied for maternity capital due to the "bureaucratic obstacles they encounter" (Borozdina et al. 2016, 60). This introduces an additional cost c into the model, which reflects the cost of accessing the subsidy, t, such as submitting documents multiple times and researching legal procedures (Borozdina et al. 2016). Findings from Borozdina et al. (2016) additionally suggest that the cost c may be higher for lower income families, as they have been found to encounter "significant difficulties when trying to understand and follow the stipulations of family

policy arrangements, including the maternity capital program" (67). The bureaucratic and legislative obstacles to accessing certificates reduce the anticipated response to the policy, as they introduce a cost to accessing the bonus.

We define an adapted demand function for Q which depends on $p_q, \rho, \tilde{t}, c,$ and I, where $\tilde{t}$ is a random variable reflecting uncertainty regarding the subsidy and c reflects the bureaucratic and legislative costs of accessing the policy:

$$Q^* = Q^*(p_q, \rho, \tilde{t}, c, I)$$

4 Evidence from Vital Statistics

4.1 Data Sources

The main data source for this paper is the Russia Longitudinal Monitoring Survey (RLMS). This is a nationally representative household panel survey in the Russian Federation. This paper uses data from the 1994-2017 individual, household, and community (2016) surveys of the RLMS. In a typical round, 10,000 individuals in 4,000 households are interviewed. These individuals reside in 32 oblast (regions) and 7 federal districts of the Russian Federation. Community surveys are also completed for 193 communities.

Aggregate data are sourced from The Human Fertility Database (HFD), a joint project of the Max Planck Institute for Demographic Research (MPIDR) and the Vienna Institute of Demography (VID), based out of the MPIDR. The HFD is based on official vital statistics. Specifically, we source data on total fertility rates by birth order (total and by age 40), tempo-adjusted total fertility rates by birth order, cohort fertility rates, live births by age of mother, and female population by age from the HFD. The most up-to-date data on the TFR is sourced from the World Bank.

4.2 Graphical Analysis

Figure 1 shows birth rates by birth order using data from the Human Fertility Database. First inspection of the chart suggests that the implementation of the policies in 2007 had a noteworthy impact on TFR. The rate of first births has been fairly constant (although one could argue for a slight upward trend), and increase in the fertility rate is almost

exclusively a result of higher fertility rates for second and higher orders births, the target of the MC Policy. However, as noted by Frejka et al. (2013), we cannot discount the possibility that the increase in the TFR was caused by a rescheduling of births, rather than a permanent increase in the fertility rate.

Figure 2 shows birth rates by birth order for Russia, Belarus, and Lithuania. Belarus exhibits similar first, second, and third and higher birth rates, although Belarus did not introduce a maternity capital policy around the same time. This casts some doubt on whether the increase in fertility rates for second and higher order births in Russia was caused by the introduction of the MC Policy,.

4.3 Cohort Fertility

Frejka and Zakharov (2013) note that "a meaningful assessment of the impact of a policy change on cohort fertility can only be made with a lag of at least 10 to 15 years following implementation of the policy" (635). Age-specific fertility rates in Figure 2 are sourced from the Human Fertility Database. Cohort fertility rates are considerably more stable than period fertility trends because they are not affected by changes in birth timing. Cohort fertility rates steadily declined from a peak of 1.86 births for the 1957 cohort to 1.54 births per woman for the 1972 cohort. Fertility picked up slightly for the 1973 and 1974 cohorts, who were 33 and 34 in 2007 respectively (43 and 44 in 2017). Because fertility of women decreases significantly beginning approximately at age 32 years and decreases more rapidly after age 37 (American College of Obstetricians and Gynecologists 2014), the 1973 and 1974 birth cohorts may have been some of the oldest cohorts who could take advantage of the MC Policy. This provides some preliminary evidence to suggest the policy resulted in a permanent increase in fertility.

Further evidence for a permanent increase in fertility rates as a result of the policy comes from tempo-adjusted TFR data from the Human Fertility Database, shown in Figure 3. The tempo-adjusted fertility rate is a modified form of the total fertility rate that attempts to take account of changes in birth timing to provide a better estimate of completed fertility

rates. The tempo-adjusted fertility rate is calculated using the Bongaarts-Feeney formula[1] (see Bongaarts and Feeney 1998). Like the unadjusted total fertility rate presented in Figures 2 and 3, tempo-adjusted fertility rates presented in Figure 3 suggest a sharp increase in second and higher order births per woman compared to first births, providing additional evidence for a positive impact of the policy.

Inspired by Milligan's (2005) analysis of the Quebec baby bonus, Table 1 presents data on the average number of children born per one thousand women in the Russian Federation in different age ranges by cohort. The table is shaded to indicate the whether the MC policy was active in that year. The top-left cell shows the average number of births per 1,000 women in the 1941-1945 cohort in the Russian Federation when members of this cohort were between the ages of 15 and 19. These women had an average of 23.1 births per thousand. The top row then follows this cohort until they reach the age of 44, when they had 5.64 children per thousand. Looking down the first column allows for a comparison of different cohorts in each age range. Scanning down each column (i.e., for each age range), average births per 1,000 women were falling leading up to the implementation of the Maternity Capital Policy. For example, women born between 1971 and 1975 had an average of 38.41 children per thousand when aged between 15 and 19. The cohort of women born ten years later had 21.15 children per thousand women. Following the introduction of the MC policy, births per thousand in younger cohorts (those aged 15-24) ceased to decline. There is also a sharp increase in births per thousand women in all older age cohorts (those aged 25-44). However, this may be due to other broader cultural shifts resulting in women delaying childbirth until later in life. Looking across the rows shows any intertemporal shifting of fertility. For example, the cohort of women born between 1976 and 1980 has a higher relative rate of births when they are aged 25-29 than the 1971-1975 cohort (84.33 per thousand compared to 72.45 per thousand). When the same cohort was between 30 and 34, they had 70.42 children per thousand, more than all previous

[1] Requires age-specific fertility rates by birth order. Tempo-adjusted TFR is the sum, over all possible birth orders, of the tempo-adjusted total fertility rate for that birth order. For each birth order, i, compute the tempo-adjusted total fertility rate for that birth order as the product of the total fertility rate for that birth order and an adjustment factor $1/(1 - r_i(t))$ where $r_i(t)$ is the rate of change of mean age of childbearing for birth order i.

cohorts presented. This shows that increases in fertility in this cohort do not appear to be offset by later declines in fertility. This provides some evidence against a merely temporary impact on fertility caused by rescheduling of births.

To summarize this evidence and its support for a policy impact on fertility, fertility rates of second and higher order births (the target of the policy) drove the increase in total fertility following the implementation of the policy, completed cohort fertility lifted for the 1973 and 1974 birth cohorts (likely the oldest cohorts who could significantly take advantage of the policy), tempo-adjusted total fertility for second and higher order births lifted following the implementation of the policy, and cohort fertility rates by age show preliminary evidence against a transitory reaction to the policy. However, similar increases in fertility of second and higher order births in Belarus casts some doubt upon whether the fertility increase was caused by the introduction of the MC Policy. The next section presents additional analysis using microdata, controlling for observable household, family and community characteristics.

5 Evidence from the Russian Longitudinal Monitoring Survey

5.1 Data Set Construction

The primary data set used for the analysis is from the 1994-2018 individual, household, and community surveys in the Russia Longitudinal Monitoring Survey (note that the most recent community survey is from 2016). To create the data set, we select women who are between the ages of 15 and 49 in a given year. We merged the individual dataset with the household data set using *year* and the *household ID number*, which is unique for the given round. We then merged this dataset with an appended community dataset (including information for each community between 1994 and 2018) based on the *site* and *year*. This results in a dataset that, for each woman aged between 15 and 49 in each year surveyed, includes information about the individual, their household and their community.

Community surveys were not completed in 1997, 1999, or 2017. When a survey was not completed in one year, information from the previous year for that community is used.

5.2 Difference-in-Differences Estimates

Based on Slonimczyk et al. (2013) and inspired by insights from Milligan (2005) and others, we estimate the following equation:

$$birth_{it} = \beta_0 + \beta_1 post_t + \beta_2 MCelig_{it} + \beta_3 (MCelig_{it} \times post_t) + \beta_4 age_{it} + \beta_5 age_{it}{}^2 + \boldsymbol{X}_{\boldsymbol{\gamma_1}} + \varepsilon_t$$

where *birth* is a dummy variable which equals one if woman *i* gave birth in period *t* and *post* is a dummy variable which equals zero in 2007 and earlier, and one between 2008 and 2017, indicating whether the MC policy was active. Although mothers who gave birth to children in 2007 were eligible for maternity capital certificates, gestation and information delay lags mean that most of the children born were conceived before the policy was announced. we experimented with a range of methods for controlling for the age of the woman, including cubic splines, dummy variables for `older' and `younger' women, including age, and including both age and age squared. The latter produced the best results, so this is the form used in the final models. The variable *MCelig* equals identifies whether woman *i* is eligible for the maternity capital policy in period *t*. *MCelig* is equal to one for women with one or more children who have not given birth to a second or higher order child after 2007.

In this model, the β_3 attempts to identify the causal effect of the maternity capital policy on the probability of a birth in a given year. As stated by Slonimczyk et al. (2013, 12), this is done "under the well-known `common trends' assumption, namely that any time-varying unobservables have the same effect on treated and non-treated women."

The model uses standard errors derived from the Huber-White robust estimator for the variance-covariance matrix, as recommended by Milligan (2005) and Slonimczyk et al. (2013).

The difference-in-difference (DID) estimates were not robust to the inclusion of a wide variety of controls and repeating the analysis with both probit and logit models. For example, in one case including a variable for the interaction between income and eligibility for the policy caused the coefficient of interest to shift from positive and significant to

negative. We investigated controlling for a wide variety of variables, as recommended in the literature and economic models of fertility. These controls include variables which are known to be closely linked to fertility, including age, living in an urban or rural location, marital status, and whether the woman is cohabiting with a partner. As expected, age is highly significant and exhibits a non-linear relationship with the likelihood of a birth. Marital status and whether the woman is cohabiting with a partner have positive, significant coefficients, as married women and women living with a partner are more likely to give birth. Living in an urban location was not found to be significant in this model.

We also control for income excluding the woman's income to avoid endogeneity. Income is also closely linked to fertility in economic models of fertility related to the costs of having a child. Income is found to be non-linear and significant in predicting births.

We estimate the woman's income based on education and experience, by estimating a Mincer earnings function and estimating years of education given education level.

We control for variables related to the availability of childcare, which are related to the cost of having a child, including the presence of childcare centres in the community and whether a parents, sibling, or grandparent is living in the household. The presence of state or private nurseries or preschools in the community is not found to be significant in predicting births. This could be because communities that don't have some form of state or private childcare may still be close to childcare in other communities, or because the presence of childcare in a community is strongly related to other variables such as income. As expected, having a parent or sibling in the household is strongly associated with the probability of a birth. This is in line with economic models of fertility, because the presence of another family member in the household lowers the cost of childrearing. However, there may be issues related to endogeneity, as parents may move in to the home because of the birth of a child.

We control for education status of the mother, which is related to the opportunity cost of having a child. On average, more educated women face a greater opportunity cost of being absent from the labour market (Milligan 2005). Education of the woman was not found to be significant in the model. This could potentially be because the level of education is

strongly related to incomes, which are also included in the model. We also included average floor space per family member excluding the newborn, which is related to space restrictions that may influence decisions to give birth. As expected, this was found to be highly significant and positively related to births. we also experimented with models including average rent and average house prices, reflecting the ease of increase household space, although these variables were not included in the final models because of low response rates for these questions, which significantly affected the sample size.

Other variables included in the final model are whether the woman is a Russian national or Russian born and the age group of the youngest child excluding the newborn.

We find that the estimated effect of the policy is not robust, sometimes being positive and significant and sometimes being insignificant.

5.3 Regression by Family Structure

We also run separate regression based on number of older children, including the full set of control variables. Estimates are not consistent for different family structures. Although one could expect that families with more children could be more incentivized by the policy because they face a lower expense for an additional child, due in part to economies of scale (Kuczynski, Rodriguez, and Schap, 2017), there was no evidence of this in our regressions.

5.4 Discussion

In this section, we presented additional evidence on the impact of the MC policy. Difference-in-difference estimates, controlling for a wide range of variables, find inconsistent evidence of the impact of the MC policy.

The 2008 round of the RLMS asked a series of questions about the MC policy as part of the adult questionnaire. The results of the poll on the MC policy are presented in Table 2. Of the respondents to the 2008 RLMS survey, approximately 3% of males surveyed and 4% of women surveyed claimed that the MC policy influenced their desired number of children. This provides evidence that the 2007 MC Policy had a significant, small to moderate impact on total fertility.

5.5 Heterogeneous effects

We identified some evidence of heterogeneous responses to the MC policy. Analysis in the literature of heterogeneous responses to baby bonus schemes has produced varied results.

Unlike previous analysis in the literature, we found no evidence of heterogeneous responses by income level. Milligan (2005), who finds a strong and positive income effect on policy responsiveness, argues that the income effects of a baby bonus policy are ambiguous in quantity-quality models of fertility. In contrast, both Slonimczyk et al. (2013) and Drago et al. (2011), find that low-income women are more responsive to cash payments. The lack of a significant response could be due to two opposing forces: lower families may face a greater cost in accessing the policy and have less opportunities to use the benefit, but the relative value of the lump sum is greater for lower income families. An extensive study of citizen use of and attitudes towards the MC policy by Borozdina et al. (2016) finds that lower income families often have fewer opportunities to use the benefit. For example, MC certificates can be put towards mortgage repayments, but low income families may lack the savings to get a mortgage. Borozdina et al. (2016) also find that lower income families often face greater difficulties overcoming bureaucratic and legislative obstacles to receive the MC certificates. These factors may lower the responsiveness of lower income women to the MC policy.

Similar to both Milligan (2005) and Slonimczyk et al. (2013), we find that increases in birth rates are larger among less educated women, consistent with opportunity cost models of fertility. We also find that married women are more responsive to the policy, in line with findings by Slonimczyk et al. (2013).

6 Discussion of 2018 Policy Package in relation to findings

The low birthrate is of continuing concern to the Russian Federation, with Rosstat reporting a 10.7% fall in the birth rate in 2017 (Russian Federal State Statistics Service 2018). Echoing his 2006 state of the nation address, President Putin again voiced concern over the "acute demographic situation in Russia" on November 28, 2017, and announced further pro-natalist measures (Presidential Executive Office 2017).

As discussed in *Section 3*.1, the maternity capital policy was expanded in 2018, as part of further measures taken by the Russian government to stem demographic decline (Pension Fund of the Russian Federation 2018). In the expanded policy, low-income families are entitled to 18 monthly payments of maternity capital in the event of a birth or adoption of a second child after January 1, 2018. The size of the payment "amounts to the children's subsistence minimum" (PFRF 2018). Maternity capital certificates are still issued, amounting to 453,000 rubles in 2018.

Citizen distrust of the policy (although this effect may lessen over time), constraints on how the certificates can be spent, and ongoing bureaucratic and legislative obstacles will likely continue to reduce the effectiveness of the MC Policy in Russia. However, some additions to the policy package may influence the impact of the policy.

The decision to target low-income families is supported by Slonimczyk et al. (2013) and most economic theories of fertility, as low-income families are found to be more responsive to baby bonus schemes. However, this observation is not consistent in the literature, as the income effect on policy responsiveness is ambiguous in the quantity-quality model, Milligan's (2005) analysis of the Quebec Baby Bonus finds that policy responsiveness is in fact higher among higher income families, and our own analysis found no significant interaction between income and policy responsiveness.

However, as discussed in *Section 5.4*, lower income families may have been less responsive to the policy because of difficulties overcoming legislative and bureaucratic barriers, and because they may have fewer opportunities to use the certificates. Reducing constraints on how the certificate can be spent and specifically targeting lower income families (which may remove some barriers), may increase lower income family responsiveness to the policy.

The decision to include an additional stream of payments, as opposed to a one-off payment, may reduce potential response to the policy. As noted by Becker (2006), the U.S. military found that large bonuses result in higher reenlistment rates than an equivalent series of payments during the reenlistment period. Becker argues that one-off payments are likely to be more appealing to Russian families because of liquidity constraints in Russia,

and particularly appealing to lower income families. This suggests that the policy may be more effective if the additional payment to low income families is in the form of a one-off payment, rather than a series of monthly payments.

It will be interesting to see whether the fertility rate bounces back from its 2017 drop following the expansion of the pro-natalist package. However, most economists and demographers remain skeptical regarding the permanent impact of these policies on fertility (Slonimczyk et al. 2013; Frejka et al. 2013; Becker 2006; Posner 2006).

7 Future Research

We are continuing to investigate which groups may be most influenced by the policy, in order to suggest changes to the policy that could increase effectiveness. For example, we will estimate regressions by age group. We will also do a triple difference using the Ukrainian Longitudinal Monitoring Survey and the Life in Kyrgyzstan Survey to conduct placebo tests. We will also extend vital statistics using alternate data sources.

8 Conclusion

This paper presented evidence on the impact of the 2007 Maternity Capital Policy in the Russian Federation on fertility rates, using a quasi-experimental methodology based on Milligan (2005), Slonimczyk et al. (2013) and others. We find no strong evidence that fertility increased as a result of the policy. We do find evidence of heterogeneous responses to the policy, specifically finding that less educated women and married women are more responsive to the policy. Unlike past research, we find no evidence to suggest heterogeneous responses by income level. These findings can be used to speculate about the impact of the expansion of the MC policy announced in 2017. While targeting low-income families may increase its effectiveness, continued citizen distrust of the MC policy and constraints on how the certificates can be spent could continue to diminish the impact of this policy.

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A. Appendix

Table 1: Timeline of Changes to Maternity Capital Policy

Timeline of Russian Maternity Capital Policy

January 1st, 2007	Women who give birth to or adopt a second or consecutive child are entitled to special financial assistance. MC assistance comes in the form of a certificate that entitles its holder to receive funds in the amount 250,000 rubles which can be put towards 1. Acquiring housing 2. Paying for children education 3. Investing in the mother's retirement fund Women can apply for maternity capital once in their lifetime
July 28th, 2010	Families can use the capital to build or reconstruct a house [1]
July 1st, 2011	• The deadline for the parents' right to receive a mortgage loan with the use of the funds of the capital is abolished [2] • Adoption of regional laws on the maternity capital policy at the birth of a third (or subsequent) child, as proposed in the 2010 Presidential address [3]. For example, – In the Komi Republic, a law is enacted, which approved the parent capital on the third child of 150,000 rubles. The funds of the capital can be spent on improvement of housing conditions, education for the child, and paid medical services [4].
May 7th, 2012	In regions where fertility rates are below the national average, families that have the status of the poor (based on per capita family income) are entitled to a monthly cash payment in the amount of the regional subsistence for children in the case of a third (or subsequent) child until they reach three years of age.[5]
January 1st, 2016	Maternity capital certificate holders will be permitted to spend the funds on goods and services supporting social adaptation and integration of children with disabilities[6]
July 1st, 2016	Service launched to apply for lump-sum payment from maternity capital funds on the PFR webiste[7]
December 31st, 2016	Policy originally slated expire
2017	Maternity capital stands at 453,026 rubles. Maternity capital is granted to families where children are born or adopted before Decmeber 31st, 2018.[8]
2018	• From 2018 families can receive maternity capital funds two months after the rights are acquired (originally 3 years) • Russian families where the second or third child is born between 2018 and 2022 are entitled to preferential mortgage rates, which can be paid with maternity capital funds. This is not directly related to the maternity capital program

Timeline of Russian Maternity Capital Policy contd.

January 2018	Deadline for joining the maternity capital program has been extended until December 31st, 2021.
April 2018	Low income families (less than 150% of the able-bodied population's subsistence minimum per family member) are eligible for a monthly payment of maternity capital funds if a second (or subsequent) child is born or adopted after January 1, 2018 until the child is 18 months old
November 2018	The period for issuing maternity capital certificates is reduced from one month to 15 days
December 31st, 2018	First extension Maternity Capital Policy deadline
December 31st, 2021	Current Maternity Capital Policy deadline

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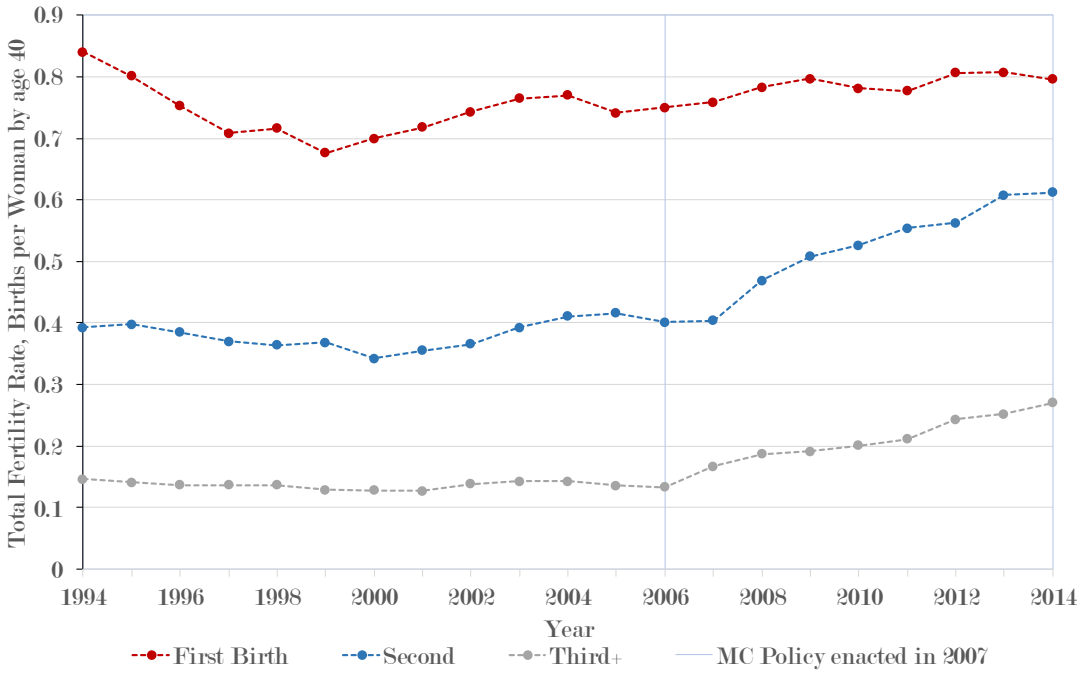
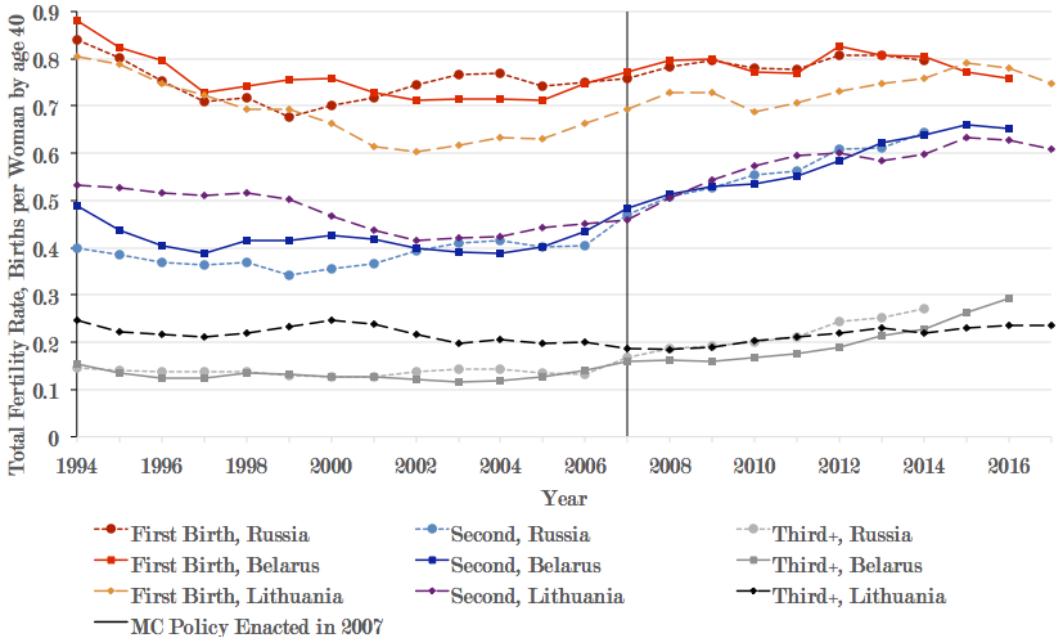
Figure 1: Total Fertility by Birth Order by Age 40, Russian Federation



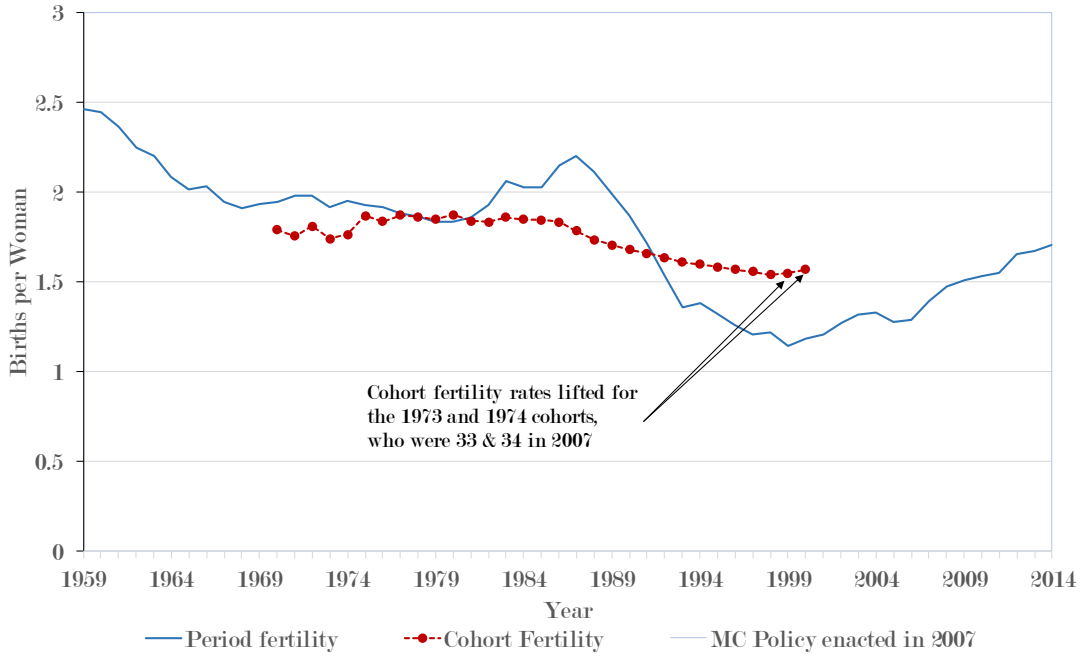
NOTES: The data source is the Human Fertility Database

Figure 2: Total Fertility by Birth Order, Country Comparison



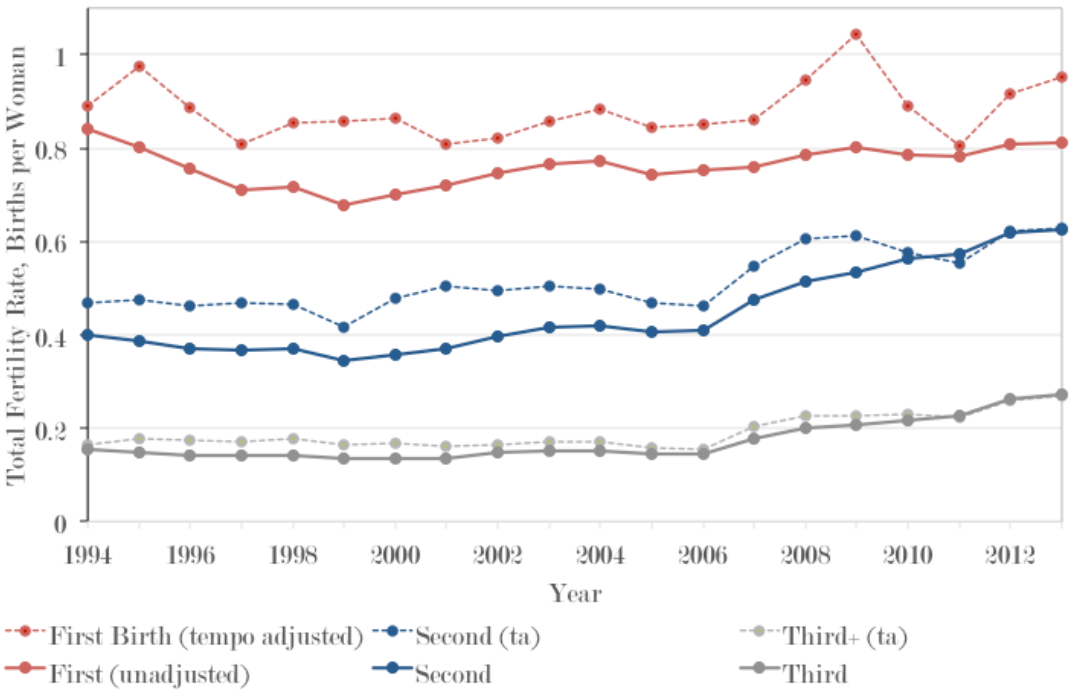
NOTES: The data source is the Human Fertility Database

Figure 3: Cohort total fertility rate at age 40 (lagged by 26 years) and period fertility rate, Russian Federation, 1959-2014



NOTES: The data source is the Human Fertility Database

Figure 4: Total Fertility by Birth Order, tempo-adjusted and unadjusted, Russian Federation



NOTES: The data source is the Human Fertility Database

Note: Fertility rate data for Russia from the Human Fertility Database has not been updated since June 2016. We are in the process of locating alternative sources to update total fertility rate data series.

Table 1: Cohort Fertility Rates

Years of Birth	Age Groups					
	age 15-19	age 20-24	age 25-29	age 30-34	age 35-39	age 40-44
1941-1945	23.10	136.97	113.62	64.49	23.56	5.64
1946-1950	19.01	144.61	112.57	58.25	26.12	5.15
1951-1955	21.08	151.54	110.19	66.06	22.72	2.98
1956-1960	25.12	157.48	120.26	52.85	12.64	2.81
1961-1965	28.82	164.43	101.29	34.32	13.94	3.84
1966-1970	35.33	151.64	72.27	39.20	20.70	6.76
1971-1975	38.41	115.85	72.45	50.59	32.63	15.84
1976-1980	29.71	96.03	84.33	70.42	60.40	
1981-1985	21.15	89.32	102.66	111.39		
1986-1990	20.03	86.75	138.79			
1991-1995	20.11	94.25				

NOTES: Report is the average rate of births per one thousand women in the Russian Federation
Years in which the Maternity Capital Policy is active are shaded
Source: Human Fertility Database and own analysis

Table 2: Result of Poll on MC Policy in the Russia Longitudinal Monitoring Survey

	Males	Females
MC influenced the # of children they want	2.80%	4.20%
	(3,821)	(3,755)
Average # of Children Desired		
… if claims not the have been influenced	1.6	1.6
	(3,516)	(3,472)
… if claims to have been influenced	1.9	1.8
	(102)	(147)
MC influenced decision to… ǂ		
… give birth/get pregnant/adopt	-	5.60%
		(399)
… give birth and desired # of children	-	3.00%
		(303)
… give birth but not the desired # of children	-	3.30%
		(303)

NOTES: Questions on MC policy were asked ot all adults in the 2008 RLMS sample with the excpetion of items marked with ǂ, which were asked to MC-eligible women only. The number of observations is in parenthesis. This table is from Slonimczyk et al (2013)