SHORT-RUN AND LONG-RUN EFFECTS OF SIZABLE CHILD SUBSIDY:

Evidence from Russia

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Short-Run and Long-Run Effects of Sizable Child Subsidy: Evidence from Russia*

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Abstract

This paper utilizes a large-scale natural experiment aimed to increase fertility in Russia. Motivated by a decade-long decrease in fertility and population, the Russian government introduced a sequence of sizable child subsidies (called Maternity Capitals) in 2007 and 2012. We find that the Maternity Capital resulted in a significant increase in fertility both in the short run (by 8%) and in the long run (by 20%), and has already resulted in an increase in completed cohort fertility for a large cohort of Russian women. The subsidy is conditional and can be used mainly to buy housing. We find that fertility grew faster in regions with a shortage of housing and with a higher ratio of subsidy to housing prices. We also find that the subsidy has a substantial general equilibrium effect. It affected the housing market and family stability. Finally, we show that this government intervention comes at substantial costs: the government's willingness to pay for an additional birth induced by the program equals approximately 50,000 dollars.

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1 Introduction

In the US, in all European countries, and most of the countries in Asia and South America, fertility is below the replacement level (United Nations, 2017). The low fertility level comes with costs: a country's future ability to finance old-age benefits is among them. Following these concerns, eighty-four percent of developed countries have implemented various pro-natalist policies that cost on average 2.6 percent of GDP (Malkova, 2019, United Nations 2013).

There are several important open questions on the evaluation of these large-scale and costly programs. The first is whether these programs can induce fertility in the short-run and/or in the long-run horizon. Pro-natalist policies may or may not have an effect depending on whether providing financial or other support to a family affects fertility decisions; fertility may or may not respond to these programs because opportunity costs of childbearing are too high or because fertility is rather driven by other factors like cultural attitudes. Even if a policy has an effect, the next question is whether it results only in a short-run change in fertility that is driven by re-scheduling the timing of births or also changes long-run (overall) fertility, i.e. affects the total amount of children a woman would like to have. While both short-run and long-run effects are of interest (Bloom et al 2009), only the latter changes the future size of the workforce and a country's ability to finance old-age benefits.

The next set of questions deals with further evaluation of the programs: What are the characteristics of families that are affected by this policy? How costly is the policy, i.e. how much is the government paying per one birth that is induced by the policy? Finally, what are non-fertility related effects of these policies? While most of the studies that analyze the effect of pro-natalist policies concentrate on fertility and mothers' labor market outcomes, these, usually large-scale, policies may have important general equilibrium and multiplier effects that may affect economies both in the short run and long run (Acemoglu, 2010).

This paper utilizes a natural experiment aimed to increase fertility in Russia to address these questions.

Motivated by a decade-long decrease in fertility and depopulation, the Russian government introduced a sizable conditional child subsidy (called Maternity Capital). The program was implemented in two waves. The first wave, the Federal Maternity Capital program, was enacted in 2007. Starting from 2007, a family that already has at least one child, and gives birth to another, becomes eligible for a one-time subsidy. Its size is approximately 10,000 dollars, which exceeds the country's average 18-month wage and exceeds the country's minimum wage over a 10-year period. Four years later, at the end of 2011, Russian regional governments introduced their own regional maternity programs that give additional - on the top of the federal subsidy - money to families with new-born children.

We first document that the Maternity Capital program results in a significant increase in fertility rates both in the short run (by 10%) and in the long run (by more than 20%). To identify the causal effect of maternity capital in the short run, we utilize high frequency (monthly and quarterly) data and use Regression Discontinuity (RD) analysis within a relatively short time interval near the adoptions of the child subsidies. To find the long-run effect, we confirm that the short-run shocks that were identified in our RD analysis are persistent over time by applying difference estimators with various time trends. Then, we utilize Difference-in-Differences estimators where we first employ variation in the levels of regional child subsidies (regional Maternity Capital programs). Second, we compare the post-reform fertility growth in Russia with that of Eastern European countries that showed similar pre-reform trends in fertility. Both regressions show that the Maternity Capital resulted in long-term fertility growth.

Figure 1 below illustrates the effect of the Maternity Capital on birth rates. Panels A and B show monthly data on the number of births and birth rates, panel C shows de-seasoned data to control for seasonality in birth rates. All graphs indicate clear jumps in the number of births in July 2007, 9 months after the announcement of the federal program, and in 2012, when the regional programs were introduced.

Figure 1: Number of births, by birth date

Note: Source: Panel A: Russian 2010 Census. Panels B and C: World Fertility Database, Rosstat (www.gks.ru)

Figure A1 in appendix shows the effect of of the Maternity Capital on total fertility rate (TFR) and on decomposition of births using annual data for the period till year 2017. It shows that Maternity Capital affects births of second and higher parity children more. Figure A1 also shows drop in fertility rates in 2017 compare to 2016; yet, the TFR in 2017 exceeds TFR in pre-reform 2006 year on more than 25%.

The effects of the policy are not limited to fertility. This policy affects family stability: it results in a reduction in the share of single mothers and in the share of non-married mothers. Also, the policy affects the housing market.[1] In particular, we find that the supply of new housing and housing prices increased significantly as a result of the program.[2] Confirming a close connection between the housing market and fertility, we find that in regions where the subsidy has a higher value for the housing market, the program has a larger effect: the effect of maternity capital was stronger, both in the short run and long run, in regions with a shortage of housing, and in regions with a higher ratio of subsidy to price of apartments (i.e. those regions where the real price of subsidy as measured in square meters of housing is higher). Both results suggest that cost-benefit analysis of such policies should go beyond the short-run and long-run effects on fertility. [3] Ignoring general equilibrium issues may result in substantial bias in the evaluation of both short-run and long-run costs and benefits of the program (Acemoglu, 2010).

Finally, we show that Maternity Capital is costly for the budget: our calculations show that the amount of money that the government pays for an increase in birth rates is approximately 50,000 dollars per additional birth that is induced by the program.

The paper proceeds as follows. In the next section, we discuss the literature. Section 3 discusses the institutional environment of the Russian maternity capital program. Sections 4, 5 and 6 discuss the data, short-run analysis, and long-run analysis for Russia. Section 7, 8, and 9 study general equilibrium effects, changes in mother characteristics, and WTP. Section 10 provides robustness checks. Section 11 concludes the paper.

2 Related Literature

Following the canonical theoretical model of fertility as an economic decision by Becker (1960), many papers have tested empirically whether fertility responds to financial incentives or not. The evidence is mixed. Gauthier (1996), Gauthier and Hatzius (1997), Acs (1996), Rosenzweig (1999), and Kearny (2004) find no effect of pro-natalist policies. On the other hand, Malkova (2019), Cohen et al. (2013), Conzales (2013), Milligan (2011), Lalive and Zweimüller (2009),

[1]The recipients of the subsidy can use it only on three options: on housing, the child's education, and the mother's pension. 88% of families use it to buy housing. For more details see section 3.

[2]This result also identifies the losers of the program: those who did not plan to have a new baby, but would like to buy a house, suffer from the rising housing prices.

[3]While most of the studies that analyze the effect of pro-natalist policies concentrate on fertility and labor market outcomes, our study shows that the effect of these large-scale policies may go far beyond this scope.

Laroque and Salanié (2005), Slonimczyk and Yurko (2014), Whittington (1992) find evidence that fertility follows financial incentives.

Most of these studies (except Malkova, 2019) document only the short-run response to policies. Adda et al (2017), Sobotka and Lutz (2010), and Schoen (2004) argue that the documented short-run effect overestimates the effect of pro-natalist policies because they are driven by the rescheduling of birth, but not by the decisions of families to increase the overall number of children.[4] In particular, Adda et al. (2017) utilizes German data to show that the long-run effect of the pro-natalist policy is smaller than the short-run response. In our case, the policy affects both short-run and long-run fertility. In this respect, the closest paper to ours, Malkova (2019), documents the rise in 2nd and higher parity fertility rates in response to a maternity program in the Soviet Union. Our paper complements and adds to Malkova (2019) in several ways. Malkova (2019) analysis concentrates on the effect of the policy in a non-market socialistic economy (USSR), which has several distinguishing features. Housing was free in the USSR. The other costs of raising children was extremely low: every family had access to free childcare, free healthcare, and then to free high school, and free college education. The opportunity costs of raising children were also low: the earning profile was flat and females were guaranteed their job back after they came back from maternity leave (Malkova, 2019). In our study, we provide evidence from the market environment that allows us to get more "external validity" of our results as well as to analyze a broader set of important outcomes that would be impossible to do in closed socialistic economy.

Second, while most of the previous studies concentrate on the effect of pro-natalist policies on fertility and mothers' labor market outcomes, our study shows that the effects of these large-scale policies may go far beyond this scope. We provide an example of the importance of the general equilibrium effects for policy evaluation, which contributes to the existing discussion (Acemoglu, 2010). Finally, by showing the sizable effect of the program on the housing market, our paper shows strong connection between childbearing decisions and housing (Dettling and Kearney, 2014).

3 Institutional Environment: Russian Maternity Capital Program

The Russian Federal Maternity Capital program became effective on January 1, 2007. Families that adopted or gave birth to a second or higher birth order child became eligible for a one-time subsidy of 250,000 rubles (10,000 dollars), an amount that exceeds the country's average 18-month wage. This amount is updated annually to account for inflation (see Figure 2 for the ruble and dollar amount of maternity capital). Families do not receive the money in cash.

[4] Another potential driver initial short effect of the program comes from additional births in a large pool of families that have parents from older-age cohorts that decided to have one more child.

Instead, they receive a certificate that can be used only to pay for three options: "improvement to current living conditions", (i.e. for housing, including existing mortgages), their child's college education, and the mother's pension.[5] The money from this certificate is transferred directly from the pension fund (the administrator of the program) to the education facility or the home seller or mortgage holder. The subsidy is granted only once per family. According to the initial (2007) version of the Maternity Capital law a family could utilize the Maternity Capital Certificate money only after their child reaches two years of age. Since December 2008 the family can use the Maternity Capital money to pay for a mortgage immediately after the birth of a child.

Out of three options (housing, education, pension), 88% of the families spend their subsidy money on housing. One of the reasons behind this is that the option to buy a house (or apartments), in contrast to other options, can be realized shortly after the birth of a child. An important restriction which we will explore further in the text, is that using the certificate to buy an apartment requires that the child automatically becomes co-owner of the apartment. This makes the apartments less liquid. In particular, if a family decides to sell this apartment, they will need to comply with the regulations of guardianship and trusteeship bodies. As a result, some families, mainly buyers of expensive apartments, prefer not to use maternity capital.[6] The other important feature of the Maternity Capital program is that it was unanticipated by the public until October 2006 (see Slonimczyk and Yurko, 2014), when the bill about maternity capital was introduced to the State Duma (Parliament).

In the first twelve years after the adoption of maternity capital, 8.9 million families received Maternity Capital certificates, and 5.1 million families used the whole amount of their Maternity Capital Money; 3.3 million families used Maternity Capital to pay for a mortgage and more than 1.9 families used Maternity Capital to pay for housing without using a mortgage.

Since the start of the maternity capital program, many Russian regions (states) have also adopted regional laws that give an additional subsidy to families on top of the federal program. Two regions adopted regional Maternity Capital Programs in 2008. At the end of 2010, Russian President Dmitry Medvedev requested regional governments to adopt regional child support programs. In most of the other regions laws were passed in the second half of 2011 and came into force in 2012. By 2012, 87% of the regions had adopted an additional subsidy, averaging about 25% of the federal subsidy. The amounts of regional subsidies vary greatly across the regions, from 0 to 108% of the federal subsidy. The programs also vary across regions in many other dimensions: by which children are eligible (many of the programs give subsidy to the third and higher

[5]In 2014, the option to use maternity capital to pay for kindergarten or pre-school also became available (see the comment to Federal Law 14.07.2014 N 648). These two options, as well as the option to use maternity capital to pay for high school, did not become popular because most of the pre-school, kindergartens and high school are public and free in Russia.

[6]Also, the government applies additional restrictions to make sure that families indeed use maternity capital to improve current living conditions, but not to invest. Thus, although families can use maternity capital to buy apartments (house), they can not use maternity capital to buy relatively cheap alternatives like land or summer houses (dacha).

birth order child, some regions give subsidy to the first child, some only to the fourth or only to the fifth child); by restrictions on the use of a subsidy: many regional programs give unconditional subsidies in cash, some regions require restricted use (among them are housing, education, taxes, pension, medical spending, insurance, rental expenses, cars); and by which families are eligible: in some regions only families with income below a certain threshold are eligible for a regional subsidy.

Initially, both the Federal and Regional Maternity Capital Programs were set to last for 10 years until January 1, 2017. In 2016, the Federal Maternity Capital program was prolonged till 2018, and then in 2018 it was prolonged till 2021. Majority Regional Maternity Capital programs were prolonged till 2021. The drop in TFR in 2017 shown in Figure A1 may happen partly because families scheduled giving birth within initially proposed 10-year interval of Maternity Capital.

4 Data

In our study, we utilize several datasets.

First, we utilize regional-(state) level data on various regional characteristics that come from the Russian Statistical Agency, Rosstat (www.gks.ru) and the Russian Fertility and Mortality Database (RFMD, http://demogr.nes.ru/en/demogr_indicat/). This data contains monthly counts of births at the national and regional (state) level. The Russian Fertility and Mortality Database contains annual regional-level data on age-specific birth rates for all Russian regions, and on the birth rates by birth order for more than 50% of the Russian regions. The Rosstat data provides different regional data with an annual and/or quarterly and/or monthly frequency. In particular, the data on regional birth counts is provided by Rosstat and is available monthly, whereas the data on regional housing prices is available quarterly, and the data on the amount of new housing is available only on an annual basis.

Second, we use the 2010 Russian census and 2015 Russian micro-census. Such data is not available at the individual level but can be obtained in the form of counts of individuals within narrow groups defined by a set of demographic and regional characteristics. For our purposes, we extract several samples. The first sample contains counts of children born in a particular month and year, by a mother of a particular age, and living in a family with k children (k=1,2,..). The second sample contains counts of children within a particular county (rayon), born in a particular month and year, living in a family with k children (k=1,2,..), and living in a family with two parents or with one parent. The third and the forth samples provide the same counts but aggregated at the state (region) and national levels, respectively.[7] Thus, rayon-(or region-) level datasets contain monthly data on the number of children that were born in a particular month and year in families with 1, 2, 3, 4 or more children (including newborns) for families with either a single parent or with two parents for 2,351

[7]There are 2351 rayons and 85 regions in Russia.

of Russian rayon's (or 85 regions) for the period of 2000-2010 (2010 is a census year). The obtained datasets contain 2,857,200 and 160,200 cells (observations) in rayon-level and region-level data respectively. In addition to the census 2010, we utilize data on the 2015 Russian micro census that surveys 1.7 percent of the population. Due to size limitations, we extract counts not on monthly, but quarterly birth date frequency. Census (micro-census) data on monthly births rates are richer compared to Rosstat: In particular, using census data we can calculate monthly birth counts by parity, by mother age as well as by other demographic characteristics. However, census provides retrospective information on counts of births based on information obtained in 2010 (2015), and thus some births are missing due to child mortality. Thus, for our regressions, we use both Rosstat and Census data. Results are similar for all datasets.

Third, we utilize individual-level data from the Russian Longitudinal Monitoring Survey (RLMS, see https://www.hse.ru/en/rlms/). The RLMS is a nationally-representative annual survey that covers about (more than) 10,000 individual respondents, from 1994 to 2015. The RLMS survey contains rich information on demographic and socioeconomic characteristics. The RLMS has data on the date of birth and birth order, as well as various demographic and socio-economic characteristics of children and their families. In our analysis, we restrict the time span of the data to the years 2000-2015. The year of the adoption of Maternity Capital lies in the middle of this period.

Finally, to do national-level analysis and cross-country comparisons we use the Human Fertility Database (HFD) provided by Max Plank Institute for Demographic Research (MPIDR) and the Vienna Institute of Demography (see http://www.fertilitydata.org/ and http://www.humanfertility.org/cgi-bin/main.php). The HF database contains annual country-specific data on age-specific birth rates, on the birth rates by birth order, as well as monthly counts of births.

The summary statistics of variables used in the analysis are shown in Table 1.

Birth Rates Variables and Data Used For short-run analysis, we use monthly-level data in the main specification. Monthly counts of births are available at national and at the regional level, thus we utilize national and regional-level data, and use log counts of births in the main specification. In the robustness section, we construct data on the population of females of childbearing age by smoothing out available annual-level data and use constructed log fertility rate (log number of births divided by the number of females of childbearing age) instead of log number of births. For within-country long-run analysis, we use available at regional and at national level annual data on a log of age-specific fertility rates.[8] For cross-country case-study, we use data on age-specific fertility, TFR (total fertility rate), cumulative fertility rate, and tempo-adjusted fertility rates that are available on the country level (for definitions see note 1

[8]Data on age-specific births are available monthly only for retrospective 2010 Census data, and thus we do not use them in the short-run main specification, and we use them in robustness analysis.

in appendix).

5 Short-Run Effect on Fertility

5.1 Federal Maternity Capital Program

The main challenge in the analysis of the effect of a universal natural experiment like the introduction of federal maternity capital is to choose a credible counterfactual. The Dif-in-Dif approach requires a control group with characteristics similar to those of the families that were treated by the Maternity Capital program.[9] One credible solution is to employ an RD design that resembles perfect randomization in the neighborhood of the threshold and does not rely on a control group. The RD approach estimates the local treatment effect that we interpret as the short-run effect.

In our RD strategy, we compare fertility rates within a short time interval before and after the introduction of the Maternity Capital Program. For the Federal Maternity Capital Program, we treat October 2006, the official announcement of the Maternity Capital date, as the threshold date for conception decisions (see Slonimczyk and Yurko (2014)). This means that we treat July 2007 as a threshold month for realized birth outcomes.[10] For the Regional Maternity Capital Programs, we treat January 2012, the starting of the majority of the regional maternity capital programs as the threshold date for realized birth outcomes.[11]

To estimate the effect of maternity capital in the short run we employ several RD specifications.

Our baseline regression employs the following flexible RD specification

$$Y_{rt} = \theta I(t \geq 0)_{rt} + f(t) + g(t) * I(t \geq 0)_{rt} + D'_{rt}\Gamma + u_{rt} \quad (1)$$

where t is date $(year + (month - 1/12))$ normalized to be 0 at the month maternity capital was announced, $f(t)$ and $g(t)$ are the smooth functions of time; Y_{rt} stands for the dependent variable (log births, share of single parents, housing prices); because birth rates are seasonal we include the set of controls D_{rt} that contains the month fixed effects to control for seasonality. In all regressions, we use the triangular kernel; $f(t)$ is parametrized to be a first-order polynomial, and the error terms u_{rt} are clustered at the date level. The parameter of interest θ stands for the effect of maternity capital. We estimate the model using monthly data on national-, regional-, and rayon-level cells. The bandwidth was set to be

[9] For example, the option to use families that give birth to their first child as a control group would be an imperfect solution because the program may facilitate birth rates of the first child too.

[10] The threshold time point in decisions in the housing market is similar to conception decisions, i.e. the threshold date is October 2016. In the housing market, one can buy housing using a mortgage before obtaining the maternity capital certificate and then, after getting maternity capital, use it to pay a mortgage.

[11] Recall that information about Regional Maternity programs became publicly available within a year before January of 2012.

3 in the baseline specification.[12] In the robustness section, we use the robust RD estimator by Calonico, Cattaneo, and Titiunik (2014) to confirm our main specification results.

Table 2 shows the results of the RD estimates of the effect of maternity capital on birth rates.[13] Panels A, B, and C of Table 2 show the results of the RD regressions at national×month bins, regional×month bins, and rayon×month bins respectively. All panels indicate that maternity capital results in a 9% increase in birth rates. The subsidy affects the birth rates of second and higher birth order children more. While the fertility rate for the first child increased by 7%, the fertility rates for 2nd, 3rd, 4th, and higher birth order children increased by 12%, 15%, and 13%, correspondingly.[14]

To confirm a close relationship between the housing market and fertility, we explore the regional (and rayon-level) heterogeneity in the effect of the maternity capital program. The vast majority of families use federal maternity capital to buy apartments or houses.[15] Thus, one can expect that in regions with a housing shortage, the demand for maternity capital would be higher. We then compare the effect of the program in regions with high and low prices of housing. The average price of apartments varies greatly across Russian regions: in 2007, with Maternity Capital funds one could buy a 20 square meters apartment in the North Ossetia region, whereas in Moscow one could buy only 2.4 square meters. Given that buying apartments using maternity capital is accompanied by future legal costs (see Section 3), it is reasonable to expect that the effect of maternity capital will be bigger in places with lower housing prices (or, equivalently, the higher real price of Maternity Capital). To check the differential effect we add pre-reform regional characteristics, the shortage of housing and housing affordability, and their interactions with the program dummy $I(t \geq 0)_{rt}$ in the regressions (2).

$$\begin{aligned} Y_{mt} = \theta I(t \geq 0)_{rt} + \gamma I(t \geq 0)_{rt}(Z_{rt0} - \overline{Z_{rt0}}) + \mu Z_{rt0} \\ + f(t) + g(t) * I(t \geq 0)_{rt} + D'_{rt}\Gamma + u_{rt} \end{aligned} \tag{2}$$

In this regression Z_{rt0} stands for pre-reform regional characteristics (in 2006), the availability of housing is defined as the average square of meters of owned

[12]Figure A2 in Appendix shows RD estimates for different bandwidth sizes. The estimates are the same for bandwidths greater than 1.5. We treat the specification (1) as the main because it is more flexible. In particular, in this specification, we can control for seasonality or can estimate the heterogeneity of the maternity capital effects with respect to initial housing prices.

[13]Figure 3 shows the short-run effect of the Federal Maternity program for the births of different parity.

[14]Columns (1) and (2) of panels A and B show results for two datasets, Rosstat (RFMD) and the 2010 Census. Rosstat and HFD provide monthly counts of births at the date of birth. Census data provide retrospective information on monthly counts of births based on information obtained in 2010, and thus some births are missing due to child mortality. The results shown in columns (1) and (2) are similar.

[15]Figure 4 shows birth rates over time for various Russian regions. Indeed, Figure 4 shows that in rich regions such as Moscow there is no visible effect of maternity capital, whereas in typical Russian regions like Bryansk, Nizhniy Novgorod, Tatarstan, and others the effect is sizable.

housing per one person in the region, the affordability of housing is defined as the size of apartments that can be bought using maternity capital.

Panel A of Table 3 shows the results of the estimation. In regions with a shortage of housing or more affordable housing, the effect of maternity capital is bigger. The effect is economically high: in regions where the price of apartments and the size of the living area are one standard deviation lower than the mean, the fertility increases by an additional 2.8 and 2 percentage points respectively (compared to an average increase of 8 pp). We find a similar differential effect caused by the program when we explore heterogeneity at the rayon level. Panel B of Table 3 shows that in rayons where the average number of rooms in apartments per household is 1 standard deviation lower than the average the growth in fertility is 3 pp higher.

Finally, we provide validity checks for the RD regression.

We check whether economic and social factors (average wage, unemployment rate, migration, and crime) do not change discontinuously at the time of the introduction or announcement of maternity capital. This test serves as a validity check for the RD strategy. If the timing of shocks in income or other factors coincides with the introduction of the Maternity Capital, then factors other than maternity capital may drive the results. Figure 5 shows the results of the RD estimates for different placebo threshold dates. It shows that there are no statistically significant discontinuous changes in economic factors neither in October 2006 (the announcement of maternity capital) or in July 2007 (the date of the increase in birth rates).

We also check how the mother's age changes with the introduction of maternity capital. This test can serve as an indicator that the short-run effect may differ from the long-run effect. Parents can react to the introduction of maternity capital by re-scheduling the time of birth for an earlier age. Also, the program in its initial stage may affect the large pool of parents from the older cohort that decides to give birth to an additional child. To test for the possible sample selection and strategic responses we estimate the regression (1) for mother's age by births for different birth orders. Table 4 shows the results of the estimation. The average age of the mother increases by 0.1 years. Figure 6 shows the distribution of the RD effect by the age of the mother and by birth order. It shows that this short-run effect is driven by the increase in proportions of mothers from ages 33-40 that gave birth to a second or higher birth order child.

5.2 Regional Maternity Capital Programs

We further provide a similar analysis of the short-run effects of the Regional Maternity Capital Programs. We treat January 2012, the starting date of the majority of regional maternity capital programs as the threshold date for realized birth outcomes. The specification of the RD regression is similar to (1), where the running variable t is normalized to be 0 in January 2012.

Table 5 shows the results of the RD estimates of the effect of regional maternity capital on birth rates. Panels A and B of Table 5 show the results of the RD regressions at the national and regional levels. All panels indicate that regional maternity capital results in a further increase in birth rates by 4.7%. The regional programs primarily affect births of 1st and 3rd order children (by 5.4%, and 5.7% correspondingly) because the majority of these programs were designed to induce births of children of this parity.

5.3 Validity check: Ukraine Case Study

In this section, we discuss the case study of Ukraine that provides an additional validity check for RD results. The RD estimates would show a spurious effect if the introduction of Maternity Capital coincides with some unobservable economic or social shock that also affects fertility. Although we already checked this possibility by showing that no other factors changed discontinuously around the threshold date, the Ukrainian case study provides an additional validity check. Facing similar demographic challenges, Ukraine also introduced a sizable child subsidy but did at a different times (one year later than Russia). Therefore, we explore different timing in the introduction of the subsidy and can check that fertility responds differently in two countries and does so after the country-specific subsidy was introduced.

Ukraine significantly changed child support policy twice. The first policy change was in April 2005 when the government introduced a one-time child benefit of 8500 UAH (1,700 dollars). The second increase in child benefits was introduced to the Ukrainian Rada (Parliament) on October 2007 and came to force in January 2008. According to the new policy, a family that gives birth to a first, second, and third or higher birth order child receives child benefit of the size of 12,240 UAH, 25,000 UAH, and 50,000 UAH (2,500, 5000, and 10,000 dollars) correspondingly. Differently from Russia, the subsidy in Ukraine can be used for any purposes.

Figure 7 shows monthly data on the number of births in Ukraine. It shows a jump in fertility rates in July 2008, nine months after the announcement of the child subsidy. Table A1 shows the results of the RD estimates of the effect of the subsidy on birth rates. Table A1 shows that the subsidy had sizable immediate effects on the birth rate in Ukraine: it resulted in an immediate increase in birth rate by 8 percent.

To show that Ukraine and Russia experience shocks at fertility in different points of time, we run placebo experiments. We estimate placebo RD coefficients for a jump in fertility within different placebo threshold dates that vary from January 2006 till 2010. Figure 8 shows the results of placebo experiments for both Ukraine and Russia. The placebo RD coefficients plot for Russia shows an inverse U-shape with peaks in July 2007. The placebo RD coefficients plot for Ukraine shows two peaks that happen in January 2006 and July 2008.

Thus, we show that the jumps in birth rates in Ukraine and Russia happened simultaneously with the changing child policy in these countries. These dates are different for Russia and Ukraine, therefore we provide additional evidence that these jumps are driven by the change in child support policies and not by random economic or social shocks (that are likely to hit both neighbor countries at the same time).

6 Cumulative Effect (Long-run) Effect on Fertility

6.1 Within Country Estimates of Long-Run Effect and Cross-Regional Evidence

In this section, we provide within Russia cross-regional analysis of the long-run effect. To do so we utilize age-specific data on birth rates from 2000 to 2017 and use the following regional-age specific regression:

$$\begin{aligned} Y_{art} = \theta_1 I(year \geq 2007)_{rt} + \theta_2 I(year \geq 2012) + \gamma(S_{rt} - \overline{S}) \\ + \delta_a + t * \delta_a + \delta_r + D'_{rt}\Gamma + u_{art} \end{aligned} \quad (3)$$

where Y_{art} stands for log of the birth rate of mothers at age a, in a region r, at year t. θ_1 and θ_2 show the change in fertility rates across the periods of 2007-2017, and 2012-2017, δ_a, $t * \delta_a$,δ_r stand for age fixed effects, age-specific time trends and regional fixed effects correspondingly. S_{rtb} stands for the ratio of the regional child subsidy (to child of corresponding birth order) to the subsidy that is given by the federal maternity capital program (recall that in different regions the subsidies are given to children of different parity). The last parameter of interest, γ shows an additional effect of a regional program in a region that introduces a subsidy that exceeds the average regional subsidy by amount equal to Federal Maternity capital. Thus γ is Dif-in-Dif estimator that provides evidence on the effect of the program that came from cross-regional variation. Set of control variables D_{rt} includes log average income and housing availability in a region. Errors are clustered at the regional∗age level.

The regional-level data is available only for birth rates without splitting them by parity.[16] To analyze the long-run effect of programs on birth rates by parity we utilize national-age data. At the national level we do not observe regional heterogeneity, and the regression specification is

$$Y_{atb} = \theta_1 I(year \geq 2007)_t + \theta_2 I(year \geq 2012)_t + \delta_{ab} + t * \delta_{ab} + D'_t\Gamma + u_{atb} \quad (4)$$

where Y_{atb} stands for log of the birth rate of mothers at age a, at year t and for parity b. θ_1 and θ_2 show the change in fertility rates across the periods of 2007-2017, and 2012-2017, δ_{ab}, $t * \delta_{ab}$ stand for age fixed effects, age-specific time trends. S_{rtb} stands for the ratio of the regional child subsidy (to child of corresponding birth order) to the subsidy that is given by the federal maternity capital program (recall that in different regions the subsidies are given to children of different parity). Errors are allowed to be clustered at the age level.

[16] The regional-level data on birth rates by parity exists for 50% of regions. Because we do not know how the selection to these regions affects estimates we discuss parity-specific regional regressions only in robustness section.

Table 6 shows the results of the regressions. It shows that after accounting for time trends, the Federal Program results in an increase in birth rates by 12.7 percentage points, and the regional programs result in further increase in birth rates by 6.3 percentage points.[17] To note, θ_1 and θ_2 show an average increase in birth rates (over existing trend) for the 2007-2017 and 2012-2017 periods, while the RD estimates obtained in the previous section show an immediate (short-run) change. In absence of post-reform trends one should not see any differences between RD and long-run estimates, however in case of the rescheduling (see Adda, 2017), the RD estimates should be higher than the average long-run changes. Indeed, results show that an average long-run increase is similar to (or slightly higher than) the sum of the short-run changes. Column 2 of table 6 shows that in a region that introduced a subsidy that exceeded the country average by the level equal to Federal maternity capital, subsidy results in an additional increase in birth rates by 5 percent. Column 3 of Table 6 shows Dif-in-Dif (γ) estimates for the regional-level regression (3) where we include a full set of year fixed effects instead of two post-program dummies. Column 3 shows slightly higher estimate of γ. The economic magnitude of the effect is as follows. The upper quartile of regional subsidy exceeds the bottom quartile by 0.15 of federal subsidy level. It implies that in a region with a subsidy that equals to upper quartile fertility growth rate was higher than in a region with a subsidy that equals to lower quartile by 1pp. Column 4 to 8 of Table 6 show the results of national-age-level regressions, and shows similar estimates of θ_1 and θ_2. Column 4 to 8 also show that the Federal program affects more births of 2nd children, while the regional programs affect more births of 3rd children.

Finally, similar to the short-run estimates, we check that maternity capital has a stronger effect on the fertility rates in regions with a shortage of housing options and the higher relative price of Maternity Capital (relative to local price of apartments). To test this prediction, we use a similar Dif-in-Dif specification and include the interaction of these variables with $I(year \geq 2007)_{rt}$. Table 7 shows that in regions with lower availability of housing and in regions with the higher relative prices of Maternity capital the effect of the programs on birth rates is higher.

6.2 Robustness check: Russia vs Eastern Europe Case Study

As a robustness check, we will now compare the long-term growth of fertility rates in Russia with Eastern and Central European countries that face similar economic conditions and had similar pre-reform fertility trends.[18] Like Russia,

[17] Recall that the Federal program targeted births of 2nd children, while majority of the regional programs targeted births of 3rd children.

[18] We exclude former Yugoslavia countries as those that have war conflicts recently and thus may follow different demographic patterns. We also exclude Caucasian and Central Asian countries because they have different fertility patterns (significantly higher fertility rates). In our first Dif-in-Dif estimates we use the remaining fourteen Eastern and Central European countries as a control group.

Eastern European countries experienced a drop in fertility rates right after the collapse of the Soviet Union and had similar trends in fertility up until 2007. Part of these countries, including Ukraine and Belarus, adopted pro-natalist policies recently (see Frejka and Gietel-Basten (2016)). Thus, we are likely to underestimate the effect of maternity capital in this Dif-in-Dif approach. Figure 9 shows the fertility rates for these countries, Russia, and the US over the period of 1995-2015. It shows that while having similar trends in fertility before 2007, afterward Russia significantly surpassed all the countries from this comparison group.

For the long-run analysis, we use several measures of fertility that are available in demographic datasets. First, we use the total fertility rate, TFR. Also, we follow the demographic literature and use Bongaarts-Feeney tempo-adjusted TR measures to account for the possible rescheduling of birth rates (the so-called tempo effects, see Sobotka, (2004), Yi and Land (2001), Schoen (2004), Sobotka and Lutz, (2001)).

To estimate the effect of fertility, we employ two Dif-in-Dif regressions, in which we compare the growth of fertility rates in Russia with the control group.

In the first regression we look at the average growth in fertility in the post-reform years by estimating the following specification:

$$\begin{aligned} Y_{ct} = \theta I(Russia)_c I(year \geq 2007)_{ct} + \alpha I(Russia)_c \\ + \beta I(year \geq 2007)_{ct} + D'_{ct}\Gamma + u_{ct} \end{aligned} \tag{5}$$

In the second regression we look at the year-specific effect on fertility in the post-reform years by estimating the following specification:

$$\begin{aligned} Y_{ct} = \textstyle\sum_{y=2007}^{2015} \theta_y I(year = y)_{ct} I(Russia)_{ct} + \alpha I(Russia)_c \\ + \textstyle\sum_{y=2007}^{2015} \beta_y I(year = y)_{ct} + D'_{ct}\Gamma + u_{ct} \end{aligned} \tag{6}$$

In both regressions the set of controls includes time trend and country-level fixed effects.

Table 8 shows the results of the regressions with the first control group of countries.

For both measures (TR and tempo-adjusted TFP) Russia demonstrates significantly higher growth in fertility rates relative to the control group. The effect is economically large: the lowest of estimates show that maternity capital results in an average across years fertility increase by 11%, and that effect becomes stronger over time: in the last year of observation (2014), the (adjusted) total fertility rates exceed the pre-reform level by 20%. The effect of the reform is higher for the higher birth order birth rate. TR increases by 6.2%, 11.2%, 25,9%, and by 27% for 1st, 2nd, 3rd, and 4th and higher birth order respectively. Again, the effect becomes stronger over time: in the last year of observation (2014), the total fertility rates exceed the pre-reform level by 17%, 21%, 34%, and by 41% for the 1st, 2nd, 3rd, and 4th and higher birth order respectively.

Table 9 shows the results of regressions with the second control group. As expected, in this case, the magnitude of the effect is significantly higher (by approximately one half). According to this specification, in the last year of observation (2014), the total fertility rate exceeds the pre-reform level by 33% for all children, and by 24%, 35%, 57% for the 1st, 2nd, and 3rd and higher birth order respectively.

6.3 Effect on Completed Cohort Fertility Rates

Ideally, to infer about a long-run effect on fertility, one would like to check the effect of the program on the completed fertility rate, i.e. on the average number of children that have been born by women who completed their childbearing years.[19] In our case this comparison is infeasible because women that have been affected by the program have not reached the end of their childbearing ages yet. Thus, to check whether the program already affected completed fertility rates, we simulate the effect of the program in the unrealistically pessimistic scenario in which women from treatment group stop giving birth completely since 2018, and at the same time women from hypothetical control group experience the highest (over pre-program period 1992-2006 or over whole post-USSR period 1992-2017) growth in fertility.

We perform this simulation in several steps.

First, we take age-specific per-period fertility rates and calculate comparison group fertility rates by subtracting the effects of the Federal and Regional Maternity Capital Programs, calculated in Table 6. Then we calculate cumulative fertility rates by summing up per-period fertility for every birth-year cohort. Finally, for the control group we project complete cumulative fertility rate under the assumption that females from the control group would experience the highest historical (over both pre-program and post years (1992-2017) or over only pre-program years (1992-2006)) growth in fertility.[20]

Panel A of Figure 10 shows cumulative fertility rates for females age 30 to 45 in 2017. Panel B and Panel C of Figure 10 compare projected completed fertility rates. Panel B uses pre-program years (years 1992-2006) to project maximal change in fertility for control group, and Panel C uses all years 1992-2017 to make a projection. Panel B shows that for Russian women age 35 to 45 in 2017 the completed cumulative fertility already exceeds that in control group. Panel C shows same result for women age 37 to 45.

Again, we provide a robustness check using cross-country case study (see section 6.2). To calculate the cumulative effect of the program, we further compare the cohort cumulative fertility rates in 2006 and 2014.[21] Also, we construct a projected 2016 cohort fertility rate using available data up to 2016

[19] Indirect evidence of the effect of Maternity Capital on long-run fertility is shown in Figure A3 in the appendix. Figure A3 shows that the average desired number of children that family would like to have jumped after 2007 from 1.4 to 2 children.

[20] To do so we use data on age-specific per period cumulative fertility rates for years 1992-2017. For every age, we pick the maximum (over years) observed percentage increase in cumulative fertility from this age till age 55. Then to get a projection for completed fertility rates we multiply cumulative fertility rate this age to this maximum historical growth.

[21] We restrict this analysis to 2014 because there is no data for fertility rates after 2014 for most of the countries in the control group.

on TR, and data on age-specific fertility rates till 2014.[22] Figure 11, Panel A and Panel B show the results of regression that compares changes in age-specific cumulative fertility rates in Russia and Eastern European countries from 2006 to 2014, and from 2006 to 2016, respectively. To do so, we repeat Dif-in-Dif regressions described in equation (4) for the years 2006 and 2014 (2016). Figure 11 then shows the Dif-in-Dif coefficients and confidence intervals for regression for CFR at every particular age. Figure 11 shows that for any particular age from 20 to 40, the cumulative fertility rate increases by 20% relative to the control group. The growth in fertility is facilitated by births of higher birth order children: while the cumulative fertility for the first child increases by 10%, the cumulative fertility for higher birth order children increases by more than 50%. Thus, one can conclude that the reform results in a significant increase in final cohort fertility for older ages. According to the fertility database, in any year of observation the 99ths and 90ths percentiles of age at which a mother gives birth to a child does not exceed 40 and 35 years, respectively (see Figure 11). It means that even in the unrealistically pessimistic scenario where Russian women who are of age 35-40 in 2016 stop giving birth completely, the average number of children that they will have at the end of the childbearing age will exceed that of the control group by at least 15%. Again, the total effect on the births of higher birth order children is higher: in the pessimistic scenario, the share of families that have two or more children will exceed the for the control group's share by 40%.

7 General Equilibrium Effects

7.1 Maternity Capital and Family Stability

In this section we analyze the effect of the program on family stability, the pressing public policy concern in Russia. The share of children that live with single parent constitutes 30% in Russia. This number is higher than that in US where 25% of children live with single parent and higher than that in any European country.[23] Figure 12 shows short-run changes in the share of children that live with a single parent for families that give birth before and after the Maternity Capital Program using Census 2010 data. It shows a significant drop in the share of children that live with a single parent right after the introduction of the Federal Maternity Program. Table 10 quantifies this short-run effect: column 1 and 2 show that the share of single parents decreases by 0.008 or by 3.7% compared to pre-reform level; column 3 shows that the share of non-married

[22]The human fertility database contains data on TR, age-specific fertility till the year 2014. The data on later years (2015-2017) is collected by authors using different sources (World Bank, CIA World Factbook, Rosstat, www.gks.ru).

[23]For review of family statistics in Rosstat demographic volume, http://www.gks.ru/free_doc/new_site/perepis2010/croc/Documents/portret-russia.pdf for Russia, https://www.pewresearch.org/fact-tank/2018/04/27/about-one-third-of-u-s-children-are-living-with-an-unmarried-parent/ for US, and Iacovou and Skew (2011) for EU.

mothers also decreases by 3%. To note, RD estimates show the cumulative effect of the program through two factors: selection to compliers (married couples are likely to participate in the program) and program-induced changes in families (parents are less likely to divorce if they got Maternity Capital Money).

Finally, Table 10 shows no effect of the program on abortions.

7.2 Maternity Capital and Housing Market

In section 5.1 (Panel A of Table 3) we already shown the connection between the housing market and Maternity Capital program by documenting a larger effect of the program in regions where subsidy has a higher value for the housing market. Figure 13 provides further evidence of the effect of Maternity Capital program on housing market. Figure 13 shows the quarterly and annual indicators of the Russian housing market for a period from 2005 to 2015. It shows an increase in housing prices and the supply of new housing after the announcement of the program. The causal interpretation of the magnitude of the effect that is shown in Figure 13 is suggestive: the effect on the housing market may be partly explained by the development of the mortgage market in Russia.[24]

To quantify the effect of maternity capital on the housing market, we collect the extensive set of controls that account for the development of local mortgage markets and banking system and estimate the following regional-age specific regression:

$$\begin{aligned} Y_{rt} = \theta_1 I(year \geq 2007)_{rt} + \theta_2 I(year \geq 2012) \\ +\delta_r + t + D'_{rt}\Gamma + u_{rt} \end{aligned} \tag{7}$$

where Y_{rt} stands for the log of prices of one square meter of housing in a region r, at date t and log of construction of new housing. θ_1 and θ_2 show the change in outcomes across the periods of 2007-2017, and 2012-2017, δ_r, t stand for regional fixed effects and time trends.[25] The set of control variables D_{rt} includes log average real income, log population, and housing availability, total amount of mortgage credits given by regional banks, average mortgage interest rate, average term of mortgages, number of banks, that are certified to give mortgages. Errors are clustered at the regional level. Table 11 shows the

[24]The mortgage market exists in Russia since the middle of the 1990s, and grew up from 0.2% of GDP in 2004 to 2.5% of GDP in 2011. Yet, the Russian mortgage market was and is underdeveloped compared to that in Eastern European countries, EU and US. In 2007 a share of mortgage loans to GDP was 1.5% in Russia compare to 11% in Poland, 40% in EU, and more than 60% in US. In 2011, the share of mortgage loans to GDP was 2.5%, 19%, 75%, and 40% for Russia, Poland, US, and EU correspondingly (see http://www.cesifo-group.de/de/ifoHome/facts/DICE/Banking-and-Financial-Markets/Banking/Comparative-Statistics.html). One of the reasons of the small size of mortgage market is the high price of mortgage in Russia: in 2007 the annual interest rate was 11.4% and 13.7% for mortgages in US dollars and Russian rubles correspondingly (see Central Bank of Russia, www.cbr.ru).

In the first twelve years after the adoption of maternity capital, 5.2 million families uses Maternity Capital money for housing. The share of transactions that involved the Maternity Capital funds constitutes about one sixths of total transactions on the housing market.

[25]We analyze regressions at national and at regional levels (both age-specific). At the national level we do not observe regional heterogeneity, and the regression specification is $Y_{at} = \theta_1 I(year \geq 2007)_t + \theta_2 I(year \geq 2012)_t + \delta_a + t * \delta_a + D'_t\Gamma + u_{at}$

estimation results. It shows that Maternity Capital programs increase housing prices and construction of new housing by 18% and 15% correspondingly.[26]

7.3 Cross-border Effects: Ukraine case study

In this section, we document a discontinuous increase in conception rates in Ukrainian regions with a Russian majority relatively to regions with a Ukrainian majority right after the introduction of Russian Maternity capital.

Figure 14 below shows monthly data on the differences in birth rates between regions with Russian and Ukrainian majorities. It shows a discontinuous jump in July 2008 exactly at the introduction of Maternity Capital in Russia. Figure 14 shows the placebo simulation of the RD estimate for these differences. It confirms the results that are shown in Figure 15: the difference peaked in July 2008, and disappeared in one year within the introduction of child subsidy in Ukraine. Finally, Table 12 provides quantitative estimates of the effect. The RD estimates show that Ukrainian regions with a Russian majority experience a sizable jump in fertility rates. The magnitude of the effect is as follows: in a hypothetical Ukrainian region populated only by people with Russian ethnicity, a fertility rate jumps by 5% compared to a hypothetical region populated by other ethnic groups. This effect is approximately one-half of that which occurred in Russia.

We see several possible explanations for the effect: persuasion, peer (relatives) effects and intention to buy property in Russia. Recent literature shows that fertility decisions, as well as other family-related decisions, are subject to persuasion (Bassi and Rasul, 2017, Card and Dahl, 2011, Chong et al, 2012, Della Vigna and Gentzkow, 2010). People with Russian ethnicity in Ukraine watch Russian TV and Russian Media. Therefore they are likely to be affected by a large-scale campaign in the media that accompanied the introduction of Maternity capital. The second explanation is peer (relatives) effects. Many Ukrainian families have close relatives just on the other side of the border and the fertility decisions of relatives in Russia may affect own fertility decisions (for empirical examples of peer effects see Moretti and Mas, 2009, Maurin and Moschion, 2009, Yakovlev, 2018). Finally, this result may also be driven by the intention to buy a property in Russia. To be eligible for Maternity Capital subsidy, one should have Russian citizenship; and it is not required to live in Russia. Although double citizenship (between Ukraine and Russia) is illegal in Ukraine, some Ukrainian families may obtain second Russian citizenship illegally, and then use it to obtain and realize maternity capital.[27]

[26]This result also identifies the losers of the program: those who did not plan to have a new baby, but would like to buy a house, suffer from the rising housing prices.

[27]The question of which effect prevails is out of scope of this paper.

8 Change in Mothers' Characteristics

In this section, we analyze changes in the characteristics of mothers that gave birth before and after the introduction of the program.

For this purpose, we utilize an individual level panel survey, RLMS, that provides mothers characteristics at the moment of the birth of a child.[28] We look on females of age 18-50 over the period of 2000-2015 and check how characteristics of those who give a birth changed after year 2007 using following Difference-in-Difference regression:

$$Y_{it} = \gamma I(year \geq 2007)_{it} \times I(give\,birth)_{it} + \theta I(year \geq 2007)_{it} + \beta I(give\,birth)_{it} \\ + \delta_t + \delta_r + \delta_a + t * \delta_a + u_{it} \tag{8}$$

The dependent variable Y_{it} stands for the mother's and her family characteristics, $I(give\,birth)$ is an indicator whether a female gave birth to a child within last year, δ_t, δ_r δ_a, $\delta_a t$, stand for year, regional, age fixed effects and age specific time trends correspondingly. Errors are clustered at the individual level.

The Dif-in-Dif parameter of interest in this model is γ. It It shows how characteristics of females who gave birth in a particular year changed after 2007 compared to changes in characteristics of other females of same age within in the same region. Table 13 shows the results of the regression (8). While most of the effects are statistically insignificant, it shows that the program affects more older mothers, married mothers, and families that belong to top 25% by income of family head. To note: this section analysis is incomplete and subject to further development as soon as better data become available.

9 WTP for Additional Child

In this section, we roughly calculate how much the Russian government is paying for an additional child that is born because of the program.

While a family receives 10,000 dollars for a child, it does not imply that the government's willingness to pay for birth of any additional child is equal to the subsidy level.

WTP is different because of two reasons. On the one hand, the government pays not only to those families who decided to give birth to a child because of maternity capital (compliers) but also to those who would give birth to the child

[28] For this particular analysis, we chose RLMS survey over census data for two reasons. First, as it was discussed in section 7, a census data shows cumulative effect of selection and program effects. In this section, we are primarily interested in quantifying selection effect. In addition, census data does not contain information on several important personal characteristics, that are of primary interest for this analysis, such as personal or family income. The disadvantage of the RLMS survey relative to Census data is that the birth events are rare events in the RLMS. RLMS surveys on average 10,000 respondents in every round and contains data on average on 150 births per every round of the survey. Thus we do not have much power for the hypothesis tests in our regression analysis.

independently of the subsidy (always-takers). On the other hand, the subsidy increases birth rates not only of second children but also of first children for which the government does not use maternity capital money.

The rough calculation of WTP is as follows. The Maternity Capital subsidy results in an increase in fertility rates by 7% and 13% for the first and for higher birth order children respectively (see Table 2). For this increase in fertility, the government pays to *all* (100%) families that give birth to second and higher birth order children (10,000 dollars per child). There are approximately equal numbers of births of first and of 2nd or higher birth order children. Thus, the government's willingness to pay for the birth of an additional child that is implied by the Maternity capital program equals 10,000*(100%/(7%+13%)) or approximately 50,000 dollars.

10 Robustness Checks

Table 14 shows the results of various robustness checks of the estimation of the effects on fertility. Panel A shows the results of an RD estimation using log fertility rates instead of log number of births as a dependent variable. Panel B shows the results of an RD estimation using alternative to our RD procedures CCT procedure discussed above). Panel C shows results of regressions where we allow for a transition period of treatment variable from 0 to 1 within a half of year before the programs start instead of discontinuous jump of treatment variable from 0 to 1 at the threshold date (see Clark and Del Bono, 2016 for similar approach). In all panels, results correspond with our main specification results. Panel D shows the RD estimates using mother age cells, and controlling for age-specific time trends (using 2010 Census data). Estimates are similar to our main specification results. Panel E shows the long-run effect of the program on birth rates for births by parity using available for a subset of regions data on birth rates by parity. It shows similar to main specification estimates of the effect of the program.

11 Conclusion

The paper documents the strong effect of a sizable child subsidy on fertility.

We find that the introduction of the subsidy in 2007 resulted in a significant increase in fertility both in the short run and in the long run. To identify the causal effect of the subsidy in the short run, we apply the Regression Discontinuity strategy within a short time interval near the child subsidy's adoption. The short-run effects do not vanish over time. We find that the program resulted in a decade-long increase in fertility by 20% and has already resulted in an increase in completed fertility for a certain cohort of Russian women.

We also find that the subsidy has a substantial general equilibrium effect. It affected the housing market. We find that housing prices and the supply of new houses increased as a result of the program. It affected family stability: it resulted in a decrease of the share of single mothers and higher marriage rates.

Finally, we show that this government intervention comes at substantial costs: the government's willingness to pay for an additional birth induced by the program equals approximately 50,000 dollars.

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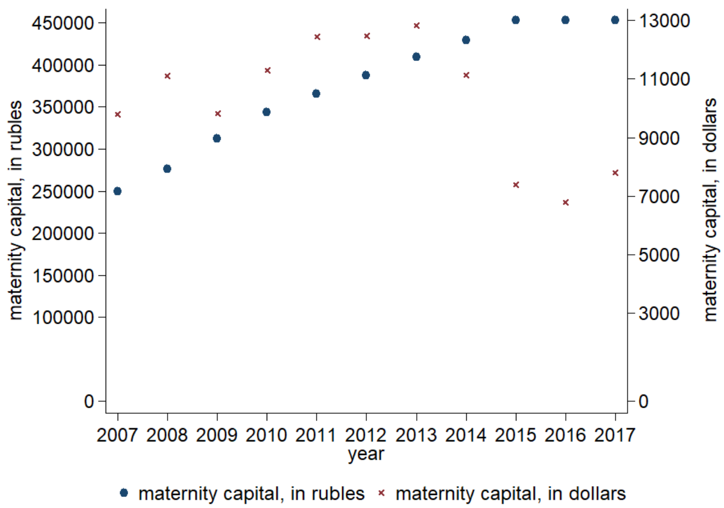
https://population.un.org/wpp/Publications/Files/WPP2017_KeyFindings.pdf

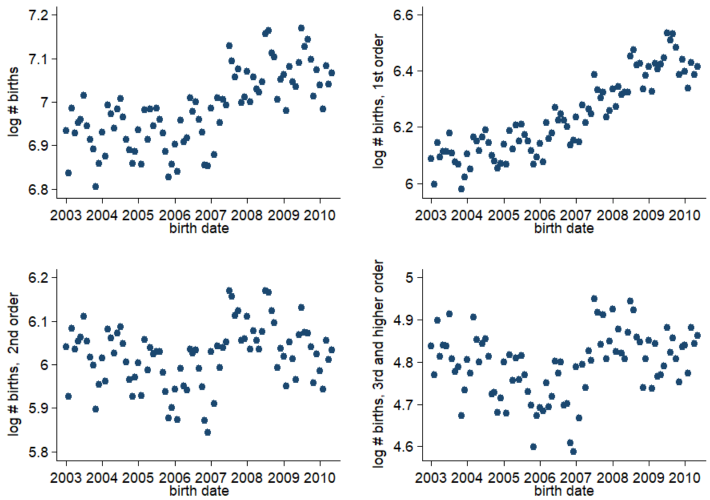
Tables and Figures

Figure 2: Values of maternity capital



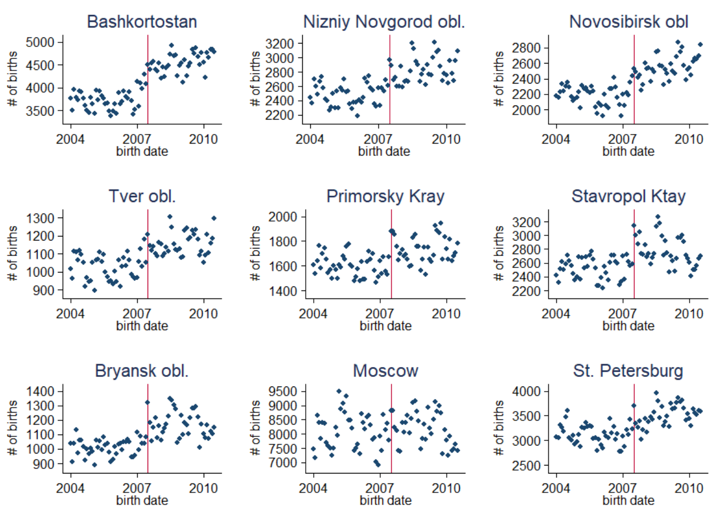
Source: Russian Federation Pension Fund

Figure 3: Birth rates in Short Run (by parity)



Source: Russian Census 2010. Monthly bins.

Figure 4: Effect of maternity capital, by regions
Effect of MC on birth rates in different regions



Source: Russian Census 2010

Figure 5: RD estimates for pre-determinate covariates with different placebo dates for threshold

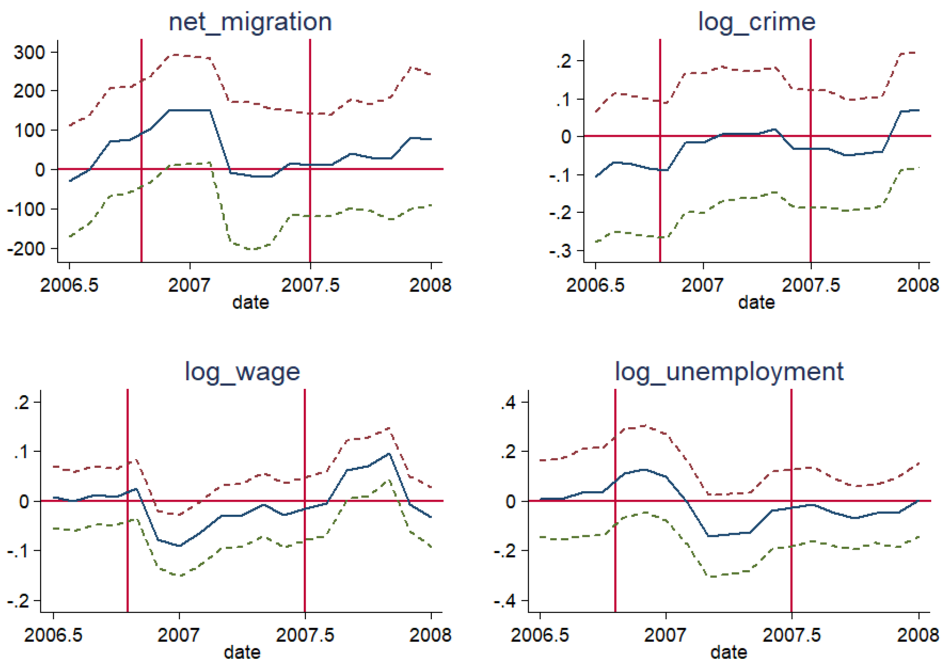


Figure 6: Short-Run effect on births by age of mother and order of child

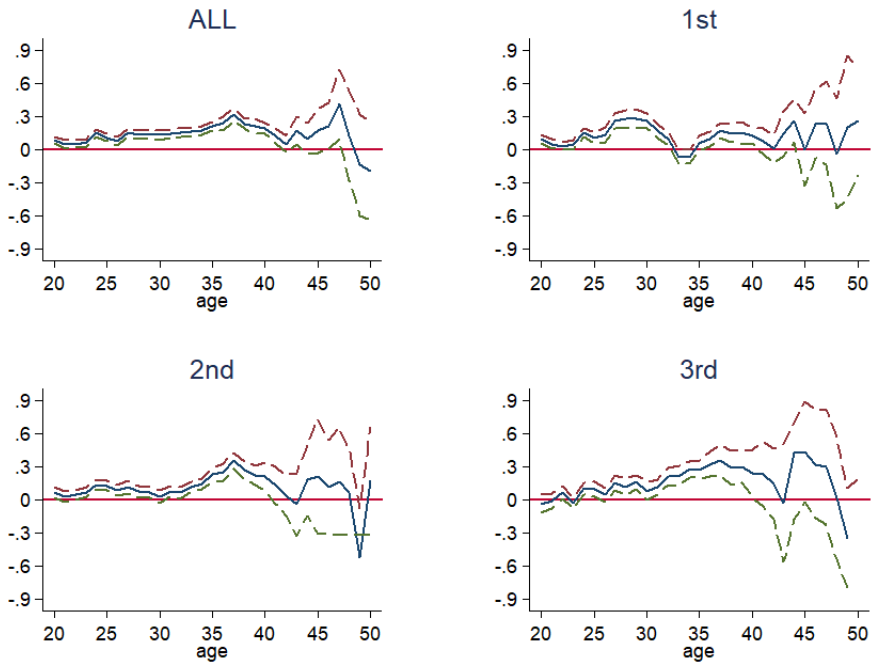


Figure 7: Number of births, by birth date. Ukraine

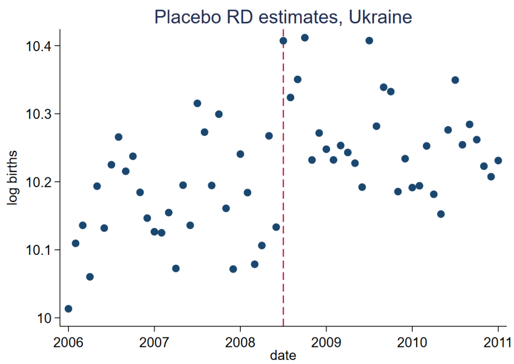
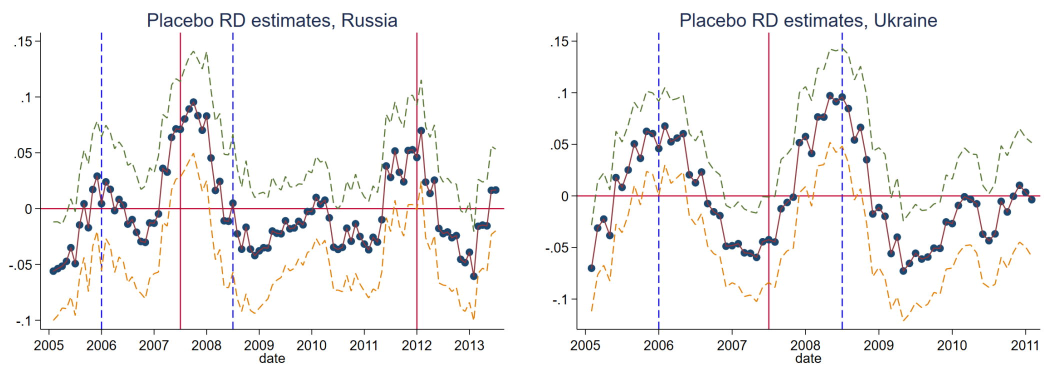


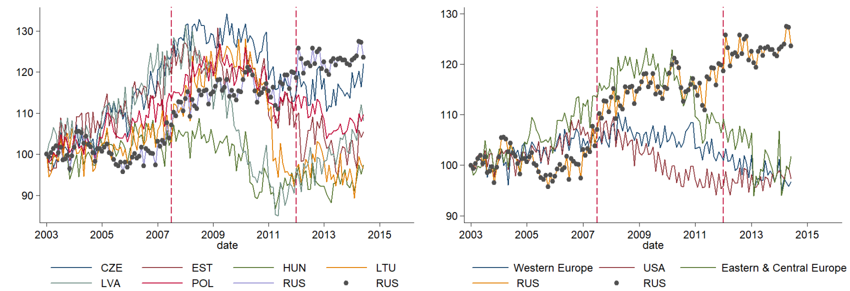
Figure 8: Placebo Experiments for RD estimates in Russia and Ukraine



Note: Solid lines stand for starting dates of Maternity Capital programs in Russia, dashed lines stand for for starting dates of child support programs in Ukraine.

Figure 9: Normalized monthly births in Russia, Eastern European countries, US, and Western Europe

Panel A: Monthly bins (subset of countries for which monthly data is available)



Note: Births are normalized for every country: 2003=100%. List of Western European countries includes Spain, Austria, Denmark, Finland, Ireland, Italy, France, Portugal, Sweden, Luxembourg, and Netherlands.

List of countries restricted to those for which monthly data is available. Source: http://www.fertilitydata.org/.

Panel B: Annual data

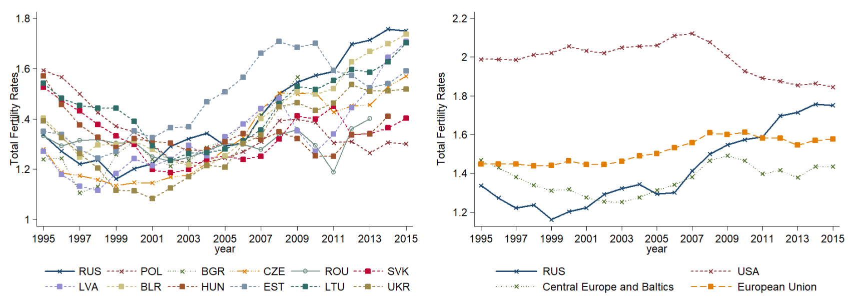


Figure 10: Changes in Age-Specific Cumulative Fertility Rates

Figure A: Cumulative Fertility Rates of Treatment and Control Group

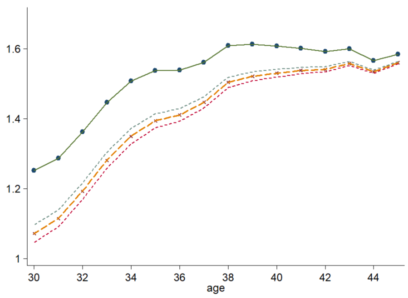
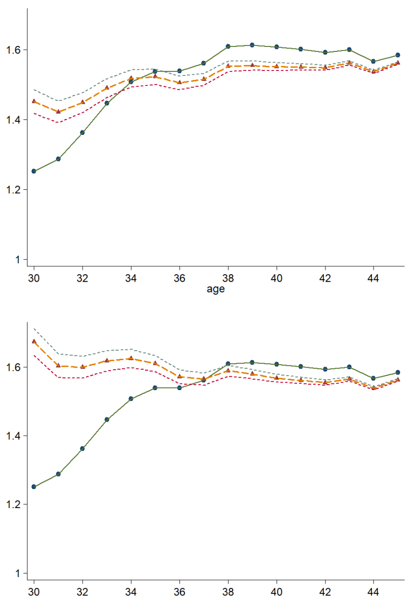


Figure B and C: Cumulative Fertility Rates of Treatment Group and Projected Maximum of Completed Fertility Rate of Control Group



Note: Dashed lines: Control group; Solid line: Treatment group.

Figure 11: Changes in Age-Specific Cumulative Fertility Rates

Figure A: Change in CFR, all births: 2006 vs 2014 (Left Panel) and 2006 vs 2016 (Right Panel)

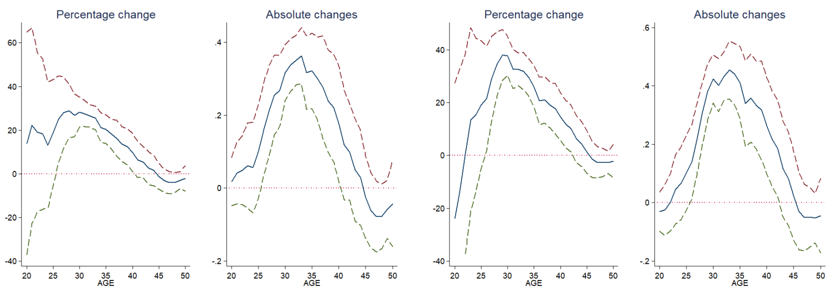


Figure B: Changes in CFR, by birth order: 2006 vs 2014

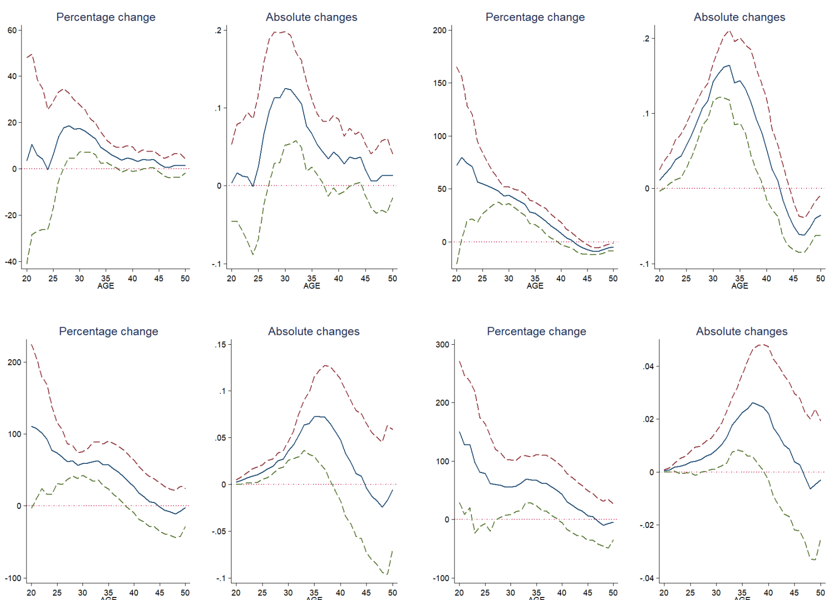
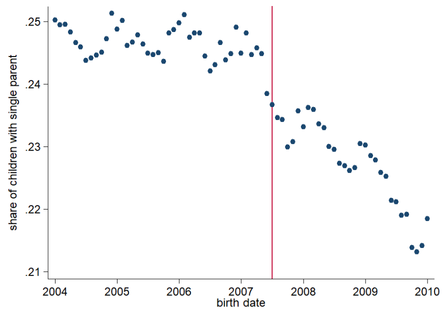
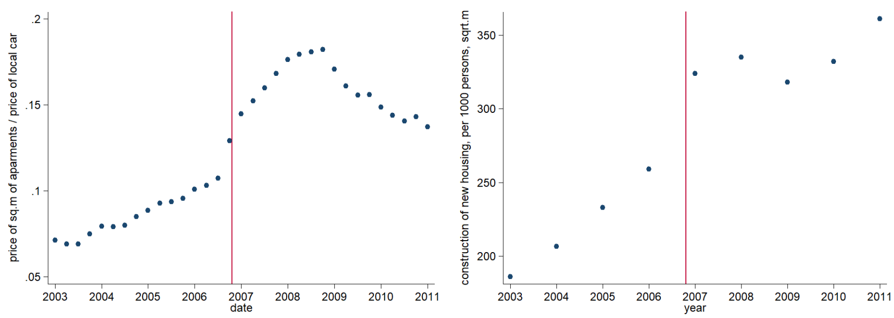


Figure 12: Share of children that live with single parent and Maternity Capital



Note: Panel A: Source: Russian Census 2010. Panel B: source RLMS

Figure 13: Housing Market, Short Run
Panel A: Housing prices. Panel B: Construction of new houses



Source: Rosstat 2015

Figure 14: Difference in birth rates among Russian and Ukrainian Regions.

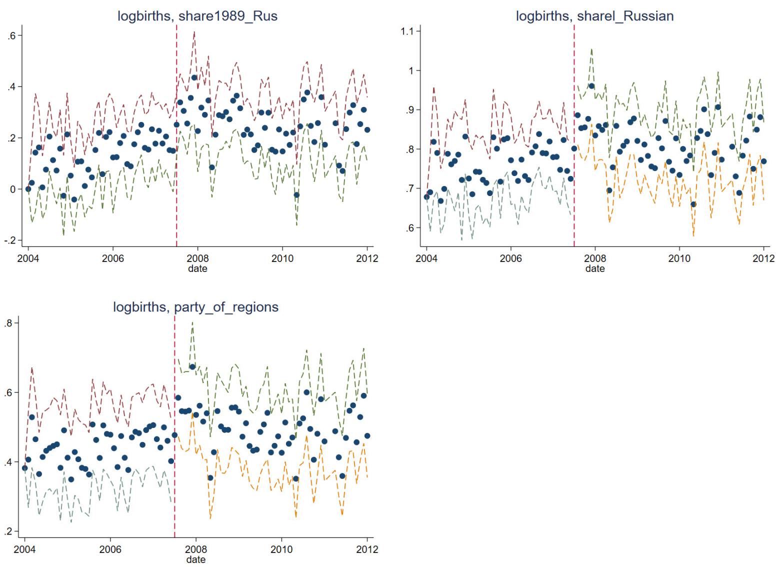
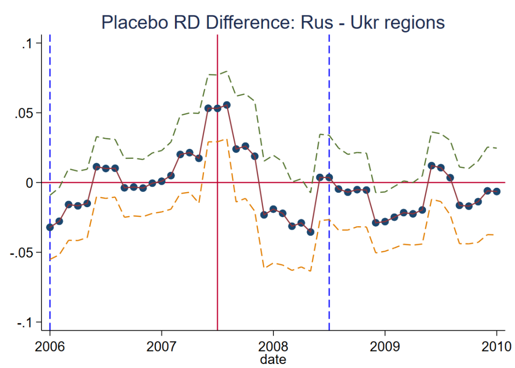


Figure 15: Placebo RD estimates of difference in birth rates between regions with Ukrainian and Russian Majority



Tables

Table 1. Summary Statitics

Variable	Obs	Mean	SD	Min	Max
Rayon×month Data, Census 2010					
# of births	228576	48.95	108.4	0	1990
Rooms per HH	228576	2.535	.4127	1.013	4.503
Rooms per cap	228576	.7650	.0941	.386	1.152
Individual Level Surveys, RLMS, females, age 18-50					
I(gave birth)	66771	.0372	.1892	0	1
I(gave birth, order≥2)	66771	.0174	.1309	0	1
Relative wage	53710	1	.235	.590	1.979
I(college)	66771	.3041	.460	0	1
Region×month Data, Rosstat					
net migration	11227	256.9	1796	-5335	53629
log # crimes	12764	7.414	1.080	2.83	10.55
log wage	12674	9.806	.5843	8.02	11.65
log unempl.	13367	2.527	.9252	-1.20	5.930
# of births	13302	1759	1664	9	13627
log TR	6560	8.509	.2018	6.39	9.583
marr./divorce	6708	2.209	3.201	.295	76.38
log house price	6452	10.19	.5002	8.43	12.04
Annual Regional Data, Long Run					
ratio of reg. to federal subsidy	664	.1028	.1730	0	1.085
living area	1239	21.68	3.399	4.2	30.4
log real income	1235	6.004	.567	4.126	7.588
metrs of housing per Mat. Cap.	1065	10.13	3.061	2.821	19.04

Variable	Obs	Mean	SD	Min	Max
Region×month, Census 2010, Fertility Database					
# of births, by birth order					
all	6400	1622	1398	37	9510
1st	9000	705.7	696.5	0	5832
2nd	9000	561.0	511.7	0	3423
3rd	9000	138.6	172.9	0	1565
4th	9000	38.98	74.3	0	723
5th	9000	13.40	28.56	0	296
Share of Single Parents, by birth order					
all	6400	.1928	.0511	.035	.4375
1st	9440	.381	.0640	0	.666
2nd	9440	.188	.0469	0	.6875
3rd	9426	.178	.0792	0	1
4th	9165	.180	.1667	0	1
5th	7842	.155	.2407	0	1
National Level×month, Census 2010, Fert.Database					
Births, by birth order (thousands)					
all	81	129.8	10.50	109.9	152.8
1st	120	52.93	11.08	0	74.28
2nd	120	42.08	6.642	0	50.30
3rd	120	10.40	1.634	0	12.45
4th	120	2.923	0.488	0	3.640
5th	120	1005	185.7	0	1344

Table 2: RD estimates: Effect of Federal MC program (2007) on birth rates

Panel A. National Level Regressions

	(1)	(2)	(3)	(4)	(5)
			log births		
birth order:	all	all	1st	2nd	3rd
I(after 2007)	0.082***	0.089***	0.066***	0.114***	0.144***
	[0.008]	[0.012]	[0.018]	[0.017]	[0.018]
Obs	72	72	72	72	72
Data	HFD		2010 Census		

Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1

Panel B. Regional level regressions

	(1)	(2)	(3)	(4)	(5)
			log birth rate		
birth order:	all	all	1st	2nd	3rd
I(after 2007)	0.080***	0.094***	0.081***	0.131***	0.172***
	[0.019]	[0.012]	[0.017]	[0.016]	[0.019]
Observations	6,560	6,400	8,850	8,850	8,845
Data	Rosstat		2010 Census		

Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1

Panel C. Rayon level regressions

	(1)
	# of births
I(after 2007)	8.009***
	[2.244]
pp change	.15
Observations	283,339
R-squared	0.001
RD	OWN
bandwidth	2.461

Robust standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Local heterogeneity in Short-Run effect

Panel A: Regional Level Data				
	(1)	(2)	(3)	(4)
			log birth rate	
birth order	all births	all births	all births	births of 2nd child
After 2007×	-0.006***		-0.007***	-0.025**
living area	[0.001]		[0.001]	[0.012]
After 2007 ×		0.007***	0.002	0.019***
meters per MC		[0.002]	[0.002]	[0.002]
After 2007×			-0.034**	-0.014***
log income			[0.013]	[0.002]
After 2007	0.080***	0.081***	0.081***	0.131***
	[0.019]	[0.019]	[0.019]	[0.016]
Observations	6,396	6,240	6,240	8,468
R-squared	0.461	0.246	0.497	0.341

Note: Robust standard errors clustered at regional level in brackets; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Panel B: rayon-level data		
	(1)	(2)
VARIABLES	# of births	# of births
After × Rooms per capita	-21.174***	
	[3.809]	
After × Rooms per household		-2.308***
		[0.675]
After	7.548***	7.548***
	[1.515]	[1.515]
Observations	223,814	223,814
R-squared	0.034	0.016

Note: Robust standard errors in brackets. *** $p<0.01$; births are in levels instead of logs because rayon-level data on births contain zero values.

Table 4: RD estimates for Mother age at birth

	(1)	(2)	(3)	(4)
	mother age at birth			
Birth order	all	1st	2nd	3rd
I(after 2007)	0.146***	0.082	0.099	0.019
	[0.047]	[0.061]	[0.083]	[0.115]
Observations	10,400	10,399	10,399	10,345

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Short-Run Effect of Regional Maternity Capitals on Fertility

	(1)	(2)	(3)	(4)	(5)
			log births		
birth order:	all	all	1st	2nd	3rd
I(after 2012)	0.047***	0.037**	0.055**	0.021	0.058*
	[0.012]	[0.017]	[0.020]	[0.022]	[0.029]
Observations	71	71	71	71	71
Data source	HFD		2015 Micro Census		
Level	Nation ×month	Nation × quarter	Nation × quarter	Nation × quarter	Nation × quarter

	(6)	(7)	(8)	(9)	(10)
			log births		
birth order:	all	all	1st	2nd	3rd
I(after 2012)	0.048**	0.043***	0.084***	0.011	0.101***
	[0.024]	[0.015]	[0.026]	[0.019]	[0.033]
Observations	5,460	2,214	2,214	2,213	2,195
Data source	Rosstat		2015 Micro Census		
Level	Region ×month	Region × quarter	Region × quarter	Region × quarter	Region × quarter

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Long-Run Effect on Fertility Rates: Within country analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Log Fertility Rate				
birth order:	all	all	all	all	1st	2nd	3rd	4th
I(after 2007)	0.127***	0.127***		0.148***	0.049	0.127***	0.127***	0.099*
	[0.008]	[0.008]		[0.020]	[0.031]	[0.033]	[0.044]	[0.049]
I(after 2012)	0.063***	0.063***		0.101***	0.049*	0.054	0.151***	0.119**
	[0.008]	[0.008]		[0.022]	[0.026]	[0.049]	[0.053]	[0.048]
$(S_{rt} - \overline{S})$		0.050*	0.070**					
		[0.030]	[0.030]					
R-squared	0.982	0.982	0.982	0.997	0.996	0.996	0.993	0.991
Obs	61295	61295	61295	736	704	702	690	651
Data		Region×Age				Nation×Age		
Regional FE	YES	YES	YES					
Regional trends	YES	YES	YES					
Age FE	YES	YES	YES	YES	YES	YES	YES	YES
Age Trends	YES	YES	YES	YES	YES	YES	YES	YES
Year FE			YES					

Note: Robust standard errors in brackets; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; log average income and housing availability are included as controls to regional regressions

Table 7: Regional heterogeneity of Long-Run Effect on Fertility

	(1)	(2)	(3)
VARIABLES		log TFR	
After 2007×	-0.014***		-0.012***
living area	[0.004]		[0.003]
After 2007 ×		0.014**	0.013**
meters per MC		[0.006]	[0.005]
After 2007×			-0.049*
log income			[0.025]
After 2007	0.074***	0.052***	0.115***
	[0.006]	[0.011]	[0.006]
After 2012	0.055***	0.056***	0.066***
	[0.004]	[0.005]	[0.005]
Observations	1,270	1,241	1,404
R-squared	0.973	0.971	0.953

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Long-Run Effect on Total Fertility Rates: Russia vs First Control Group

VARIABLES	(1) TR	(2) adjTFR	(3) adjTFR1	(4) adjTFR2	(5) adjTFR3	(6) adjTFR4	(7) adjTFR5p
A)							
Russia×I(after 2007)	0.147***	0.212***	0.056	0.070***	0.057***	0.018***	0.011**
	[0.030]	[0.064]	[0.034]	[0.021]	[0.010]	[0.004]	[0.004]
Percentage change in TR:							
2000/6 vs 2007/14	.084	.122	.065	.118	.281	.294	.312
B)							
Russia×I(2007)	0.027	0.060	0.011	0.008	0.024**	0.011**	0.008**
Russia×I(2008)	0.048	0.159**	0.018	0.071***	0.045***	0.014***	0.009*
Russia×I(2009)	0.076**	0.229**	0.054	0.086***	0.063***	0.018***	0.008
Russia×I(2010)	0.130***	0.151**	-0.004	0.060**	0.065***	0.018***	0.011*
Russia×I(2011)	0.169***	0.163*	0.030	0.047	0.059***	0.015**	0.013*
Russia×I(2012)	0.237***	0.360***	0.138**	0.108**	0.079***	0.022***	0.015**
Russia×I(2013)	0.249***	0.389***	0.150**	0.125**	0.072***	0.026***	0.016**
	[0.041]	[0.112]	[0.049]	[0.051]	[0.019]	[0.006]	[0.006]
Russia×I(2014)	0.244***						
	[0.046]						
Percentage change:							
2014 vs 2006	.139	.223	.176	.21	.355	.425	.435

Note: Robust standard errors in brackets. ***p<0.01,**p<0.05,*p<0.1. All Eastern European Countries are in Control Group. In all regressions, country FE, time trends are included.

Table 9: Long-Run Effect on Total Fertility Rates: Panel B (Second Control Group)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	TR	adjTFR	adjTFR1	adjTFR2	adjTFR3	adjTFR4	adjTFR5p
Russia*I(after)	0.191***	0.340***	0.115**	0.105**	0.078***	0.024***	0.018*
	[0.037]	[0.059]	[0.035]	[0.026]	[0.008]	[0.006]	[0.008]
Percentage change							
2000/6 vs 2007/14	.109	.195	.135	.177	.383	.408	.49
Russia×I(2007)	0.044	0.138*	0.076*	0.007	0.033*	0.012*	0.011
Russia×I(2008)	0.073*	0.286***	0.107**	0.090***	0.055***	0.019***	0.013
Russia×I(2009)	0.112**	0.359***	0.153**	0.091***	0.076***	0.025***	0.015
Russia×I(2010)	0.197**	0.252**	0.039	0.083**	0.083***	0.026**	0.019*
Russia×I(2011)	0.237***	0.318**	0.062	0.122**	0.086***	0.026**	0.023*
Russia×I(2012)	0.298***	0.538***	0.178**	0.193***	0.114***	0.033**	0.022
Russia×I(2013)	0.300***	0.580***	0.202***	0.206***	0.115***	0.032**	0.024
	[0.045]	[0.060]	[0.050]	[0.027]	[0.009]	[0.009]	[0.012]
Russia×I(2014)	0.284***						
	[0.065]						
Percentage change							
2006 vs 2014	.162	.333	.238	.347	.565	.539	.661

Table 10: Short-Run Effect of Maternity Capital on Family Outcomes

	(1)	(2)	(3)	(4)
	share of families with a single parent		share of married mothers	log abortions
After 2007	-0.008***	-0.007***	-0.004***	0.003
	[0.001]	[0.001]	[0.001]	[0.013]
Observations	6,240	73	73	564
R-squared	0.050	0.96	0.538	0.07
value of dep.var. at t=0	0.22	0.22	0.132	
percentage change	-3.7%	-3.2%	-3%	

Note: a couple may be married, but not live together. RD estimates, 2010 Census

Table 11: Maternity Capital and Regional Housing Markets

	(1)	(2)	(3)
VARIABLES	log real price, 1 sq.m		log construction
	new	secondary	of new housing
After 2007	0.187***	0.162***	0.147***
	[0.022]	[0.027]	[0.046]
After 2012	0.043***	0.026	0.021
	[0.016]	[0.016]	[0.040]
Log real income	0.280***	0.411***	0.589***
	[0.083]	[0.089]	[0.191]
log population	-0.035	-0.377	-2.165**
	[0.545]	[0.535]	[1.059]
Housing availability	0.013	-0.030	-0.040
	[0.016]	[0.020]	[0.027]
log # banks	0.001	-0.047	-0.039
	[0.042]	[0.043]	[0.059]
log credits	0.081***	0.114***	0.101***
	[0.017]	[0.020]	[0.028]
Term credit	0.002***	0.002***	0.000
	[0.000]	[0.000]	[0.001]
Interest rate	0.000	0.003	0.026*
	[0.008]	[0.012]	[0.014]
Time trend	-0.068***	-0.052***	0.007
	[0.009]	[0.008]	[0.025]
Observations	651	694	697
R-squared	0.540	0.600	0.559
Number of id	76	79	79

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Effect of Russian Federal Maternity Program on birth rates in Ukraine

	(1) log births	(2) log births	(3) log births	(4) log births
I(after 2007) × share of Russian population (census 2001)	0.047***			
	[0.012]			
I(after 2007) × share of Russian population (census 1989)		0.110***		
		[0.019]		
I(after 2007) × share of votes for party of regions			0.055***	
			[0.013]	
I(after 2007) × I(Russian majority)				0.023***
				[0.006]
I(after 2007)	0.011	0.010	0.011	0.011
	[0.022]	[0.022]	[0.022]	[0.022]
Observations	1,971	1,898	1,971	1,971
R-squared	0.045	0.297	0.055	0.076

Notes: Robust standard errors in brackets. Months FE and time trend are included in regressions. *** p<0.01, ** p<0.05, * p<0.1

Table 13: Family characteristics before and after program.

Panel A: Sample: females age 18-50; Regression controls for age, region, and year fixed effects, and age-specific time trends.

	(1)	(2)	(3)	(4)	(5)	(6)
	mother:	mother:	quantiles by head of household income			grandfather
	I(married)	I(college)	bottom 25%	middle 50%	top 25%	college
After 2007	0.029	0.008	-0.031	-0.014	0.044**	-0.018
× $I(give\ birth)$	(0.020)	(0.018)	(0.019)	(0.022)	(0.018)	(0.018)
Observations	66,771	66,771	65,920	65,920	65,920	47,678
R-squared	0.116	0.103	0.113	0.070	0.199	0.09

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Panel B: Sample: females age 25-50; regression controls for age, region, and year fixed effects, and age-specific time trends.

	(1)	(2)	(3)	(4)	(5)	(6)
	mother:	mother:	quantiles by head of household income			grandfather
	I(married)	I(college)	bottom 25%	middle 50%	top 25%	college
After 2007	0.074***	-0.006	-0.049*	-0.000	0.050*	-0.044*
× $I(give\ birth)$	(0.028)	(0.029)	(0.029)	(0.032)	(0.027)	(0.027)
Observations	50,304	50,304	49,597	49,597	49,597	37,060
R-squared	0.042	0.099	0.139	0.085	0.208	0.098

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Panel B: Sample: females age 18-50; unconditional effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	mother:	mother:	quantiles by head of household income			grandfather:	mother:
	I(married)	I(college)	bottom 25%	middle 50%	top 25%	I(college)	age
After 2007	0.078***	0.047**	-0.045**	0.004	0.041**	-0.018	1.861***
× $I(give\ birth)$	(0.020)	(0.020)	(0.020)	(0.023)	(0.020)	(0.019)	(0.260)
Observations	66,771	66,771	65,920	65,920	65,920	47,678	66,771
R-squared	0.010	0.011	0.001	0.016	0.019	0.002	0.021

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 14: RD estimates: Robustness check.

Panel A. Short Run Effect on Log Birth rates. Federal MC program.

	(1)	(2)	(3)	(4)	(5)	(6)
			log fertility rate, all births			
I(after)	0.082***	0.090***	0.069***	0.085***	0.050**	0.054***
	[0.008]	[0.013]	[0.017]	[0.013]	[0.023]	[0.012]
Data	HFD	Census	Rosstat	Census	HFD	Rosstat
	National×month		Regional×month		National×month	
	Federal (2007) MC				Regional (2012) MC	

Panel B. CCT Regression Discontinuity estimates. Federal MC program.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					log births			
Birth order	all	1st	2nd	3rd	all	1st	2nd	3rd
	National×month level data				Regional×month level data			
Robust RD	0.079***	0.086**	0.094***	0.120***	0.095***	0.091***	0.100***	0.085
	[0.026]	[0.035]	[0.032]	[0.038]	[0.029]	[0.028]	[0.025]	[0.062]
bandwidth	1.951	1.766	1.721	2.096	.66	1.056	1.005	1.302

Panel C. Estimates with a half-year transition period of treatment variable.

	(1)	(2)	(3)	(4)
	log fertility rate, all births			
I(after)	0.092***	0.076***	0.067***	0.063***
	[0.011]	[0.010]	[0.012]	[0.005]
Data	National	Regional	National	Regional
	Federal (2007) MC		Regional (2012) MC	

Panel D. Age of Mother cells. Federal and Regional MC programs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Log Fertility Rate				Log Fertility Rate		
birth order	all	1st	2nd	3rd	all	1st	2nd	3rd
RD	0.107***	0.058***	0.154***	0.122***	0.059**	0.044	0.102***	0.086*
	[0.025]	[0.020]	[0.034]	[0.028]	[0.023]	[0.035]	[0.037]	[0.045]
		Federal (2007) MC				Regional (2012) MC		

Panel E. Long-Run effect for births by parity, regional-level regressions

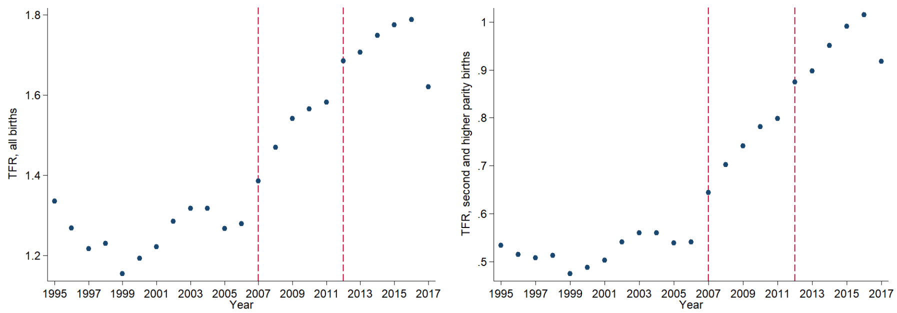
	(1)	(2)		(3)
		Log Fertility Rate		
birth order:	1st	2nd	3rd	4th
$(S_{rtb} - \overline{S}_b)$	0.042		0.156***	0.248***
	[0.052]		[0.041]	[0.046]
I(after 2007)	0.098***	0.189***	0.165***	0.112***
	[0.008]	[0.009]	[0.011]	[0.014]
I(after 2012)	0.061***	0.079***	0.183***	0.181***
	[0.009]	[0.009]	[0.009]	[0.011]

Note: In all panels robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

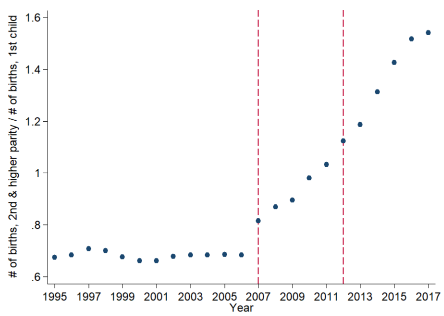
APPENDIX

Figure A1. Effect of of the Maternity Capital on TFR and decomposition of births

Panel A: Effect of of the Maternity Capital on TFR by parity



Panel B: The effect of of the Maternity Capital on decomposition of births



Note: Panel B shows ratio of # of births of children of second and higher parity births relative to # of births of first children.

Figure A2. RD estimates for different bandwidth sizes

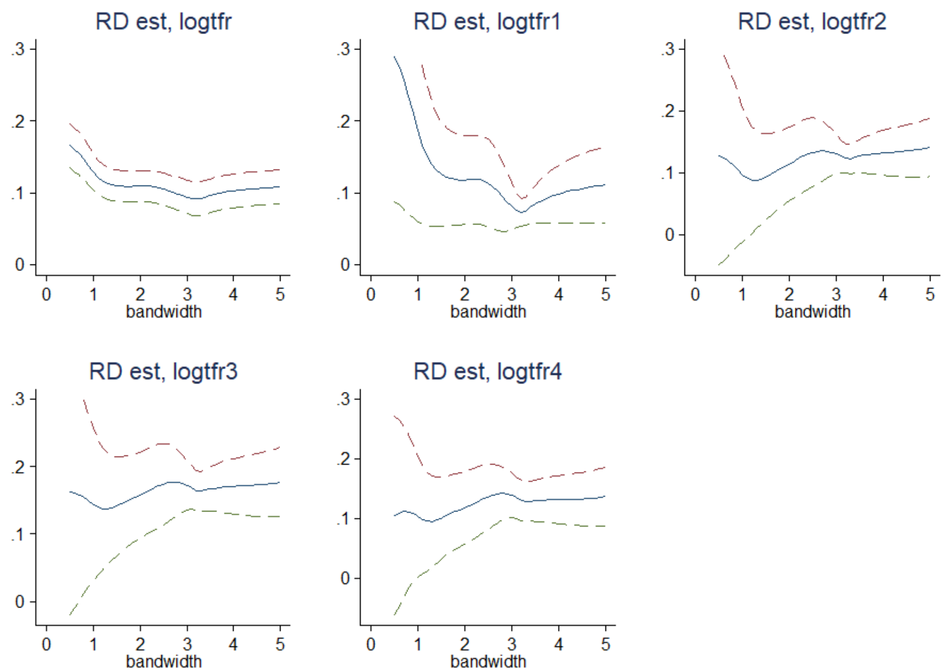
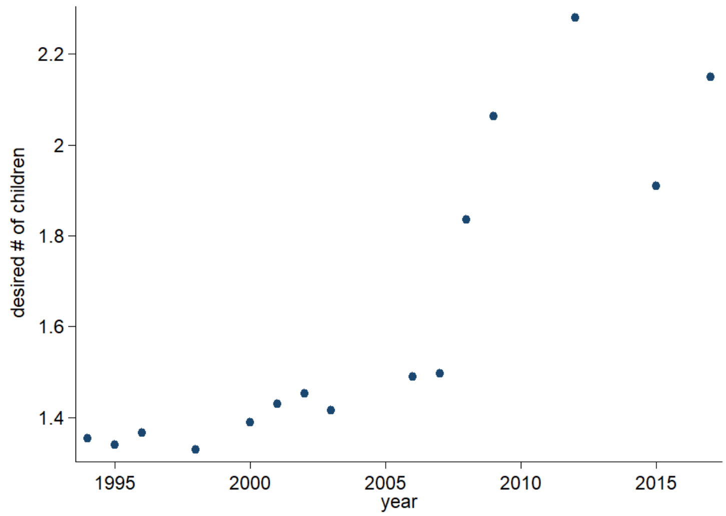


Figure A3. Maternity Capital and desired size of family



Note: Source: Rosstat, RLMS

Table A1. Effect of 2008 Child Subsidy on Fertility in Ukraine

	(1)	(3)
VARIABLES	log births	log births
RD: own	0.078***	
	[0.017]	
RD: CCL		0.242***
		[0.079]
Observations	2,511	729
R-squared	0.034	
bandwidth	3	1.127

Standard errors in brackets.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A2. Long-Run Effect on Fertility Rates

VARIABLES	(1) ASFR	(2) ASFR1	(3) ASFR2	(4) ASFR3	(5) ASFR4	(6) ASFR5P	(7) CPFR	(8) CPFR1	(9) CPFR2	(10) CPFR3	(11) CPFR4
Russia×After	0.002***	-0.001**	0.002***	0.001***	0.000***	0.000***	0.072***	-0.016*	0.051***	0.026***	0.008***
	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.021]	[0.009]	[0.010]	[0.005]	[0.002]
Observations	6,296	6,332	6,332	6,332	5,962	5,962	6,776	6,776	6,776	6,776	6,776
Percentage change											
2007/14 vs 2000/6	.06	-.049	.135	.209	.198	.176	.088	-.035	.199	.368	.36
Russia×I(2007)	0.001	-0.001***	0.001***	0.000***	0.000***	0.000***	0.011	-0.025***	0.019**	0.010**	0.004***
Russia×I(2008)	0.001	-0.001***	0.001***	0.001***	0.000***	0.000**	0.018	-0.034***	0.027***	0.017***	0.005***
Russia×I(2009)	0.001	-0.001***	0.001***	0.001***	0.000***	0.000**	0.027	-0.025***	0.028***	0.016***	0.005***
Russia×I(2010)	0.002*	-0.001**	0.002***	0.001***	0.000**	0.000**	0.051*	-0.016	0.040***	0.019**	0.005**
Russia×I(2011)	0.003**	-0.001	0.002***	0.001***	0.000***	0.000***	0.077**	-0.005	0.048***	0.024***	0.006**
Russia×I(2012)	0.005***	-0.000	0.003***	0.002***	0.000***	0.000***	0.120***	0.000	0.070***	0.034***	0.010***
Russia×I(2013)	0.005***	-0.001	0.003***	0.002***	0.000***	0.000***	0.136***	0.001	0.079***	0.039***	0.011***
	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]	[0.031]	[0.015]	[0.015]	[0.007]	[0.002]
Russia×I(2014)							0.144***	-0.015	0.093***	0.046***	0.013***
							[0.032]	[0.016]	[0.015]	[0.007]	[0.002]
Observations	6,296	6,332	6,332	6,332	5,962	5,962	6,776	6,776	6,776	6,776	6,776
Percentage change:											
2014 vs 2006	.119	-.025	.216	.333	.299	.239	.177	-.032	.367	.658	.616

Note: Robust standard errors in brackets. ***p<0.01,**p<0.05,*p<0.1. All Eastern European Countries are in Control Group. In all regressions, country FE, age FE, time trens are included.

Table A2. Long-Run Effect on Fertility Rates, ASFR ad CPFR

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
VARIABLES	ASFR	ASFR1	ASFR2	ASFR3	ASFR4	ASFR5P	CPFR	CPFR1	CPFR2	CPFR3	CPFR4
Russia×After	0.004**	-0.001*	0.003***	0.002***	0.000***	0.000***	0.112**	-0.020	0.076***	0.039***	0.011***
	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]	[0.032]	[0.014]	[0.012]	[0.005]	[0.002]
Observations	3,238	3,238	3,238	3,238	3,003	3,003	3,520	3,520	3,520	3,520	3,520
Percentage change											
2000/6 vs 2007/14	.094	-.068	.204	.319	.285	.231	.137	-.043	.297	.55	.525
Russia×I(2007)	0.001	-0.001**	0.001**	0.001***	0.000***	0.000***	0.033	-0.021*	0.029**	0.016**	0.006**
Russia×I(2008)	0.002	-0.001**	0.002**	0.001***	0.000	0.000***	0.047	-0.030**	0.041**	0.024***	0.007***
Russia×I(2009)	0.002	-0.001**	0.002*	0.001***	0.000***	0.000*	0.048	-0.029*	0.041**	0.025***	0.008***
Russia×I(2010)	0.004	-0.002	0.003**	0.002***	0.000***	0.000**	0.098	-0.023	0.070**	0.035***	0.010**
Russia×I(2011)	0.004*	-0.002	0.004***	0.002***	0.001***	0.000***	0.143**	-0.006	0.087***	0.043***	0.012***
Russia×I(2012)	0.007***	-0.001	0.005***	0.002***	0.001***	0.000***	0.185***	0.000	0.108***	0.053***	0.015***
Russia×I(2013)	0.008***	-0.001	0.005***	0.003***	0.001***	0.000***	0.202***	0.001	0.119***	0.059***	0.016***
	[0.002]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]	[0.034]	[0.016]	[0.010]	[0.005]	[0.003]
Russia×I(2014)							0.191***	-0.022	0.125***	0.062***	0.017***
							[0.039]	[0.020]	[0.010]	[0.006]	[0.003]
Observations	3,238	3,238	3,238	3,238	3,003	3,003	3,520	3,520	3,520	3,520	3,520
Percentage change											
2006 vs 2014	.185	-.049	.355	.532	.419	.278	.234	-.048	.493	.88	.81

NOTE 1: FERTILITY RATES MEASURES: CALCULATION

This description is copied from the methodology section in the human fertility database (www.humanfertility.org, Jasilioniene et al 2016).

The period total fertility rate for all birth orders combined and by birth order is computed as follows:

$$\mathrm{TFR}\,(t) = \sum_{x=x_{\min}}^{x_{\max}} f\,(x,t)$$

$$\mathrm{TFR}_i\,(t) = \sum_{x=x_{\min}}^{x_{\max}} f_i\,(x,t)$$

In formula above, $x_{\min}$ corresponds to 12 years or younger. The values of the TFR and TFR_i are computed for age $x_{\max} = 55 + years$; i.e., for the age span covering all reproductive ages. The HFD also lists a parallel estimate based on the sum of the observed fertility rates by age 40; i.e, with $x_{\max} = 39$ years. This information is more useful for cohort fertility analysis, where the cumulated fertility rates of cohorts nearing the end of their reproductive period provide a valuable approximation of their future completed fertility.

Tempo-adjusted total fertility rate Changes in period fertility measures are often driven by the temporary postponement or advancement of births. It is therefore difficult to identify to what extent fluctuations seen in the period TR result from such —timing changes, and to what extent these are —real (quantum) changes that would influence the completed fertility of real birth cohorts. A comparison of period and cohort fertility measures reveals that tempo distortions can cause a substantial gap between the two indicators for an extended period of time (Sobotka, 2004a, 2004b).

Tempo distortions in period fertility measures have inspired efforts to develop an adjustment method that would help to eliminate them. A simple and widely used TR adjustment, based on order-specific TFRs and changes in order-specific mean ages at birth, was proposed by Bongaarts and Feeney (1998). The Bongaarts-Feeney tempo-adjusted TR is computed as a sum of order-specific TFRs adjusted for changes in the mean age of order-specific fertility schedule, $r_i(t)$ as shown in formula below:

$$\text{adj TFR}\,(t) = \sum_i \text{adj TFR}_i\,(t)$$

where

$$\text{adj TFR}_i\,(t) := \frac{\mathrm{TFR}_i\,(t)}{1 - r_i\,(t)}$$

Following Bongaarts and Feeney (2000: 563), the adjustment factor $r_i(t)$ is estimated as follows:

Table A3. Long-Run Effect on Total Fertility Rates: Ukraine vs First Control Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	TR	adjTFR	adjTFR1	adjTFR2	adjTFR3	adjTFR4	adjTFR5p
Panel A							
Ukraine×I(after)	0.120***	0.145**	0.018	0.042**	0.052***	0.018***	0.015***
	[0.030]	[0.058]	[0.033]	[0.018]	[0.009]	[0.004]	[0.004]
Percentage change:							
2000/6 vs 2007/14	.068	.083	.021	.071	.255	.299	.416
Panel B							
Ukraine×I(2008)	0.096***	0.074	0.001	0.032**	0.022**	0.009**	0.009**
Ukraine×I(2009)	0.095***	0.085	-0.014	0.022	0.047***	0.018***	0.012**
Ukraine×I(2010)	0.091**	0.111**	-0.008	0.030	0.054***	0.019***	0.016***
Ukraine×I(2011)	0.144***	0.223***	0.042	0.073*	0.069***	0.020***	0.019***
Ukraine×I(2012)	0.176***	0.263**	0.087*	0.064	0.069***	0.023***	0.020***
	[0.036]	[0.090]	[0.044]	[0.041]	[0.015]	[0.006]	[0.005]
Ukraine×I(2013)	0.146***						
	[0.039]						
Ukraine×I(2014)	0.100**						
	[0.044]						
Percentage change:							
2014 vs 2006	.056	.151	.102	.108	.341	.387	.558

Note: Robust standard errors in brackets. ***p<0.01,**p<0.05,*p<0.1. All Eastern European Countries are in Control Group. In all regressions, country FE, time trends are included.

$$r_i(t) := \frac{1}{2}\left(\mathrm{MAB}_i(t+1) - \mathrm{MAB}_i(t-1)\right)$$

where $\mathrm{MAB}_i(t)$ is the mean age at birth order i calculated from unconditional age- and order-specific fertility rates

$$\mathrm{MAB}_i(t) := \frac{\sum_{x=x_{\min}}^{x_{\max}} \bar{x} \cdot f_i(x,t)}{\sum_{x=x_{\min}}^{x_{\max}} f_i(x,t)}$$

Value $\bar{x}$ is the mean age at birth within the elementary age interval $[x, x+1)$:

$$\bar{x} = x + a(x)$$

where $a(x)$ is the average share of the age interval $[x, x+1)$ lived before giving birth to a child. We assume that all $a(x)$ values are equal to 0.5 for any completed age x and birth order i (for data organized by Lexis squares and horizontal parallelograms) and zero for any age x reached during the year and birth order i (for data organized by vertical parallelograms).

The tempo distortion in the observed TR then equals adj $\mathrm{TFR}(t) - \mathrm{TFR}(t)$.

Cumulative fertility rates computed for birth cohorts refer to the average number of children born to a woman by a certain age. They are usually shown for all birth orders combined, but they can also be disaggregated by birth order. When computed from period fertility rates, cumulative fertility is a hypothetical construct that can be interpreted as the average number of children that would be born to a woman by age x if she experienced at all ages below x the set of age-specific fertility rates observed in a given year.

In the HFD, cumulative fertility rates are calculated from unconditional age-specific fertility rates sorted by Lexis squares and vertical parallelograms (period dimension) and horizontal parallelograms (cohort dimension):

Cumulative period fertility rates by age x for year t for all birth orders combined (Lexis squares and vertical parallelograms):

$$\mathrm{CPFR}(x,t) = \sum_{z=x_{\min}}^{x-1} f(z,t)$$

Cumulative period fertility rates by age x for year t for birth order i (Lexis squares and vertical parallelograms):

$$\mathrm{CPFR}_i(x,t) = \sum_{z=x_{\min}}^{x-1} f_i(z,t)$$

In formulae above, x and z refer to the age in completed years (ACY) in case of the Lexis squares and the age reached during the year (ARDY) for Lexis vertical parallelograms; $x_{\min}$ corresponds to age 12 or younger. If the upper age limit of the summation is equal or very close to the maximum reproductive age (i.e., if it is 50 or higher), the cumulative fertility rate equals the total fertility rate (TR).

The cumulative cohort fertility rate (CCFR) refers to the average number of children born to a woman from birth cohort c by age x, and is computed by summing up the set of age-specific fertility rates of the cohort c observed over their reproductive lives up to age x. CCFRs are calculated for all cohorts c who are observed from age x_{min} that is equal to 15 or younger.

Cumulative cohort fertility rates by age x for cohort c for all birth orders combined (horizontal parallelogram) is

$$\text{CCFR}\,(x,c) = \sum_{z=x_{\text{min}}}^{x-1} f\,(z,c)$$

Cumulative cohort fertility rate by age x for cohort c and birth order i (horizontal parallelogram) is

$$\text{CCFR}_i\,(x,c) = \sum_{z=x_{\text{min}}}^{x-1} f_i\,(z,c)$$

For birth cohorts, the corresponding quantities represent the completed cohort fertility (CCF). The completed cohort fertility for all birth orders combined and by birth order is computed as follows:

$$\text{CCF}\,(c) = \sum_{z=x_{\text{min}}}^{x_{\text{max}}} f\,(x,c)$$

$$\text{CCF}_i\,(c) = \sum_{z=x_{\text{min}}}^{x_{\text{max}}} f_i\,(x,c)$$

The CCF is calculated for all cohorts c that are observed from age x_{min} that is equal to age 15 or younger until age 50 or older. Again, two types of the CCF are shown. The first one represents the CCF at age 50 or older ($x_{\text{max}} = 49+$ years), whereas the second one shows the CCF (or, more correctly, cumulated cohort fertility) by age 40 (with $x_{\text{max}} = 39$ years) and thus represents an incomplete approximation of the future CCF.