The Russian Maternity Capital Policy: Two Models

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Abstract

Between 1991 and 2007 the Russian Federation experienced a decrease in population and a drop in total fertility rate below population replacement levels. In 2007 the government, citing the importance of forestalling this decline, implemented the Russian Maternity Capital Policy, a one-time subsidy to those families who have a second or higher order birth. Study aims to analyze the impact of this policy on the total fertility rate of the Russian Federation to better understand post-Soviet trends in fertility and gain insight into how effective similar policies will be in the future if implemented elsewhere. This study uses two models to assess the policy. First, a novel difference-in-difference-in-difference model is developed to add to existing literature on the policy. Second, a synthetic control model is developed generate a counterfactual to measure causal effects of the policy on total fertility rate in Russia. Difference-in-difference-in-difference estimations show the policy having a 0% to 3.5% positive effect on fertility, and the synthetic control model results show that the policy had a large impact on fertility in the mid-2010s but this change has declined since 2019.
JEL Classification: J, J1, J11, J12, J13
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Contents

1 Background and Motivation

In the 1950s, the Soviet Union and its Warsaw Bloc neighbors enjoyed some of the highest birth rates in the relatively developed world. By the latter half of the 1960s, the USSR had population growth rates below 10 per thousand per year. The cause of this reversal was perplexing to many both inside and outside of the Soviet Union. While it is commonplace to see rapidly urbanizing societies experience a decline in fertility, many Soviet demographers and social scientists believed that this trend was a purely capitalist phenomena.[1] The Soviet Union would not experience this decline as it attempted to develop, according to these demographers, due to the superior nature of the Soviet economy. History, of course, disagrees with these experts.

Looking at the Russian and Ukrainian Soviet Federative Socialist Republics specifically, population growth declined to a plateau for the duration of the 70s and early 80s, and then decreased again until the fall of the Soviet Union. From then until the mid 2000s, both Russia and Ukraine experienced further steep declines in population growth rates. Population growth hit a minimum in 2001 in Ukraine with a 1.1% decrease in that year, and Russian population growth reached a minimum with 0.5% decrease few years later in 2003. In contrast with Ukraine, Russia's population growth was supplemented by migration from Central Asia during this period. From here growth rates increased in both countries for about a decade, but then began to decrease after around 2015. All the while, fertility rates remained well below replacement levels, reaching a minimum in Russia and Ukraine in the late 90s and early 2000s, respectively.

[1] Berent (1970) find that the "socialist population law" entry in the *Great Soviet Encyclopedia* claims this.

Since the fall of the Soviet Union, Russia's population has declined by about 3% which is and amount similar to other post-Soviet European countries. The United Nations predicts that the Russian population will fall to 135.8 million from close to 144 million today by 2050 and suffer a further decrease to 126.1 million by 2100.[2] Obviously, three factors, in a general sense, determine the population change in a country: births, deaths, and migration. Russia and Ukraine's mortality rate remains high in comparison to western European countries and its current birth rate is about 1.76 births per woman (well below replacement levels). Immigration from Central Asian countries has also decreased within the past four years.[3] All these factors pressured the Russian government to respond with policy intended to reverse this trend.

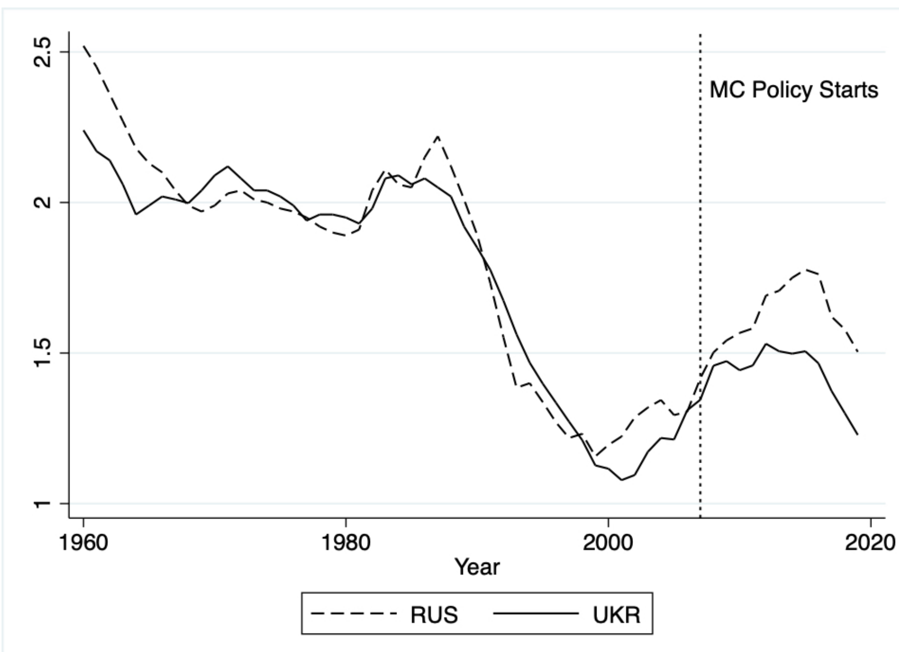

Figure 1: Total Fertility Rates of Russia and Ukraine 1960-2020

[2]https://imrussia.org/en/analysis/3074-putin\%E2\%80\%99s-maternal-capital-will-not-fix-russia\%E2\%80\%99s-demographic-problem

[3]https://www.vedomosti.ru/economics/articles/2019/04/08/798624-chislo-migrantov-rossii?utm_medium=Social&utm_campaign=echobox&utm_source=Facebook#Echobox=1554765395

The relative strength of the Russian economy due to extraction of its vast endowment of natural resources, stability, and reasonable macroeconomic management allows the country the flexibility to put in place economic and social programs similar to those found in western Europe.[4] One of these plans in particular, the Russian Maternity Capital program (MC program), aims to address the issue of the long trend of total fertility rates (TFR). The MC program is a simple subsidy to Russian families that have a second or higher order birth. This program, along with the absence of a similar program in Ukraine, creates the opportunity to explore the effectiveness of maternity subsidy programs and gain a better understanding of what influences family planning decisions in Russia.

There has been considerable literature on the topic of the effectiveness of the Russian MC program on the total fertility rate in the last decade. Most show that the effect is positive but far below the stated goal of a 50% increase in TFR. In other places such as Quebec and the Friuli Venezia Giulia region of Italy, similar programs have produced similarly underwhelming results, though those subsidies are smaller and regional as opposed to Russia's national program. This paper utilizes two different methods to explore the impact of the MC policy in Russia.

First, data from the World Values Survey (WVS), which intermittently surveys basic demographic and social values from countries around the world, are used to construct a difference-in-difference-in-difference model to estimate the impact of the policy. The WVS does not survey each country in every survey "wave", but it is fortunate that Ukraine and Russia have been included in the same wave 4 times since 1995.[5] While most other studies have focused

[4] https://www.reuters.com/markets/europe/russias-oil-gas-revenue-windfall-2022-01-21/

[5] Waves are periods of around 4 years where WVS chooses a bundle of countries to conduct interviews

on data from the Russian Longitudinal Monitoring Survey and other Russian national surveys, the WVS provides an opportunity to explore this issue with a comparative lens. The result is a rare and unique opportunity to compare determinants across borders within the same survey.

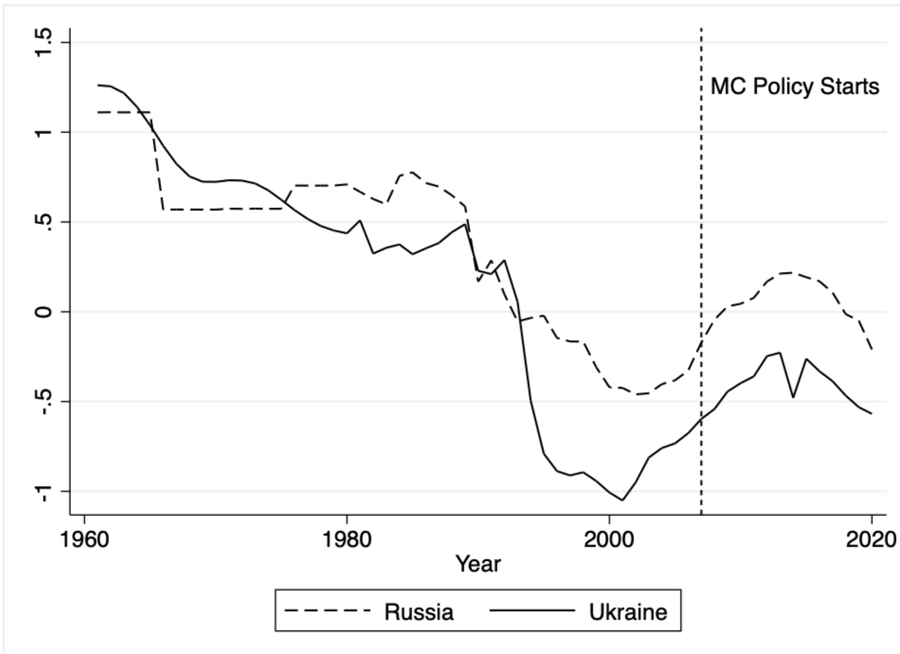

Figure 2: Population Growth Rates for Russia and Ukraine

Second, this paper constructs a synthetic control model (SCM) to create a "synthetic Russia" where the MC policy was not put into place in 2007. This allows comparison of TFR in synthetic Russia (SR) and Russia to determine the causal effect of the policy. Aggregate economic data collected by the DataCommons and the World Bank is used in this analysis.

As the TFR continues to decrease in wealthy countries around the world, it is reasonable to expect leaders in these countries to explore policies like the MC program. Therefore, whether such a program is effective is important from a public policy perspective. For economists, it

with the same questions.

is my hope that this thesis contributes to the corpus of literature dedicated to understanding what drives women and families to decide to have children and how they react to prices. Such decisions are quite complex, but they are the most important financial and personal decisions a woman or couple can make in their lives – it is paramount to be able to contribute what I can to our general understanding of how such programs impact decision making.

1.1 The Maternity Capital Policy

The Russian Maternity Capital program is a conditional child subsidy targeted at families with one or more children. Starting in 2007, a family or single mother that has one or more children and gives birth to another is eligible to receive a lump sum of 250,000 rubles. This is a large subsidy – in 2007 rubles, this is equivalent to around $10,000 2021 PPP dollars. For comparison, the GNI per capita of Russians in 2020 was only $27,550 PPP dollars.

In his announcement of the program, Vladimir Putin framed the issue as one that intimately affects the place of women within the family unit and society. In his 2006 address to the Federal Assembly of Russia, President Putin declared:

"... most effective in my view, is a measure to ensure material support. I think that the state has a duty to help women who have given birth to a second child and end up out of the workplace for a long time, losing their skills. I think that, unfortunately, women in this situation often end up in a dependent and frankly even degraded position within the family. We should not be shy about discussing these issues openly and we must do so if we want to resolve these problems. If the state is genuinely interested in increasing the birth rate, it must support women who decide to have a second child."

On the first day of 2007, the policy officially went into effect. As of 2020, over 8 million families have received the subsidy.

The Maternity Capital subsidy was originally only earmarked to be used for housing, a child's education, or investing in the mother's retirement fund and could not be spent later than 2010 if received in 2007. Since its implementation, the rules around what the money can be spent on have been relaxed to include more housing costs, such as mortgage payments and payments to improve or renovate housing. these have been the only substantial changes to the structure and substance of the subsidy along with semi-regular increases to the amount of subsidy and extensions to the length of the program,. As of 2022 the amount parents are eligible to receive stands at 466,617 rubles or $6,094 2021 PPP dollars.

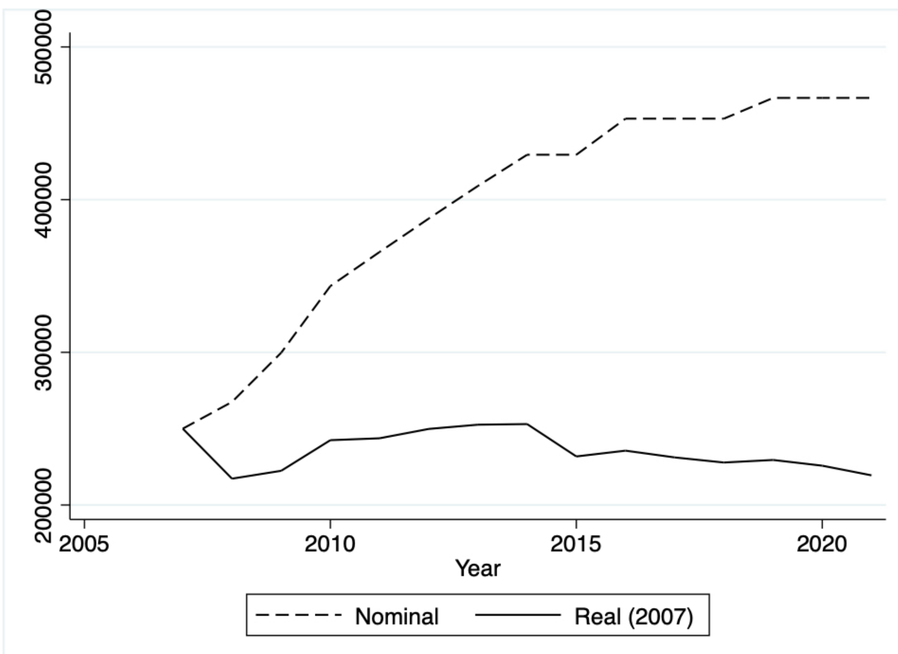

Figure 3: Real vs. Nominal (2007 constant rubles) Value of MC Subsidy

Within Russia the policy has had a mixed reception. A 2014 study by Borzdina, Rotkirch, Temkina, and Zdravomyslova reported that "Russian women and families harbor a deep distrust of the program and Russian social policy, as it sends contradictory messages combining paternalistic and liberal trends" and that "Many eligible mothers have not activated their capital due to various bureaucratic obstacles they encounter". They also report that the results of the study show that the Russian poor have fewer tools available to put the subsidy to use when compared to middle class families.

As with many state programs, there has been a lot of news generated, even within the last year, about corruption siphoning funds from the MC policy. In October of 2021, the newspaper *Novaya Gazeta* ran a piece about a small town 150 miles north of Moscow where it is alleged that MC funds are laundered through the purchase of uninhabitable old buildings.[6] Since the subsidy is only approved for use for certain purchases, including mortgage payments, it is alleged that recipients would purchase and then sell old houses to clean the cash of the restrictions that receiving the lump sum is constrained to.

Indeed, in response, at least in part, to some of the studies cited in this analysis, many are questioning the efficacy of the MC program and whether it works at all. In an interview (also in the *Novaya Gazeta*) with the head of the prestigious Institute of Demography at the Higher School of Economics, Anatoly Vishnevsky the demographer claims that there is "no hope" of resolving the birth rate problem in Russia.[7] While it is clear there is recent backlash to the MC policy, the Russian government has extended funding for the project until at least 2026.

[6] https://novayagazeta.ru/articles/2021/10/13/mamy-dorogie

[7] https://novayagazeta.ru/articles/2020/01/16/83471-nadezhd-na-reshenie-problemy-rozhdaemosti-v-rossii-net

2 Literature Survey

2.1 Literature Involving Regression Analysis

There is a large corpus of literature that deals with the background of the problem of declining Russian total fertility rate (TFR), the Russian MC program, and the effectiveness of MC schemes in other countries around the word. This literature review will begin with non-quantitative analysis of TFR trends in Russia, and then move on to key quantitative studies on the topic in Russia and elsewhere. Since Ukraine does not have such a policy in place, the focus in this section is on previous literature on the Russian MC program.

Goltsova and Leschenko (2010) explore TFR in Irkutsk, where they find that TFR decreases to 1.7 in 1999 and then rises thereafter. They explore reasons for this and determine that much of this decrease can be attributed to adults moving out of Irkutsk when it is around time for them to begin having children. They also hypothesize that the dramatic increase in births starting at the turn of the millennium is due to "birth lag" during which couples put off having children due to the instability of the 1990s and then had children in the 2000s to make up for that. They use a survey to contrast desired and expected TFR rates, where reported desired fertility is 2.15 and the expected fertility is 1.88. This paper also highlights the importance of housing as a determinant of the decision to have a child. The authors are skeptical that the MC policy will have a large effect on Russian TFR and suggest that it does little to change who is willing to have two or more children and instead acts more as a wealth transfer to those people instead of an incentive to have more children.

Yakimenko and Vostrukhina (2015) argue that the increase of births in the 2000s can be attributed to the decision of couples and women to wait out the instability of the 90s. They also assert that the MC program, 8 years old at the time of the publishing of this article, helped increase fertility of the cohort that was reared in the 90s. A Rosstat survey used in this article reports that only 6% of respondents who were interested in having children claim to have been influenced by the MC policy. This paper has much in common with Goltsova and Leschenko (2010), and the fluidity with which births can be rescheduled has a large impact on this analysis and will be discussed later.

Billingsly and Duntaeva (2017) use historical demographic data to understand fertility patters across the Soviet Union and other Warsaw Bloc states. They find that the age of motherhood rises in the second half of the 20th century and that half of the decline in TFR can be attributed to poor economic performance in those countries.

Slonimczyk and Yurko (2013) estimate a structural model of fertility and labor force participation and use this to estimate the long-run effect of the Russian MC program on TFR. They use this approach to sidestep the issue of an upward bias in the data due to a presumed rescheduling of births due to the policy (i.e., that couples or women will decide to have children earlier than they would otherwise so that they can receive the subsidy while it is in effect). They find that the policy increases fertility by around .15 children per woman with increase of .12 for households that already have two or more children. Their simulation results suggest that the increase of birth rates from the early 2000s to mid-2010s is a result of rescheduling births (both postponement from the instability of the 90s and preponement due to the MC policy). While substantial, this .15 and .12 increase for both subsets of women are significantly less than the .50 increase goal set by President Putin. Slonimczyk and Yurko also find no differential effects on these rates by employment status, but that there is a significant difference with respect to whether the woman respondent had a spouse in the household. Also insignificant is the urban/rural divide. This last metric stands in contrast to the analysis by Golstova and Leschenko (2010) in that they suggest that availability of housing would impact the significance of the MC policy on TFR in certain regions because the MC subsidy could easily build a house in rural regions but would not be enough in urban centers. Finally, the authors find that there is evidence that poorer women are more affected by the subsidy than wealthier women.

Becker and McMullen (2020) find that fertility increased following the implementation of the MC program. They use a Mincer probability equation to calculate the lifetime earnings based on employment status, education, and income levels. This would decrease the error term in this study because a respondent's current income level is not always equal to the respondent's lifetime expected average earnings by year. This is possible in Becker and McMullen's case because of the depth of the information provided by the Russian Longitudinal Monitoring Survey. Since the WVS's focus is on reporting social and personal values, the data here are not rich enough to construct a model for lifetime earnings. They also are able to use personal and household survey responses to get more information about respondent's household and community on top of personal demographic data. Their regression does not find convincing enough evidence for a positive impact of the policy.

Outside of Russia, Milligan (2005) explores the effects of a similar program to the Russian MC scheme in Quebec. Nontaxable benefits were paid to residents when they had a child between May 1988 and September 1997. Though the structure of the benefit is similar, the amounts are much smaller than the Russian MC program, 500 CAD for the first or second child, and 3,000 CAD for the third or higher parity child. The outcome of Milligan's study is that there is a small and positive (between 5.6% and 12%) implied increase in the probability of having a child toward the end of the decade that the policy was in place in comparison to the beginning.

In Italy, specifically the Friuli Venezia Giulia regions, Boccuzzo find that a "birth bonus" program like the Russian plan also has a small and positive effect on births. The plan, according to Boccuzzo, resulted in around 1,000 extra births. They find that the number of extra births was more significant and positive for those with two children already and had comparatively low educational attainment.

Sergei Zakharov has written extensively about the effect of the 2007 MC policy and other earlier efforts to increase births in Russia and the Soviet Union. His overarching thesis is that period fertility (i.e. TFR rates in any given moment in time) are far more variable than cohort fertility rates (the completed fertility rate at age 40 for a given population cohort) due to the ability for women and families to reschedule births. This critique would call in to question the results of other papers in this literature review since most focus on period TFR. Frejka and Zakharov (2013) find that cohort fertility and fertility forecasts have not changed as of 2011. Churilova and Zakharov (2019) find that the expected number of children for men has remained the same during the period the policy has been in place, and for women the number increased between 2007-2010 but regressed to the norm after this. Zakharov (2018) finds that the share of the Russian population that has not entered a marriage by the age of 30 has increased at least up until 2015. The effect of this is simply that fewer marriages will most likely yield fewer children for the foreseeable future.

Throughout the literature, there are concerns about endogeneity within the data. An additional problem is the concern about timing. If a study finds that the program does in fact increase births within the time or birth cohort it is hard to determine whether the increase is due to rescheduling of births. Overall, a subsidy like this could simply reschedule births that would have taken place anyway but later. This would bias the impact the effect of the policy upwards. But now that the policy has been in place for 15 years, the long duration of the program should make the timing effect decrease as it becomes seen as a permanent policy. There is also a question of whether the policies have any effect on births at all, in the sense that any increase could just be a continuation of an upward trend in births. In Russia and Ukraine this issue is particularly salient, as some studies mentioned reference births delayed from the 90s taking place within the period of the MC program.

2.2 Synthetic Control Model Implementations

Synthetic control models (SCM) are theorized by Abadie and Gardeazabal (2003) and later refined in Abadie et al. (2010). In these articles the authors construct a methodology for performing SCM and apply the method to estimate the impact of California's tobacco control policies. The authors point out that case studies at the disaggregated level can be useful, but that these studies are limited in size and are therefore hindered in pursuit of examining aggregate effects of policies and interventions. On the other hand, it is in many cases very hard to find aggregate economic data to suit the needs of these studies and therefore disaggregated data are used. SCM is useful as a technique because it uses data-driven techniques to analyze effects of changes on easy to find aggregate data. For example, the DDD analysis in this paper is useful, but since it necessarily must use data from a limited survey, it is not an ideal method to investigate the change in the policy. Importantly in Abadie et. al (2010), the authors discuss at length the limitations of the SCM approach which is important in this paper's analysis.

SCM is an approach that uses historical and macro-level data to estimate the effect of a change by generating a counterfactual where the change does not take place. Several countries similar to the treated country are selected and an algorithm assigns weights to the characteristics of those countries (in comparison to the pre-treatment data from the control country) and creates a synthetic version of the treatment country, with which the comparison can be made.

The inspiration for this use of SCM comes from Bluszcz and Valente (2019), who use SCM to estimate the economic cost of the Donbass war in Ukraine after 2014. The authors also expand on the methodology of the model from Abadie and Gardeazabal (2003) and provide new methods to placebo test the results of their study which will be used in this analysis. Since standard significance tests cannot be used for SCM, their work is helpful to guide this study in understanding the impact of the Russian MC policy.

3 Data and Summary Statistics

3.1 World Values Survey

Data come from the World Values Survey (WVS) which is an international network of national surveys conducted in over 90 countries that represent just under 90% of the entire world population. Since 1981, almost 400,000 interviews have been conducted and included in the survey. The aim of the survey is to track human beliefs and values, but it also includes basic demographic data which is the data of interest for this project.

Though the WVS has surveyed in over 90 countries, each country is not included in the same "wave" of the survey. The WVS utilizes waves (time periods of 3-5 years) where the same survey is used in every interview, but not every country is included in every wave. Again, this project is fortunate that, since 1995, Russia and Ukraine have been included in 4 of 5 waves, and each have been included in the same wave that the other occurs in. This project utilizes data from wave 3 (1995-1998), wave 5 (2005-2009), wave 6 (2010-2014), and wave 7 (2017-2020). This project only utilizes data from those waves that include Russia and Ukraine beyond 1995 because wave 2 includes a time period where Russia and Ukraine were member states of the USSR. The WVS uses nationally representative bundles of primary sampling units to conduct surveys within countries.

It is the aim of this paper to introduce a DDD analysis of the effect of the MC policy on Russian TFR. As seen in the literature review, several studies have been conducted on this matter using different surveys and some have included a DID analysis comparing Russia to another country. Geographical data from the WVS make it possible to expand on this literature by applying DDD to distance from each survey to the Russo-Ukrainian border. It is assumed that cultural difference and other confounding factors are minimized near the border. This model attempts to exploit this by including geographical data from WVS.

Though the WVS uses more or less the same survey between waves, especially with regard to demographic questions, there are some inconsistencies between waves that pose some methodological constraints for the purposes of this paper. Most salient of these is the differing methods that geographic location of surveys are reported. For example, surveys in Ukraine report raion (district) names for one wave, region (western or southern region, for example) names in another wave, and town names in yet another wave. For Russia, the survey only supplies which federal administrative district the survey was administered in for waves 3, 5, and 6 while for wave 7 the survey includes geographic coordinates. This poses some methodological considerations while building a workable dataset for this project. In order to standardize the data, the Google Maps API was used to geocode coordinates for all survey responses in the dataset, where the API was fed a name of town, oblast, or region, and API returned longitude and latitude coordinates for the location. Then, the rough distance between each location and the border of either Russia (if the respondent was from Ukraine) or Ukraine (if the respondent was in Russia) was calculated with the longitude and latitude data from each survey. Since it is difficult to solve for the distance between a point on the globe and a border, several cities were selected in both Ukraine and Russia, and distances calculated from each longitude and latitude point to these cities and the minimum distance from the respondent's location to the bundle of cities was added to the dataset.

Variable Name	Description
Marital Status	Whether the respondent is married, divorced, or single
Children	The amount of children the respondent has, if any
Education	The education level of the respondent, normalized by country by the WVS
Age	Age of respondent
Income	The income level normalized to a number between 1 and 10 by the WVS
Education	Education level of respondent
Employment	Whether the respondent is employed full-time
Cheif Wage Earner	Whether the respondent the chief wage earner of the household
Town Size	Town size of location of respondent
Distance	Distance of respondent from Ukraine/Russia

Table 1: Variables included in DDD analysis

Both Sloniczyk and Yurko (2013) and Becker and McMullen (2020) use longitudinal survey data which make it possible to recreate a timeline of births for parents or women with children included in the study. WVS does not use the same primary sampling units and survey respondents between waves even in the same country. This makes it impossible for this project to recreate a timeline of births and a dependent variable (like Slonimczyk and Yurko) which is the probability that a couple has had a child in the last year. In the Russian Longitudinal Monitoring survey, recreating a timeline of births is necessary because they respondents are repeating through survey sessions (though some new families and individuals are added to the survey to replenish it) and regressing purely on the number of children in a household for each survey would essentially "double count" them. Since WVS uses different respondents between waves, such a timeline of births does not have to be recreated in a similar manner and using number of children as a dependent variable is significant on its own within this survey.

Data include 17,023 surveys in the entire time period, with 7,099 of these taking place in both Ukraine and Russia after the time period in which the MC program was begun. Within the dataset, the average number of births per woman is 1.46 for both Ukraine and Russia for the entire period studied, 1995-present. For just those years after the start of the Russian MC program, the average number of births per women in the data is 1.355 Russia and 1.368 in Ukraine though the difference is too small to be statistically significant. These numbers are roughly the same as the data reported by the World Bank, which is displayed in Figure 1 and Figure 2. The median age for women in the sample is 46, which is considerably higher than the median age in both countries.

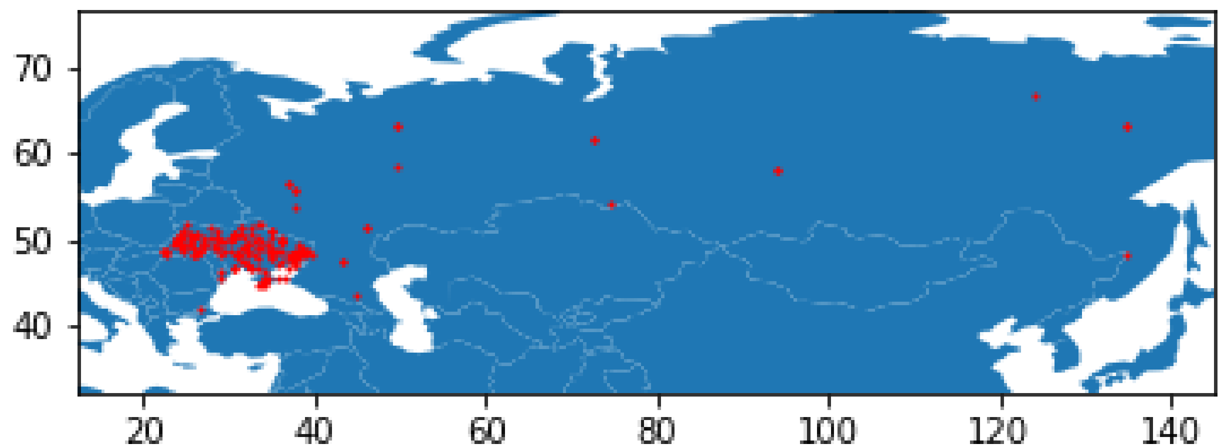

Figure 4: Locations of Surveys included in WVS data

3.2 Data for Synthetic Control Model

Data for the SCM analysis were hosted by DataCommons, a project that collects and organizes data from sources around the world. All variables in this analysis were collected by the World Bank. The countries included as controls in this analysis are Latvia, Lithuania, Estonia, Georgia, Ukraine, Bulgaria, and Belarus. Again, SCM analysis is used to create a counterfactual yearly TFR for Russia. These countries were chosen because of their shared history as a part of either the Soviet Union or the Warsaw Bloc in order to reduce interpo-

	Mean	SD	Min	Max
Total fertility rate	1.925	.5220	1.078	4.786[8]
Deaths per capita	.0113	.0024	.0059	.0166
GINI	33.87	5.017	24.00	48.40
GNI Growth Rate	.0451	.8407	-5.889	9.994

Table 2: SCM variables and summary statistics for 7 control countries

lation bias (Bluscz and Valente 2016). Also, none of these countries have introduced MC policies. Data include years from 1960 - 2019 for all the countries included in the analysis, with 1960-2006 being the time period for control for all countries. 2007-2019 are the years that TFR will be constructed for synthetic Russia (Russia if it had not implemented the MC policy).

The variables included in this analysis are described in Table 2. TFR is included because it is the variable of interest in this analysis. Deaths per capita is included because it is a determinant related to population growth and correlated with TFR. GNI is inlcuded because of the relationship between wealth and fertility (either positive or negative) as reported in Alvarez-Diaz et. al. (2018). GINI, a measure of economic equality ranging from 0 to 1, is also included to include factors that may affect TFR but not be captured by the other variables.

GINI is the only variable that does not have data for every year from 1960-2019. With all countries in this analysis being members of the Soviet Union, where metrics like GINI were not collected, data are only available from the mid-1990s to 2019.

[8] Armenia in 1960

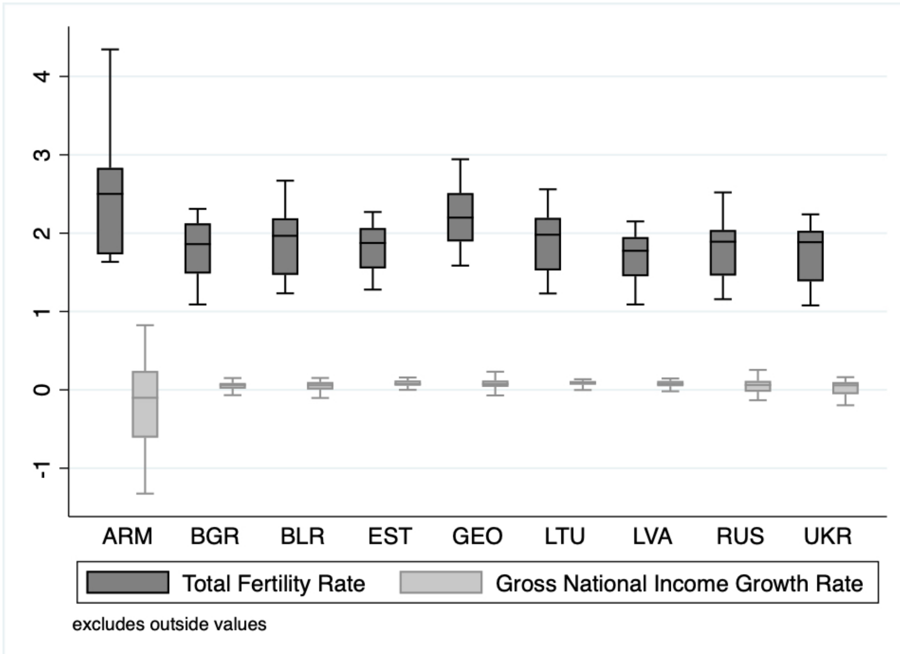

Figure 5: Box Plots for TFR and GNI by Country for 1960-2019

4 Methodology

4.1 Brief Model of Fertility

The goal of this paper is to analyze whether the Russian MC policy has had an effect on Russian TFR since its implementation in 2007 and, if so, determine the magnitude of this effect. Is there any reason to suspect that a birth subsidy would increase fertility in the first place? To understand this question from a theoretical perspective an economic model of fertility is needed.

Becker (1960) was the first to create such a model, and since then it has been refined by many economists in as many papers (notably by Becker and Barro (1989) and Milligan (2003)). This paper will use a simplified version of the Milligan model of fertility as a jumping-off point.

Agents have some utility function and choose between two goods, children (Q) and a composite good (Z). Z is a numeraire good with price normalized to 1. They are subject to a budget constraint where s is the amount of the birth subsidy received when having another child; p is the price of children. The utility maximization problem is given by:

$$\begin{aligned} \max\, U &= U(Q, Z) \\ s.t\; I &= (p - s)Q + Z \end{aligned} \tag{1}$$

This yields first order condition:

$$\frac{U_Q}{U_Z} = p - s \tag{2}$$

This in turn implies a demand function for children to be:

$$Q^* = Q(p, s, I) \tag{3}$$

If $\frac{\partial Q}{\partial t} > 0$ (i.e. children are not a Giffen good, which this model assumes) then the demand for children is increasing with the amount of the subsidy if income is held as a constant.

While this is a basic model, the addition of a positive subsidy (which decreases the relative price of children) can lead to a higher equilibrium amount of children. Becker and McMullen

(2020) expand on this theoretical explanation to account for the fact that the real value of a subsidy is less than its stated amount (since the subsidy is constrained to certain uses, every ruble added to the subsidy is worth somewhere between $0 < s < 1$ to the recipient on the margins) and hidden costs related to bureaucratic obstacles and public mistrust of the subsidy.

4.2 DDD Model

This project's methodology is inspired by models constructed in Slonimczyk et al. (2013), Milligan (2005), and Becker and McMullen (2020) and used to construct our model's estimating equation:

$$\begin{aligned} Children_i = \beta_0 + \beta_1 R + \beta_2 Dist + \beta_3 Post + \beta_4 R * Dist \\ + \beta_5 R * Post + \beta_6 Dist * Post + \beta_7 R * Dist * Post + \sum_{i=8}^{13} \beta_i \boldsymbol{x_i} \end{aligned} \tag{4}$$

Equation 4 describes the DDD model specification. R is a dummy variable encoding if the survey respondent is in Russia. $Dist$ is a dummy variable encoding the distance from the Russo-Ukrainian border. The regressions reported in the results section use 500km as the demarcation point between 1 and 0. $Post$ encodes whether or not the survey was taken in the treatment period (post-2007). βs 8-13 describe the impact of other control variables in the study (reported in Table 1 and discussed below).

I assume a quadratic relationship between age and number of children, similar to other literature on the subject. Importantly, data from mothers who are older than 40 at time of the survey, have been expunged from this analysis which was also done in Becker and McMullen and Slonimczyk et. al.

Education, which is a categorical variable, encodes information about the schooling history of the respondent broken down into standard categories (i.e. no school, primary only, and etc.). Income is also included as a categorical variable ranging from 1-10. It is subjectively reported by the respondent but normalized within countries by the WVS. Both education and income were added as controls to limit the risk of endogeneity in the model. Both income and education are closely and inversely related to fertility. Milligan (2005) finds that more educated women face higher opportunity costs when giving birth when compared to less educated women. Income is also related to fertility because of the long-term cost of having a child. Town size is also reported on a scale of 1-10 by the WVS according to the number of people living in the respondent's town. This is included because it is assumed that people in rural areas might be differently affected by the policy than those living in urban ones. Becker and McMullen find that housing access is important for understanding how much value the MC subsidy would provide for a family since it is cheaper in rural areas.

This paper utilizes a DDD methodology to understand the impact of the MC policy. The first difference is the country the survey is taken in, and the second difference is location data provided by the WVS. This data (sometimes town, sometimes region, or sometimes exact latitude and longitude) are encoded using GoogleV3 geocoding API to encode town names and region names for the different location's interviews had taken place in. Then, an estimate of distance to the Russian and Ukrainian border was encoded using a Haversine distance equation (which measures distance on the surface of a sphere) defined by:

$$D(x,y) = 3,963 \times 2arcsin\sqrt{sin^2\left(\frac{(x1-y1)}{2}\right) + cos(x1)cos(y1)sin^2\left(\frac{(x2-y2)}{2}\right)} \tag{5}$$

Calculating the distance to the Russo-Ukrainian border is important because it is assumed that there are less exogenous cultural influences in Russians and Ukrainians living close to the border in comparison to those living farther away. This helps to isolate the effect of the MC policy on survey respondents by minimizing influences outside of the controls included in the analysis.

4.3 Constucting a Synthetic Control Model

This paper follows the methodology constructed for SCM in Abadie et al. (2010). The impact of the Russian MC policy in this model is the ATT (average treatment effect on the treated), or the post-MC policy average difference between synthetic Russia and real Russia. In order to create such a synthetic version of Russia, data is used for variables in Russia and other countries and weights are optimized to model Russia's TFR in the control period before the policy is implemented. These weights are then used to calculate the counterfactual synthetic Russia from 2007-2019.

Let $J+1$ be the number of observed regions in the study. We define the first region in this series to be Russia, the region exposed to the MC policy. The other J regions are potential controls in the analysis. Define Y_{it}^N be the observed outcome (TFR) for the controls at time t in region i for $i = 1, ..., J+1$ regions and $t = 1, ..., T$ time periods. T_0 is defined in this study to be the beginning of the treatment period such that $1 < T_0 < T$. We define Y_{it}^I to be the outcome for region i at time t if i is exposed to the MC policy from time $T_0 + 1$ to T. As a baseline we must assume that there are no anticipation effects that would change TFR before the policy was implemented in 2007. This does not seem to be a large problem in the case of the MC policy because there is no documented evidence that such a policy was expected, and otherwise there should not be a large effect even if it was anticipated because mothers would only receive the subsidy if they had a second child after the policy was implemented in 2007. On the contrary, since births aren't immediate, there will actually be a gestation lag.

The effect off the intervention (ATT) in time t for region i is defined to be $\alpha_{it} = Y_{it}^I - Y_{it}^N$. We also define D_{it} to be an indicator taking the value 1 if unit i is the treated region and t is greater than T_0. Therefore, the observed outcome is defined by rewriting:

$$Y_{it} = Y_{it}^N + \alpha_{it} * D_{it} \tag{6}$$

Our goal is to estimate $(\alpha_{1T_0}, ..., \alpha_{1T})$ since the treated region is defined to be $i = 1$. This implies that $\alpha_{1t} = Y_{1t} - Y_{1t}^N$. Since Y_{1t}^I is observed in the data we need to estimate only Y_{1t}^N. We then can construct a model:

$$Y_{it}^N = \sigma_t + \theta_i Z_i + \lambda_t \mu_i + \epsilon_i t \tag{7}$$

where σ_t is some common factor across regions, Z_i is a $(r \times 1)$ vector of covariates (observed), and θ_i is a $(r \times 1)$ vector of unknown parameters. λ_t is a $(1 \times F)$ vector of unobserved common factors effecting regions and μ_i is a $(F \times 1)$ vector of unknown factor loadings. Finally, ϵ_{it} are regional transitory shocks.

To define weights used in the estimation, consider a $J \times 1$ vector $W = (w_2, ..., w_{j+1})$ where $\sum_{i=2}^{J+1} w_i = 1$. W represents a synthetic control calculated as a weighted average from control regions.

Suppose that w_i^* is defined to be the optimal weighted average of control each control region (process for finding optimal weights is shown below). We can then say that:

$$\sum_{j=2}^{J+1} w_j^* Y_{j1} = Y_{11}, \sum_{j=2}^{J+1} w_j^* Y_{j2} = Y_{12}, ..., \sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0}, \text{ and } \sum_{j=2}^{J+1} w_j^* \boldsymbol{Z}_j = \boldsymbol{Z}_1 \tag{8}$$

Therefore we can complete our model, assuming that $\sum_{t=1}^{T_0} \lambda_t' * \lambda_t$ is nonsingular: [9]

$$Y_{1t}^N - \sum_{j=2}^{J+1} w_j^* Y_{jt} = \sum_{j=2}^{J+1} w_j^* \sum_{s=1}^{T_0} \lambda_t (\sum_{n=1}^{T_0} \lambda_t \lambda_n')^{-1} \lambda' (\epsilon_{js} - \epsilon_{1s}) - \sum_{j=2}^{J+1} w_j^* (\epsilon_{jt} - \epsilon_{1t}) \tag{9}$$

Now, all that is left to have a functional implementation of SCM is to determine a method to find the optimal values of w^* for each region and control variable. This is accomplished, again pioneered by Abadie et al., by using nested optimization. This involves minimizing Euclidean distance between two points, X_1 and $X_0 \times W$. X_1 is defined to be a $((r+k) \times 1)$ matrix such that $X_1 = (Z_1', \hat{Y}^{K_1}, ..., \hat{Y}_j^{k_m})$, which is a matrix of pre-intervention characteristics for the

[9] Proof in Abadie et al. (2010)

exposed region (Russia). X_0 is a variable of the same composition for the control regions. W is the same as its use above. K as used in the definition for X_1 is a matrix of pre-intervention outcomes where $Y_i^K = \sum_{s=1}^{t=0} Y_{iT_0}$.

The distance is finally calculated by:

$$W^* = min||X_1 - X_0W||v = \sqrt{(X_1 - X_0W)'V(X_1 - X_0W)} \tag{10}$$

Here V is a size $(r+k) \times (r+k)$ symmetric diagonal matrix where the elements are weights assigned to the pre-intervention variables in the analysis. These optimal weights in matrix V^* are calculated by $V^* = min(Y_1 - Y_0W^*(V)^{'}(Y_1 - Y_0W^*(V))$.

Of course in the implementation of this model to data, there are assumptions that have to be made. We are forced to assume that there is no or little time-variant heterogeneity in the dependent variable in this analysis, namely the TFR in each country. Other studies have used GDP as a dependent variable and found that it is a good implementation of SCM because this assumption is not violated. This study of course departs from this norm in the literature. Second, we must assume that there are optimal and non-negative weights that are all smaller than 1 that are used to build the model. As stated in Bluszc and Valente, this is violated with the presence of interpolation bias where there are unobservable effects that trigger changes in the dependent variable differently in the control group. Bluszcz and Valente minimize this worry by only including countries that are former Soviet Union or Eastern Bloc in the study which is mirrored in this analysis. Generally, though, I anticipate that interpolation bias is less so problematic using TFR as a dependent variable as compared to GDP. Events such as wars, trade irregularities, and interaction between economies can have a greater effect on GDP than TFR.

5 Results

5.1 DDD Results

Table 3 displays results from the DDD model. Column 1 shows results from the regression including only age and age^2 as controls. Column 2 displays results for age, age^2, marital status, employment, and if the repsondent is the chief wage earner. Column 3 displays outcomes for all previous variables and income levels. Column 4 displays results controlling for all previous variables as well as education level(in a scale from 1 to 10, as reported by WVS). Column 4 displays results including all previous control variables and town size. Since income, education, and town size are categorical variables, coefficients are not reported in Table 3 for the sake of conciseness. Regression tables including these coefficients are reported in the appendix.

Average treatment effect on the treated (ATT), reported on the top row for all regressions, displays the effect of the MC policy on TFR. The treatment group used to calculate ATT is defined by two things: living in Russia and the survey taking place after 2007. ATT is insignificant in columns 1, 3, 4, and 5 but significant in column 2 and very small.

	(1) children	(2) children	(3) children	(4) children
ATT	0.0184	0.0180*	0.0118	0.0351
	(0.0133)	(0.000418)	(0.0216)	(0.0193)
Age	0.0497	-0.00505	0.0296	0.0213
	(0.0406)	(0.0711)	(0.0304)	(0.0245)
Age^2	0.000449	0.00131	0.000704	0.000829
	(0.000663)	(0.00115)	(0.000511)	(0.000422)
Marital Status		-0.0497	-0.0662**	-0.0672
		(0.00821)	(0.000192)	(0.0112)
Employed Full-time		0.171	0.131	0.130
		(0.0405)	(0.0112)	(0.0227)
Chief Wage Earner		-0.119*	-0.176*	-0.187**
		(0.00300)	(0.00786)	(0.000802)
Constant	-0.824	-0.0718	1.437	1.437
	(0.580)	(1.019)	(2.527)	(2.504)
N	3336	2620	2405	2405

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Regression outputs

For all regressions reported in Table 3, 500km was used as the cut off for grouping data for the DDD analysis. The assumption here is that the people living close to the border on the Russian or Ukrainian side differ less than those people farther away from the border. This helps to decrease exogenous cultural influences that may cause Ukrainians and Russians make different decisions regarding having more children. This makes it easier to isolate the impact of the MC policy. The decision to use 500km as the demarcation point was essentially arbitrary. Performing the exact same regressions on respondents 250km and 1000km from the border changes the magnitude of ATT very slightly, but the significance of ATT does not change. This might suggest that distance from the border is insignificant for the respondents in the survey.

It is also interesting and perhaps unexpected that the impact of the respondent being married is negative for all of the regressions that it is included in. Perelli-Harris and Gerber (2011) report that an increase in non-marital childbirth is not due to a "second demographic transition" in Russia [10] but due to a "growing proportion of women who cohabit before conception, not changing fertility behavior of cohabitors or changes in union behavior after conception." (Perelli-Harris and Gerber 2011).

The respondent being the chief wage earner is significant in all regressions that it is included as a control. This is not so surprising, but what is surprising is that the coefficient for being fully employed is small and positive. This suggests that while employment itself does not meaningfully impact fertility being the chief wage earner does have a negative effect.

[10] This is defined to be The second demographic transition entails "sustained sub-replacement fertility, a multitude of living arrangements other than marriage, the disconnection between marriage and procreation, and no stationary population (Lesthaeghe and Surkyn 2008).

5.2 Synthetic Control Model Outcomes

SCM was used to estimate a counterfactual "synthetic Russia" (SR) in which the MC policy was not implemented, and the causal impact of the policy is reported. Secondly, placebo tests using bias correcting in the SCM model for Russia is calculated and then compared to outcomes using other control countries as the treated predictor to sanity check results.

SCM reveals a strong and positive effect of the Russian MC policy on the TFR in Russia. Of the control countries included in the analysis, SR is best created using weighted values of fertility data for Belarus, Ukraine, and Latvia (reported in Table 4). Ukraine and Belarus attaining the highest weights for creating SR is expected as these countries are similar culturally and economically and both have significant Russian speaking populations. Latvia being included is perhaps a surprise result, especially considering that Lithuania and Estonia are not included in the control pool.

Predictor balance (Table 5) shows that SCM accurately replicates predictors for all variables with the exception of GINI. It makes sense to see this outcome in the data because Russia has a significantly higher GINI coefficient (meaning that Russia is more unequal) than the two major control countries, Belarus and Ukraine. This result can also explain the inclusion of Latvia in the control pool because Latvia has GINI coefficients that are close to Russia's.

Standard inferential techniques do not apply to SCM so it is impossible to report p-values and confidence intervals for the results of the analysis. In its place, placebo testing was conducted. This consisted of creating bias-corrected gaps in TFR for Russia in each year.

Country	Weight
Armenia	0
Bulgaria	0
Belarus	.421
Estonia	0
Georgia	0
Lithuania	0
Latvia	.194
Ukraine	.386

Table 4: Optimal Weights

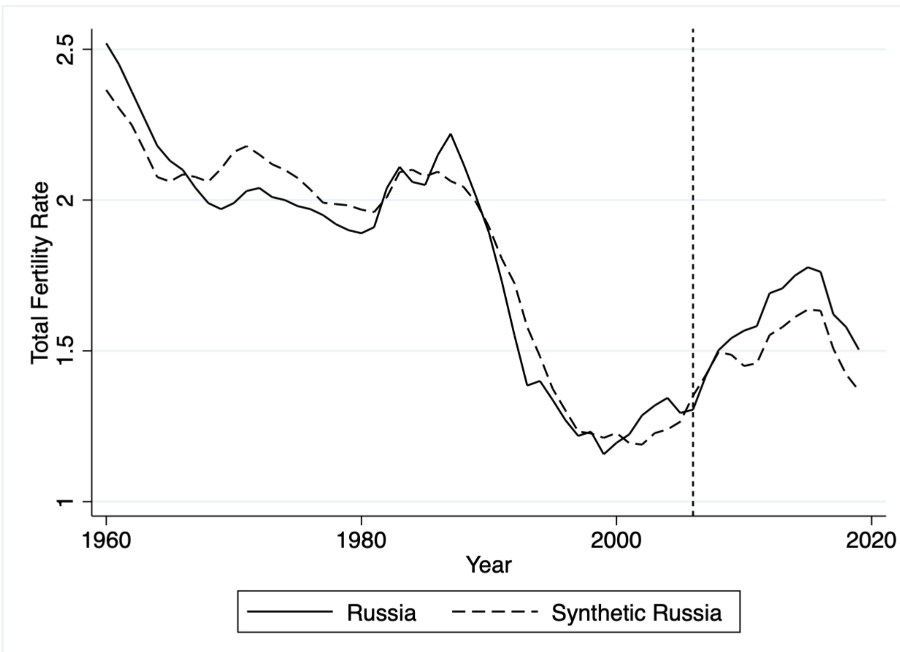

Figure 6: Russia vs "Synthetic Russia" TFR

	Treated	Synthetic
Death Rate	.0113	.0115
GINI	40.19	30.92
Fertility in 1995	1.337	1.374
Fertility in 2000	1.195	1.227
Fertility 2006	1.305	1.351

Table 5: Predictor Balance

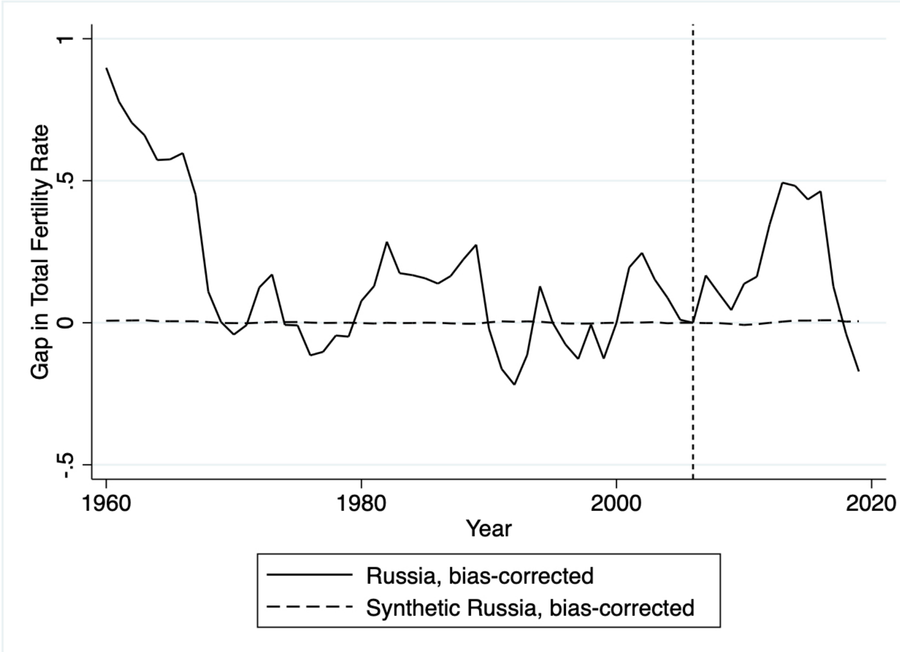

Figure 7: Bias Corrected Gaps in Total Fertility Rate

Bias correction for inexact matching on predictors is obtained by defining $\mu_{0t}(x) = E[Y|X = x, D = 0]$ where $\hat{\mu}_{0t}(x)$ is the estimator of $\mu_{0t}(x)$ and $D = 0$ signifies that the observation is treated; $\hat{\mu}_{0t}(x)$ is estimated by regressing Y_{jt} untreated countries in the time period $t > T_0$ on the predictor values X_0. Therefore the bias is defined to be $\sum_{j=2}^{J+1} \hat{w}_j \hat{\mu}_{0t}(X_j) - \hat{\mu}_{0t}(X_1)$.

Bias-corrected treatment effect $\tilde{\hat{\tau_{1t}}}$, as seen in Wiltshire 2021, is given by:

$$\begin{aligned}
\tilde{\hat{\tau_{1t}}} &= \hat{\tau}_{1t} - bias_t \\
&= \left(Y_{jt} - \sum_{j=2}^{J+1} \hat{w}_j Y_{jt} \right) - \left(\sum_{j=2}^{J+1} \hat{w}_j \hat{\mu}_{0t}(X_j) - \hat{\mu}_{0t}(X_1) \right) \\
&= (Y_{1t} - \hat{\mu}_{0t}(X_1)) - \sum_{j=2}^{J+1} \hat{w}_j \left(Y_{jt} - \hat{\mu}_{0t}(X_j) \right)
\end{aligned} \tag{11}$$

The bias-corrected results show an even stronger increase in TFR in Russia when compared

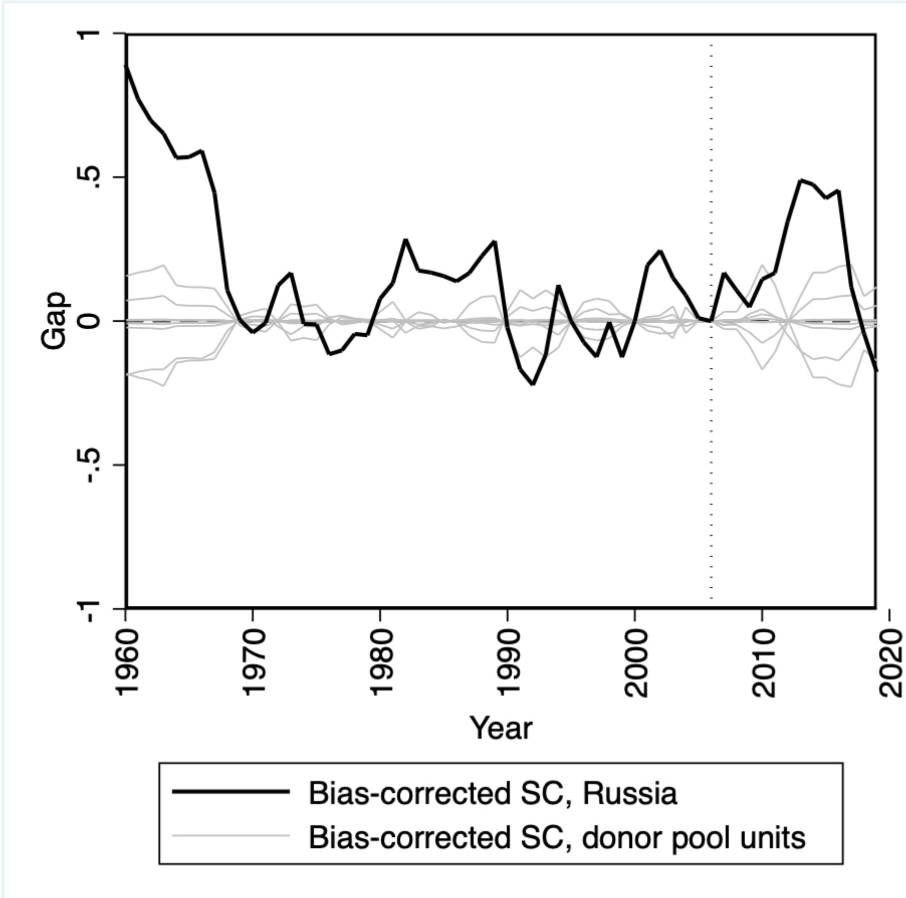

Figure 8: Bias Corrected Gaps for Donor Pool

to synthetic Russia, though this information without context is not necessarily so useful. In order to further sanity-check the results the above analysis is repeated with each country in the control pool as the treated country. Then, bias corrected gaps are calculated and graphed to compare to the outcome for Russia. The outcomes of this view are reported in Figure 8. What this shows is that compared to other synthetic versions of donor pool countries, Russia has a significant jump in TFR during the treatment period.

6 Discussion

The aim of this analysis was to measure the impact of the 2007 Russian MC policy on the total fertility rate in Russia. Two models were applied to this question: a DDD study using data from the World Values Survey, and a synthetic control model approach using aggregate economic data from 9 countries.

Results from DDD regressions are in line with other literature evaluating the Russian MC program. As a reminder: Slonimczyk and Yurko (2013) found that long run TFR has increased by .15 children per woman, Miljkovic (2015) found that TFR increased by .04 as a result of the policy, and Becker and McMullen (2020) found that there was not convincing evidence from regressions that the policy had an impact.

The model in this study fits in nicely with the literature, finding some agreement with those who believe the policy had a small impact as well as those who believe there is not impact. For regressions that are significant, there is between around a 1.8% increase in TFR associated with the policy. Regressions 1 and 3, 4, and 5 in Table 3 suggest that the impact is not significantly greater than 0. If we recall President Putin's stated goal of the policy, which is an increase in TFR by 50% due to the MC program, then this study confirms earlier results that the policy has failed to meet this goal.

Previous literature has relied on the Russian Longitudinal Monitoring Survey, and seeing earlier results confirmed by using data from the WVS makes these results more convincing. In addition to this, the DDD approach ideally helps to decrease unobserved error in regressions which would make estimates more accurate. In any case, this study confirms broadly the numbers found within the literature.

Zakharov has been insistent since his initial study on the topic in 2013 that, even if it was found that the TFR increased in the time-period since the imposition of the policy, there would be no long-term difference in the TFR in Russia. He argues that TFR might increase slightly in the short term, but that any effect would be due to a rescheduling of births forwards while agents are sure that the policy will remain in place. This argument seems to become more and more persuasive over time. It has now been 15 years since the start of the policy, and this study confirms that there have been little to no longer term effects of the MC policy on TFR.

The SCM analysis in this study suggests the truth of Zakharov's hypothesis. Non-bias corrected difference in TFR in 2020 between Russia and SR sits at around .13 which is close to the estimate provided by Slonimczyk and Yurko. However, in the bias corrected results as presented in Figure 7 show that the gap in TFR rises to around .5 births per woman in the mid-2010s and then decreases again to near 0. This could confirm that while the MC policy might have had a short term impact on TFR, this effect diminished over time.

Slightly puzzling in the results of the SCM analysis is the magnitude of the aforementioned gap in TFR in the mid-2010s (Figure 8). This gap is much larger than any other reported effect of the MC policy elsewhere in the literature. The difference of about .5 would mean that the government (temporarily at least) met their goal of increasing TFR by 50%.

The results of this analysis confirming previous results of middling outcomes of the MC policy has several policy implications for Russia and other governments looking to use subsidies to increase TFR. Regressions show that such policies around the scale of the Russian policies are not able to dramatically increase TFR. The SCM analysis shows that even if there is an initial increase, the effect of the policy decreases over time. These twin results show that if governments wish to increase TFR they should consider other options besides direct subsidies to mothers and families.

What these options are is less clear. Nargund (2009) reports that, while the TFR of native-born Americans is below replacement levels, the TFR of immigrants (especially young immigrants) is well above replacement levels. Encouraging immigration of young people is an effective way of increasing TFR. Russia is not unfamiliar with immigration, but the decrease in net migration flows in the last two years suggest that TFR could further decrease.

McDonald (2006) suggests that even though opportunities for women are increasingly more common, gender inequality within households mean that the burden of caring for children falls predominantly on women. This would imply that the opportunity cost of having a child from the mother's perspective is higher and results in dampened TFR. Naturally some would suggest that solutions to this issue could be found in 1) childcare or 2) liberal maternity and paternity leaves of absence. But, Russian mothers are entitled to 140 days of leave and 100% of their wages during that period. Also, since 2012 Russian families are entitled to universal primary and kindergarten care. This would suggest that options for decreasing opportunity costs of having a child for mothers is already exhausted.

The last possible route for increasing TFR would be to improve health outcomes for Russians.

There has already been a significant amount of movement in health metrics within the last decade. World Health Organization data show that Putin's anti-alcohol campaigns have reduced alcohol consumption by 40% between 2003 and 2016.[11] This reduction has had reverberations through many health metrics, with male mortality decreasing by 39% and female mortality decreasing by 36%. Life expectancy also reach new historic highs in every year since 2007 (though they are well below life expectancies in the US and other developed countries). This implies that increasing health outcomes might put upward pressure on TFR in the coming years, and that good health policy might be an effective way to increase TFR.

The MC policy could bring large and long lasting benefits to Russian children, mothers and families even if it is not successful at increasing long run TFR. Since the subsidy can be used for housing and education, the money could likely increase access to both of these things for the recipients. It would be feasible to see health outcomes for Russian children to increase over time as a result.

6.1 Fertility Rates and the 2022 Invasion of Ukraine

The 2022 Russian invasion of Ukraine took place during the middle of the writing of this thesis, and the developments from that war have potential intersections with the analysis presented here.

On March 16th, 2022, President Putin held an address in which he discussed socio-economic support for Russian regions. After the invasion, many western countries imposed heavy

[11] https://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/news/news/2019/10/alcohol-related-deaths-drop-in-russian-federation-due-to-strict-alcohol-control-measures,-new-report-says

sanctions on the Russian Federation. These sanctions took many forms; from a partial ban from using the SWIFT financial transaction system, restricting imports, to sanctioning the assets of Russian individuals abroad. Consequently, nearly every part of the Russian economy has been touched by sanctions. Since the situation is still developing it is impossible to say how these sanctions will the affect the economy in the long term, but at the date of writing the future does look bleak. For example, the Russian economic publication *The Bell* revised GDP growth targets from 4% to 1% in 2022.[12] Presumably, With this presumably in mind, President Putin announced a program to pay 12,000 rubles per month to mothers with children or who are pregnant. It is not clear whether this is a temporary stopgap or is meant to exist in perpetuity. It also seems that these payments will exist on top of the MC subsidy. Either way, the invasion and subsequent economic backlash has heightened the need for the Russian government to reiterate and double down on subsidies to support women and families with children. This new payment also could have been aimed at preempting a drop in fertility rates associated at war. Previous macroeconomic studies such as Vandenbroucke (2014) have found that war causes serious and immediate decreases in total fertility rate. Vandenbroucke reported that the 50% decline in French TFR during WWI can be attributed to a combination of loss of income and decrease in productivity during the war. On top of this, shocks from sanctions in the economy will cause further decreases in fertility. A similar situation has attained before in Russia, according to Becker and Hemley (1995), where TFR dropped precipitously in the turmoil of the 90s.

This policy also provides the opportunity for future scholarship on how women react to prices

[12] https://thebell.io/pervye-prognozy-padeniya-vvp-i-rosta-inflyatsii-chto-budet-so-stavkoj-tsb-i-effekt-amerikanskogo-neftyanogo-embargo

when deciding to have children. While data on this are probably years away, the introduction of this policy on top of the MC policy will allow studies to be undertaken further on how subsidies can effect changes in TFR.

I am also not the first to point out that Ukraine and Russia's low fertility rates probably will have some impact on the calculus of both governments as the war continues. In the *New York Times*[13], columnist Ross Douthat reports: "...the war in Ukraine is a war between two societies with fertility levels far below replacement, in which families might lose everything when they lose a single son. That raises questions both about how long such a war can be sustained and also what happens in the aftermath." While grief of the loss of a child must be great for all families, one would expect it to be most traumatic for parents in a single-child household and thereby leading to a more rapid decline in support for the war.

On top of having an impact on fertility rates, the fertility rates of Russia and Ukraine likely have an impact on the war as well. However, there is a question (that is impossible to answer now, if ever) as to how fertility rates have played into the calculus on the decision to invade. Brent Peabody in *Foreign Policy Magazine*[14] wrote (in January 2022, before the war) that "rather than being purely a limiting factor, it's possible to argue Russia's weak demographic hand has made it even more dangerous. After all, Russia's need for more people is no doubt a motivating consideration for its current aggressive posture toward Ukraine, and Putin has said the thought of a depopulated Russia haunts him most—even if the idea that Ukrainians would sign up to be good Russians is largely delusional." What can be said with certainty, however, is that birth rates in Russia and Ukraine will continue to weigh heavily on the

[13] https://www.nytimes.com/2022/03/12/opinion/putin-ukraine-russia.html
[14] https://foreignpolicy.com/2022/01/03/russia-demography-birthrate-decline-ukraine/

minds of leaders on both sides.

7 Conclusion

Study has sought to analyze the effectiveness of the Russian Maternity Capital program in increasing the total fertility rate of the Russian Federation using a DDD model and an SCM analysis. This is the first paper of its kind to use SCM in analysis of birth subsidies, and the DDD model adds to existing regressions by incorporating distance between the border of Russia and Ukraine. DDD results conclude that the effect of the policy is modest, if it has an effect at all, and has increased TFR somewhere between 0% and 3.5%. SCM analysis concludes that the impact of the policy resulted in a comparably large .5 births per woman increase in fertility due to the MC policy in the mid-2010s, but this effect has declined over time.

The Global Demographics Ltd. population forecast model reports that by 2045 the .02% increase (from the upper range of DDD model outcomes) in TFR associated with the subsidy implies an increase in population of about 1 million people. Since this is on the upper range of DDD estimates of the policy's increase in TFR, it is reasonable to say that the actual impact of the policy is somewhere between 0 and 1 million people. While 1 million people is a large amount, it is not quite the demographic revolution that the Putin administration hoped it would be.

Further lines of research could include other countries that border Russia and are included in the WVS data. While this study only included Russia and Ukraine, there are other countries that have survey data in time periods that overlap somewhat with Russia and Ukraine. This could help confirm DDD regression outcomes found in this analysis.

The underwhelming outcomes of the MC policy suggest that such birth subsidy schemes are not effective at increasing the total fertility rate. This forces policymakers to consider 1) that TFR is too complex of a decision to influence with economic policy or 2) there are other and more effective policy means of affecting TFR that are not wholly reliant on subsidies to mothers and families.

To close, I asked my Russian friend Igor U. his opinion of the maternity Capital program. Igor is in his late twenties, owns a coffee shop in Kirov Oblast, Russia, and began his family in 2018 with the birth of his first daughter Nika. Igor and his wife are possibly the ideal recipient of the subsidy. They are young, successful, and as of yet only have one child. He thinks that the policy is good because it will help many children receive a quality early education and help families gain access to better housing. But, on whether the policy would influence his decision to have a second child, Igor definitively said "I won't have a second child because of the payment ... I will have one only when I am ready to." Perhaps Igor's experience summarizes the impact of the policy better than any data. While payments certainly can influence personal choices, the decision to have a child might be so intimate that it is beyond the influence of the planner.

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Мамы дорогие! Как миллиарды рублей, выделяемые государством на материнский капитал, оседают в карманах чиновников и риелторов. Расследование Дениса Короткова [Новая газета]. (n.d.). Retrieved April 1, 2022, from https://novayagazeta.ru/articles/2021/10/13/mamy-dorogie

8 Appendix

	(1)	(2)	(3)	(4)
	children	children	children	children
ATT	0.0184	0.0180*	0.0118	0.0351
	(0.0133)	(0.000418)	(0.0216)	(0.0193)
Age	0.0497	-0.00505	0.0296	0.0213
	(0.0406)	(0.0711)	(0.0304)	(0.0245)
Age^2	0.000449	0.00131	0.000704	0.000829
	(0.000663)	(0.00115)	(0.000511)	(0.000422)
Wave 3	0	0	0	0
	(.)	(.)	(.)	(.)
Wave 5	-0.235			
	(0.0203)			
Wave 6	-0.335	-0.336	-0.312	-0.307
	(0.0367)	(0.0412)	(0.0311)	(0.0253)
Wave 7	-0.351	-0.351	-0.278	-0.286
	(0.0599)	(0.0518)	(0.110)	(0.0964)
Marital Status		-0.0497	-0.0662**	-0.0672
		(0.00821)	(0.000192)	(0.0112)
Fully Employed		0.171	0.131	0.130
		(0.0405)	(0.0112)	(0.0227)
Chief Wage Earner		-0.119*	-0.176*	-0.187**
		(0.00300)	(0.00786)	(0.000802)
Income Group 1 (lowest)			0	0
			(.)	(.)
Income Group 2			-0.0564	-0.0357

	(0.0929)	(0.104)
Income Group 3	-0.0216	0.0197
	(0.0457)	(0.0400)
Income Group 4	-0.156	-0.118
	(0.0652)	(0.0728)
Income Group 5	-0.132	-0.0937
	(0.0155)	(0.0176)
Income Group 6	-0.101	-0.0565
	(0.0271)	(0.0264)
Income Group 7	-0.159	-0.0920
	(0.0354)	(0.0568)
Income Group 8	-0.193	-0.109
	(0.0528)	(0.0594)
Income Group 9	-0.183	-0.0763
	(0.0549)	(0.0837)
Income Group 10 (highest)	-0.0431	0.0356
	(0.384)	(0.382)
Incomplete Primary School	0	0
	(.)	(.)
Complete Primary School	-1.069	-0.868
	(2.360)	(2.367)
Incomplete Secondary School (vocational)	-1.728	-1.567
	(3.038)	(2.848)
Complete Secondary School (vocational)	-1.793	-1.603
	(3.007)	(2.820)
Incomplete Secondary School (university preparatory)	-1.839	-1.672

			(3.244)	(3.057)
Complete Secondary School (university preparatory)			-1.821	-1.626
			(2.958)	(2.776)
Incomplete University-level			-1.856	-1.645
			(2.956)	(2.793)
Complete University-level			-1.885	-1.666
			(3.067)	(2.870)
Town Size Group 1 (least populous)				0
				(.)
Town Size Group 2				0.0424
				(0.0346)
Town Size Group 3				0.123
				(0.0538)
Town Size Group 4				-0.127
				(0.0951)
Town Size Group 5				0.0186
				(0.0581)
Town Size Group 6				-0.0762
				(0.0189)
Town Size Group 7				-0.167
				(0.122)
Town Size Group 8 (most populous)				-0.291
				(0.0771)
Constant	-0.824	-0.0718	1.437	1.437
	(0.580)	(1.019)	(2.527)	(2.504)
N	3336	2620	2405	2405

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Regression outputs with all variables included