Religiously-Inspired Baby Boom: Evidence from Georgia

Seung-Hun Chung *[1], Neha Deopa†[2], Kritika Saxena‡[3], and Lyman Stone§[4]

[1]Ohio State University
[2]University of Exeter
[3]University of Groningen
[4]McGill University

Abstract

This study investigates the Georgian Orthodox Church's response to declining fertility rates through a 2007 intervention, wherein the Patriarch personally baptized third- or higher-parity children. Employing synthetic control and interrupted time series methods using macro data, we find suggestive evidence of increased fertility rates. Validating these findings with micro data from a representative sample of Georgian women, we use quasi-experimental variation generated by religion, ethnicity, and marital status of the women; and the timing of the announcement to estimate the causal impact using a differences-in differences estimator. We find a 17 percent increase (0.3 children per woman) in the national total fertility rate, a 42 percent increase in Georgian Orthodox women's birth rate within marriage (an increase in annual hazard rate of 3.5 percent), and an 100 percent increase in their 3rd and higher order birth rate within marriage (1.3 percentage points higher annual hazard rate). The impact of the intervention also correlates with higher marriage rates and reduced reported abortions, aligning with the church's goals. This research emphasizes the potential impact of non-economic factors such as religion and the influence of traditional authority figures on shifting fertility patterns in industrialized, educated, and low-fertility societies.

Keywords: Religion, Fertility, Demographics

JEL Codes: J11, J13, Z12

*chung.627@buckeyemail.osu.edu
†n.deopa@exeter.ac.uk
‡k.saxena@rug.nl
§lyman.stone@mail.mcgill.ca

1 Introduction

Policy measures to address below-replacement fertility rates are of increasing interest to policymakers for several reasons: long-term sustainability of population trends, stalling of economic growth, declining labor force and an aging population's increasing pressure on public finances as outlays for pensions and health care increase (Prettner, 2013; Harper, 2014; Sobotka et al., 2019). The effectiveness of pro-natal policies, especially those providing financial or material rewards, has been extensively debated. Although most empirical studies find positive effects, the impact is often smaller than that desired by policymakers (Malak et al., 2019; Bergsvik et al., 2020). Meanwhile, a large body of demographic literature points to the role of evolving non-market societal characteristics, specifically the cultural roots of fertility decline. This literature highlights a shift towards emphasis on individual autonomy, decoupling of marriage and childbearing, increasing childlessness, women's increased rights and social status, and the establishment of a two-child norm for those having children (Lesthaeghe, 2014, 2020; Kearney et al., 2022). According to Zaidi and Morgan (2017) "tastes and preferences have irreversibly changed" and a reversal of these new values would be difficult, costly, or undesirable to societies that regard individualism very highly. In recent years, the economic analysis of fertility has begun to more formally consider post-Becker models incorporating factors such as endogenous preferences, intra-household bargaining, heterogeneous values and favorable social norms (Doepke et al., 2023).

Explicit tests of these theories using valid methods for causal inference are rare as "cultural interventions" are uncommon and difficult to identify. This paper leverages precisely such a shock to investigate whether a change in religious discourse whereby religious elites engage in more active promotion of higher fertility can increase fertility rates. We explore the case of Georgia which is of particular interest as its Total Fertility Rate (TFR) rose from 1.76 to 2.3 children per woman in the space of 24 months post 2007: a very large and rapid increase as observed in Figure 1. As a result of this dramatic fertility increase and its relative persistence, Georgia has had the highest fertility in the Caucasus region for nearly 15 years. We test one theory of what may have caused this striking fertility change: a religious intervention.

In December 2007, the Georgian Orthodox Church's Patriarch Ilia II announced that he would personally baptize any third-born or higher parity child born to married Georgian Orthodox parents, making him the child's godfather (Esslemont, 2009). This announcement was in response to growing concern regarding Georgia's falling birth rate, high abortion rate, increased births outside of marriage, and declining population. Given the high public admiration for Patriarch Ilia II as well as the high theological and cultural priority placed on infant baptism and spiritual parentage within the Georgian Orthodox Church, this promise was plausibly a valuable incentive[1]. Prior to

[1] Opinion polls reliably place approval of or respect for him at around 90%. For example, in March 2023

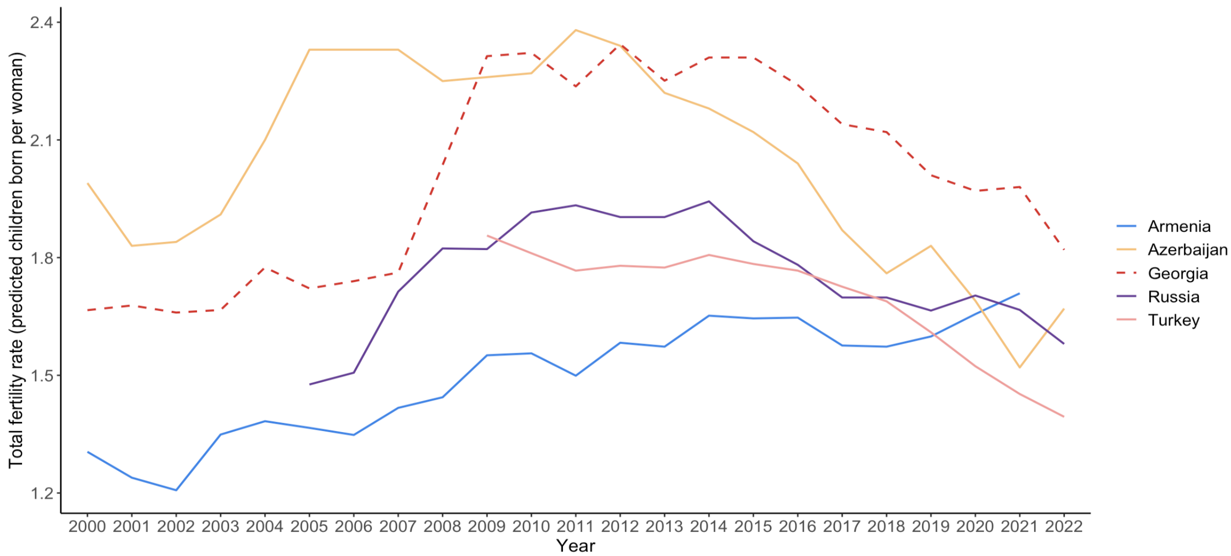


Figure 1: Total Fertility Rates (TFR) in Georgia and surrounding countries.

Note: Fertility estimates from respective national statistics offices except Georgia for period 2000-2013 due to known discrepancies in national estimates. Instead, UNFPA de facto estimates are used for this period. Russia includes the average of 6 Federal subjects bordering Georgia. Turkey represents the Turkish Northeastern Black Sea region. The red dashed line represents Georgia.

2008 there are no documented "mass baptisms" by the Georgian Orthodox Church in the modern period; a practice Patriarch Ilia II would make regular. Since this campaign began Patriarch Ilia II has baptized over 40,000 third-and-higher parity children born to married Georgian Orthodox parents - a nontrivial share of total higher-parity births in Georgia within that time (Interpress, 2020). In this paper, we use this announcement by Patriarch Ilia II as a natural experiment to investigate the impact of a religious "policy intervention" on fertility outcomes.

The study of Georgian fertility faces several challenges, and these challenges form the core motivation for our study design to leverage both macro and micro-level evidence. Georgia's system of vital registration was incomplete prior to 2014, the microdata is unavailable for early fertility surveys, demographic data for the immediate post-independence period is unreliable, large shifts in migration have made population estimation challenging, and even the reliability of Georgian censuses has been called into question by Tsuladze et al. (2002). The only previous study of Georgian fertility related to the patriarch's campaign, Lanchava (2014), was compelled to use a small sample of household rosters derived from a periodic public opinion survey, which was stratified, sampled, and weighted to represent the voter population (including overseas voters) and not the general population. As a result of these numerous challenges, we adopt multiple methods to assess the effects of Patriarch Ilia's baptism policy at the country level and at the individual level. First, we

Center for Insights in Survey Research (2023) found 91% favorability compared to 52% for the second-highest individual Kakha Kaladze a former footballer who has served as the Mayor of Tbilisi since November 2017.

provide macro evidence based on a country-level synthetic control model wherein Georgia is *treated* by Patriarch Ilia's announcement in 2007 and other post-communist countries supply the donor pool to build the counterfactual. We find that, beginning in 2008, and especially by 2010, Georgia's TFR rose significantly more than its synthetic control unit: approximately 0.3 more implied children per woman, an increase of about 20 percent from the pre-treatment mean, or 17 percent above its synthetic control unit. This implies approximately 38,000 additional births 2008-2013. Interrupted time series analyses suggests this increase was disproportionately driven by 3rd and higher-parity births, as well as births to married mothers, consistent with what would be expected from the baptism policy.

However, the aggregate evidence does not perfectly identify the treatment since not all Georgians are Orthodox adherents. Heterogeneity related to religion, parity, and marital status were important elements of the intervention itself. Therefore, leveraging within-country individual variation, we implement a difference-in-differences (DID) strategy by utilizing the 2018 Multiple Indicator Cluster Survey (MICS) for Georgia which provides annual fertility histories for women and is representative at the national level. DID allows for a more robust estimation of the patriarch's intervention by accounting for pre-existing differences between the Georgian Orthodox (treated) and non-Orthodox (control) women. We find that the average effect of the announcement on Orthodox women was a 1.3 percentage point increase in the annual probability of having a third or higher order child within wedlock: the key intended outcome of the announcement. In relative terms, this implies an approximate hundred percent increase in the propensity to have a third or higher order child. For overall fertility change, the announcement led to an increase of 3.5 percentage points in the annual probability of *any* order birth within wedlock, which amounts to a 42 percent increase relative to the mean. Adopting the same 2008-2013 comparison period as used for crude birth rates above, these increases imply a causal effect of approximately 30-40,000 additional births, strikingly similar to the estimates produce for crude birth rates.

A complicating factor in studying Georgian fertility for this period is the brief war between Georgia and Russia in August 2008, which might be presumed to impact the analysis of births post-2007. A shortcoming of the macro analysis is that it is unable to disentangle which of these similarly timed events, Patriarch Ilia II's announcement or the war, was responsible for the fertility spike observed in Georgia from 2008 onward. But our DID approach allows us to precisely address the complications posed by the war. Using information on internally displaced persons we are able to show that the the main DID results are not driven by wartime refugees, and in fact both treated and untreated women affected by war did not change their fertility due to conflict exposure. Additionally, when excluding regions with the most intense fighting from the primary specification the results continue to be robust. We support our DID results with additional triple difference estimation which accounts for bias in parallel trends due to confounding factors like the war. Finally, we provide graphical evidence using national monthly births data highlighting that large fertility effects began precisely

7-12 months after Patriarch Ilia's baptism announcement, and indeed slightly before the war began, far too soon for the war in August 2008 to be a relevant factor.

Additional DID results also show that the annual probability of marrying among unmarried treated women rose by 10.3 percentage points, and subsequent reporting of an abortion in wedlock for Orthodox women fell by 0.4 percentage points. Therefore, in combination with the macro evidence, we conclude that the post-2007 fertility boom for Georgia was disproportionately driven by married Georgian Orthodox women having higher-parity births, consistent with the boom having been caused by Patriarch Ilia II's baptism campaign. Our findings indicate that a persuasion by a highly influential figure, leveraging the beliefs and structures of a religious tradition, can motivate a significant increase in fertility in at least some contexts.

This paper contributes to the small but growing literature that explores the connections between religion, cultural norms and fertility. Previous work has explored differential fertility rates between religions or denominations (Dharmalingam and Morgan, 2004; Mosher et al., 1992; Lehrer, 1996; Zhang, 2008; Becker and Cinnirella, 2020), and the relationship between religiosity and fertility rate (Kaufmann, 2010; Okun, 2017). Our work directly adds to this literature by highlighting the causal link between announcements by religious leaders and fertility outcomes. This contribution is akin to a rising literature which suggests that specific components of religious institutional support for families or specific rhetorical statements by religious leaders might influence fertility behavior (Bassi and Rasul, 2017; Berman et al., 2018; Farina and Pathania, 2020). Prior studies of specific discursive interventions by religious leaders have been limited to the Catholic context; we extend this literature to Orthodox Christianity.

Iyer (2016) highlights the links between religion and demography as being an under-studied topic. A related strand of literature has explored the effect of religion-related governance on fertility. For instance, Aksoy and Billari (2018) study the impact of an Islamist party's pro-natal and pro-family policies on fertility and marriage rates in Turkey. They find that the electoral victory of the party did lead to an increase in both outcomes. Similarly, Alfano (2022) finds that the implementation of Sharia law in northern Nigeria led to higher fertility outcomes and and a decline in women's intra-household bargaining power. Wang (2020) uses the 1972 Wisconsin v. Yoder, which exempts Amish children from compulsory high school education, to show how it allowed the sect to grow through higher fertility. This study also explores an intervention on religion, but one which is not strictly governmental in nature, but explicitly related to shifting discourses and religious practices.

The paper is organized as follows: section 2 provides an overview of the Georgian context and Patriarch Ilia's campaign to increase fertility in the country. Section 3 describes the macro and micro level data used in the analysis. Section 4 presents stylised macro-level evidence and micro-level evidence on the effect of the announcement on fertility and also discusses the heterogeneous treatment effects. Lastly, section 5 concludes the paper.

2 Background

Georgia has long faced a challenging demographic situation. Georgia's population peaked in the early 1990s and has been on a steady decline accompanied by a shrinking working age cohort. On average, women in Georgia in 2007 could expect to have approximately 1.8 children, which is below replacement levels. Moreover, available estimates suggest that more than 10% of Georgians left the country between 2000 and 2010, and this extraordinary wave of emigration continues today (Tembon et al., 2018).

2.1 Georgian Orthodoxy and Patriarch Ilia II's Intervention

In 2007, the Georgian Orthodox Church's Patriarch Ilia II announced that he would personally baptize any third-born or higher parity child of married Georgian Orthodox parents and that he would also become their godfather. This decision was motivated by concerns about the demographic landscape of the country - low fertility, high abortion rates and increasing births outside of marriage (Jardine, 2017). The Patriarch expected and publicly stated that his offer of baptism would help increase the birth rate and that this would benefit the Georgian population. The first mass baptism was conducted on January 19, 2008, having been announced just one month earlier in December 2007, and since then such mass celebrations have been frequent. As of January 2020 over 40,000 infants have been baptized (Euronews, 2020). Figure 2 highlights the sharp rise in higher-parity births along with baptisms as a part of the "mass baptism" programs for higher order births. If the rate of baptisms as a share of high-parity births can be interpreted as a measure of program salience, then the initial year of announcement appears to have been one of the most prominent. A second wave of escalation in the baptism program was observed between 2011 and 2015. However, the salience of the program has waned since 2015 as Patriarch Ilia II has aged and the recent mass baptisms have required the use of assistants[2]. To understand why the baptism announcement would be expected to have a significant impact on fertility decisions we provide a brief background on the historical role The Georgian Orthodox Church.

[2]We do not leverage annual variation in baptismal intensity as a variable in our analysis as it is not a precise measure of policy effort. Higher baptism incidence among higher-parity births could be caused by greater program effort, or by differences in religious engagement in the wider population, or by shifts in the mix of higher-parity childbearing. Nonetheless, we note that the program has waned considerably in recent years accompanied by declining Georgian fertility.

The Georgian Orthodox Church has high social status and influence within Georgian society: according to the 2019 Caucasus Barometer Survey over 80% of the population are Georgian Orthodox. The church is an autocephalous (or administratively independent) institution in the Eastern Orthodox tradition, headed by a "catholicos" or Patriarch. In 2002, the Georgian Orthodox Church was granted a special status which included tax exemptions, clerical release from military service and special legal status of the Patriarch, therefore endorsing its primary status in the religious sphere. Two historical phenomena are important in understanding the role that the Georgian Orthodox Church played in the process of post-Soviet nation rebuilding and its continued relevance today in defining a national identity. The first was the absorption of the Georgian Orthodox Church by the Russian Orthodox Church in 1811 which led to the suppression of the Georgian language in liturgy and ecclesial education. This became a rallying point for the Georgian clergy who eventually become part of the national reawakening in the late nineteenth and early twentieth centuries. The second historical phenomenon relates to the long periods under Islamic rule during which the Georgian Orthodox Church was a guarantor of national identity, religion and language (Crego, 2014). In fact Georgian Orthodox martyrs from that period remain prominent among the lionized figures of Georgia's past, and are displayed in monumental architecture throughout the country.

Additionally, complementing the importance of the church is the fact that Patriarch Ilia II is widely respected by the citizens: according to a 2008 opinion poll 94.2% of Georgians surveyed ranked Ilia II the most trusted man in the country (International Centre on Conflict and Negotiation, 2008). These high favorability ratings continue to persist even today indicating that even relatively non-devout individuals may have accepted his announcement and shifted their fertility (Center for Insights in Survey Research, 2023). The 2019 Caucasus Barometer Survey found that approximately 80% of the respondents agree with the idea that being a good citizen requires "following national traditions". Therefore, the use of baptism as a policy instrument is particularly important in this regard. Within Georgian Orthodox theology (and Eastern Orthodox theology at large), baptism is regarded as actually conferring salvation and faith to an infant, not as a mere symbolic act. Moreover, baptisms also include a godparent or godparents, i.e. persons who are present at the baptism and vow to ensure that a child is reared in the faith, and to support that rearing. Patriarch Ilia II not only promised to personally baptize eligible children (providing a unique and high-status experience for the family) but also promised to become their godfather, thus implicitly entering into a unique form of spiritual kinship with them and their families. Linking one's family to the Georgian Patriarchate via a trusted and popular patriarch like Ilia II provides Georgian parents not only an honorable religious ceremony for their child, but a direct and powerful linkage to national history and identity. Thus, the Patriarch's baptism offer is an explicitly pro-natal intervention by a popular and respected leader of a socially dominant religious body which fused religious norms and practices with strong ideas about kinship and nationality.

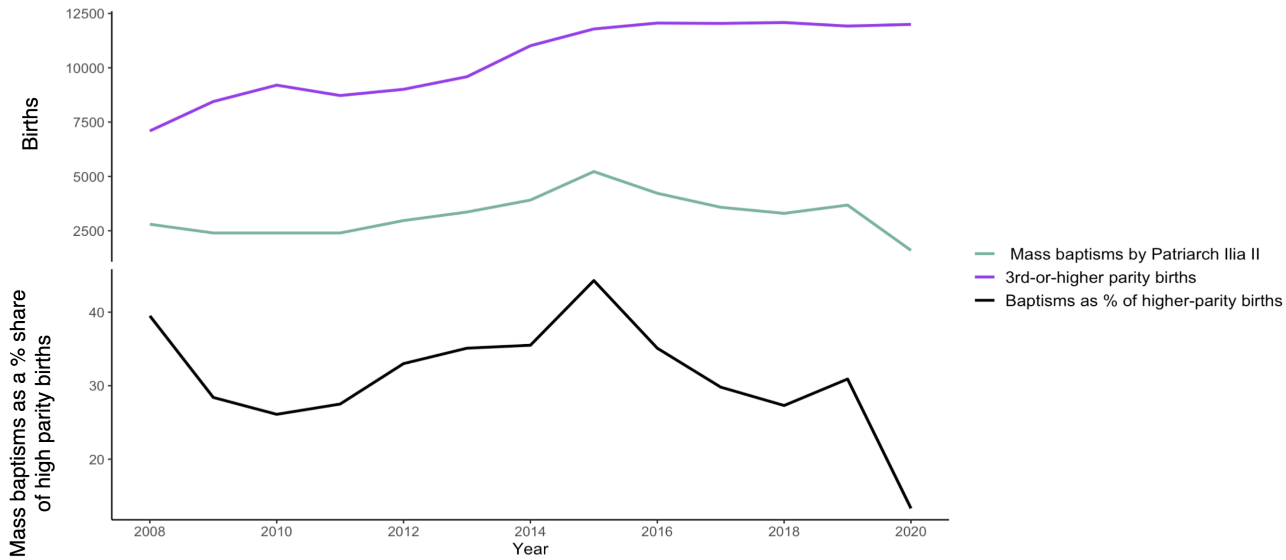


Figure 2: Mass baptisms by Patriarch Ilia II and high-parity births in Georgia.

Note: For 2008-2013 the proportion of high-parity births are obtained from United Nations Population Fund (UNFPA) de facto birth estimates. For 2014-2020 the high-parity births are obtained from the official vital statistics. Cumulative baptism figures are periodically reported by the office of the Patriarchate in news bulletins, baptisms rates between these publications have been linearly interpolated to provide annual estimates of baptisms.

2.2 2008 Russo-Georgian War

After the fall of the Soviet Union, the fractured geography of the Caucasus gave rise to separatist, ethnic, and religious conflicts in Georgia, Armenia, and Azerbaijan. The Nagorno-Karabakh conflict between Armenia and Azerbaijan is perhaps the best-known of these. Georgia also experienced civil conflict in the early 1990s, and three regions achieved total autonomy from the central government in Tbilisi: Abkhazia in the northwest along the coastal Russian border, Adjara in the southwest along the Turkish border, and Tskhinvali (or South Ossetia) close to the mountainous Russian border, in particular centered on the Roki Tunnel connecting Tskhinvali to Russia. In 2004, Georgia successfully regained control over Adjara and its predominantly Muslim and partially Turkish population. In subsequent years Russia expanded its military footprint in Abkhazia and Tskhinvali and in 2008 tensions heightened between the two countries. Finally, on 6th and 7th August 2008, Russian forces clandestinely entered Tskhinvali and began shelling Georgian positions. On August 7-8, Georgian military and paramilitary units attempted to retaliate against South Ossetian positions and hold off the anticipated invasion. Over the course of August 8-12, Russian, South Ossetian, and Abkhazian forces launched their planned offensive. During the five days, 180 Georgian combatants were killed to 170 Russian, South Ossetian, and Abkhazian combatants. Approximately 400 civilians also died in the conflict, while at least 192,000 civilians were internally displaced. Russian forces advanced to within artillery range of the Georgian capital,

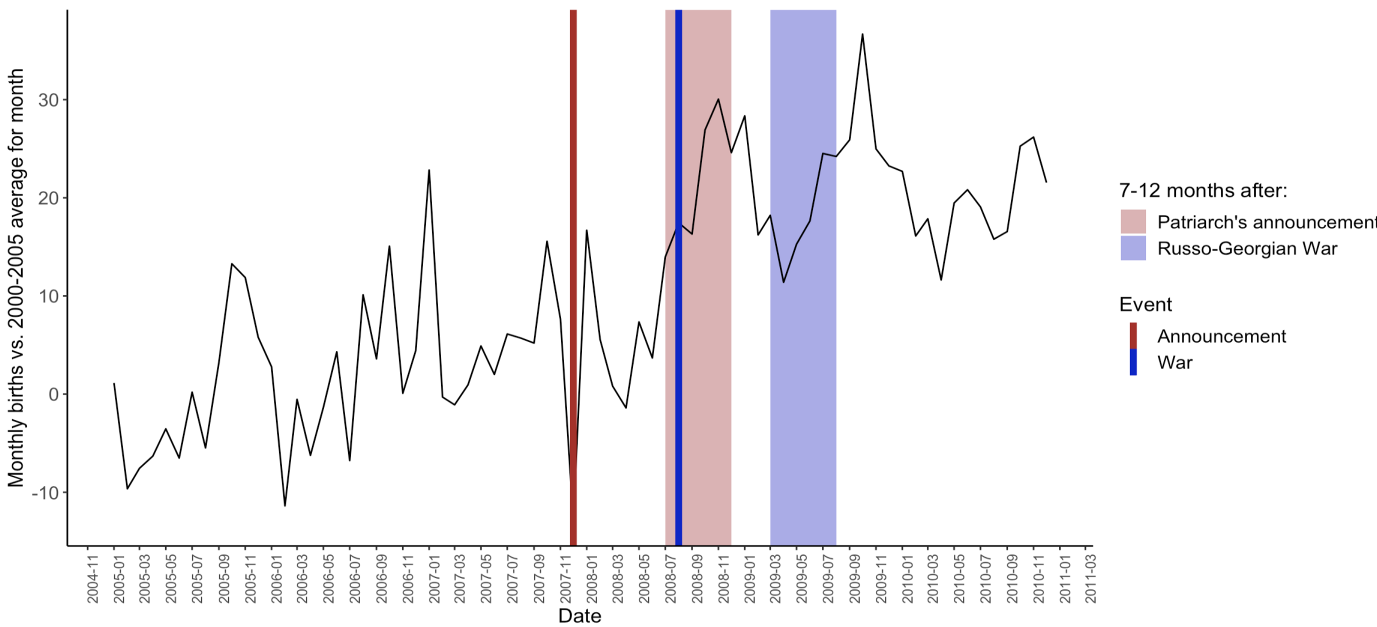


Figure 3: Changes in monthly births 2005-2011.

Note: Y-axis plots the monthly graph of births scaled by 2000-2005 average births for each month. Red bar indicates the month of the baptism announcement by Patriarch Ilia and the blue bar indicates the month of Russo-Georgian war. The shaded regions indicate 7-12 months post each of the events respectively. Figure uses monthly vital statistics data.

Tbilisi, and aerial strikes occurred in many parts of the country. In the wake of the war, the South Ossetian and Abkhazian breakaway governments expanded their de facto territories and ethnically cleansed remaining Georgian enclaves in their territories.

The timing of the conflict in August 2008, which is 8 months after Patriarch Ilia II's baptism announcement, could theoretically influence estimates of the baptism policy's effect on fertility. However, this is unlikely to be the case. First, the literature on war and fertility highlights reasons to be skeptical of a post-war baby boom. For example, Urdal and Che (2013) find that birth rates tend to rise after wars in very poor countries, but not in middle income countries like Georgia. Cetorelli (2014) finds that episodes of conflict in Iraq increased fertility among younger women, however educational attainment also declined and increases only occurred among less educated women. On the other hand Agadjanian and Prata (2002) find the opposite effect in Angola: fertility declines in times of conflict. In the Democratic Republic of the Congo Lindskog (2016) finds that first births increase during conflicts, but latter births decrease, precisely the opposite effect we identify. Castro Torres and Urdinola (2019) find that violence in Colombia increased births, but only in rural regions. Most recently, the 2014 war in Ukraine, and the 2022 Russian invasion of Ukraine, either of which are relatively close proxies for Georgia's 2008 experience, has led to a dramatic decline in fertility in Ukraine, not an increase. Lastly, recent work by Floridi et al. (2023) find that drug wars in Mexico, a upper-middle income country like Georgia, did not lead to any change in fertility desire for women. Overall, previous literature does not provide a strong *a priori* reason to expect that the 2008 Russo-Georgian war would increase Georgian fertility.

Additionally, in Figure 3 we demonstrate that Georgian fertility rose too sharply and too soon for the war to be a major cause. Observe that the rise in births begins in July 2008 as would be expected from a December policy change, given the prevalence of premature births and possibly foregone early-term abortions. Births rose further in August 2008 during the war then declined in September before rising to new heights in October through January 2009. Meanwhile, at 6-10 months after the Russo-Georgian war, births actually seem to decline somewhat vs. their immediate preceding levels, before rising again at 11-18 months after the war. In other words, births rose sharply in the immediate gestational window after Patriarch Ilia's announcement, but they actually declined in the immediate gestational window after the Russo-Georgian war. This relative birth decline after the war is consistent with effects observed in other wars in middle-income countries and in keeping with Georgia's relatively liberal policy environment for abortion. In Section 4.3.1 we address this more formally by using the Difference-in-Differences estimation with data on Internally Displaced Persons and war-affected-regions to rule out war exposure as cause for increased fertility.

3 Data

Our analysis relies on the use of both macro and micro evidence. For macro-level empirical analysis, we use data on Georgia's national fertility, birth and marriage rate from 1994 to 2022 provided by the National Statistics Office of Georgia[3]. To obtain similar data for other countries that are used as synthetic counterparts to Georgia we rely on World Development Indicators by World Bank which is collected from each country's national statistical bureau[4]. Additional variables used are average years of schooling, ratio of female to male labor force participation rate, urbanization rate, GDP (Purchasing Power Parity) per capita, and growth rate of GDP (PPP) per capita. Table A.1 in Appendix A provides summary statistics for the variables of interest and defines the main outcomes.

For the micro evidence we rely on the use of Multiple Indicator Cluster Surveys (MICS) by UNICEF. These surveys collect cross-sectional data on key indicators of well-being of children and women through sampled household surveys. For the analysis we use MICS 2018 from Georgia which reports information on several fertility outcomes of women, but does not provide a complete birth history

[3]Note that there is a substantive break in the series in 2014 when a new system of vital registration was adopted.

[4]The other countries here are limited to Eastern Europe, Russia and Caucasus region as potential donors for the synthetic control method. Further information is provided in Section 4.1

for higher-parity births. Instead, MICS provides a woman's age at first birth, year of the last-born child, total births, and the ages of all children living in the household amongst other variables. Using timing of birth of each child and woman's age at first birth, we construct a pseudo timeline of a woman's fertility over her lifetime. Since MICS asks fertility questions for women between the age of 15 to 49, we construct each woman's timeline from the year she turns 15 to her current age. This re-construction of our cross-sectional data allows us to construct a panel of all births to a woman over her timeline from her turning 15 to her current age. Summary statistics of the data is provided in table B.1.

Women with 0, 1, or 2 children have fully-identified birth histories. For the vast majority of women with 3 or more children the missing birth years can be readily imputed from household children; that is, we observe household children with birth years corresponding to the woman's year of first birth and her year of last birth, and children with birth years between those two dates summing to her total reported births. For the births women report which cannot be directly matched to reported birth years or to household children, we assume that births are evenly spaced in gaps between known births. While this imputation technique helps us with re-constructing missing information, it does suffer from bias based on our assumption of equal birth spacing for interparous births. That said, it is unlikely that we have incorrectly estimated birth years by a large amount, since we know the years of first and last birth and in most cases some intermediate births as well. In our primary specification women with imputed birth years are retained, because imputation odds are parity-dependent. Low parity women by default have no imputations, and imputation frequency rises with parity, thus excluding women with imputations excludes women in a biased fashion by excluding women with 3rd and higher births. Consequently, we expect results to become less precisely estimated at higher parities since for these births the year of birth may tend to be less accurately assigned. In Appendix B Table B.2 columns 4 and 5, we show the robustness of our main results when we drop women for whom we have imputed births between the years 2005-2010, that is, women who may have had pre-treatment high-parity births wrongly imputed as post-treatment, or vice versa. Our estimates do not change in this specification, indicating that our results are not sensitive to possible errors in imputed birth years for interparous births.

For the DID framework we identify women in the treatment group based on their religion: Georgian Orthodoxy. Within Georgia, many other religions exist, including at least two other orthodox faiths: Russian Orthodoxy and Armenian Apostolic, with the latter concentrated in Georgia's southern regions bordering Armenia. Although theologically similar in many ways, individuals in these traditions were not included in the baptism promise. Furthermore, Georgia has a considerable Sunni and Shi'a Muslim minority populations; Sunni Muslims, largely Turkish or other Turkic-speaking ethnicities, primarily live in the southwest, especially Adjaria. Shi'a Muslims, on the other hand, tend to live in the steppe-like southeastern part of Georgia, more proximate to Iran and Azerbaijan. Across the 11 Georgian regions for which MICS provides data, the Georgian

Orthodox share of reproductive-age women ranges from 51 percent to 98 percent. In general, intermarriage rates between these groups are low, as religious divides often proxy for other ethnic, linguistic, geographic, economic, and cultural divides. Likewise, with the exception of limited conversions arising from infrequent intermarriage, as well as conversion to emerging evangelical forms of Christianity, conversion rates in Georgia are not extremely high. However, we do not believe conversion would necessarily matter for program eligibility: if a woman was born and baptized herself as Georgian Orthodox but as an adult attended an evangelical church, she would likely be eligible for the baptism campaign, as her bringing her child for baptism would be construed as a return to her home tradition. Thus, neither conversion nor intermarriage present significant threats to the validity of our identification.

In general, regions with more ethnic minorities were somewhat less impacted by the 2008 war. This is one of the motivations for our use of regionally-clustered standard errors, as well as robustness tests in which we drop the most war-impacted regions, which also happen to be some of the most heavily Georgian Orthodox regions.

4 Empirical Estimation and Results

In this section we first begin by presenting macro-level synthetic control and interrupted time series models linking the baptism announcement to changes in fertility. We then proceed to a micro analysis utilizing difference-in-differences to demonstrate that the fertility dynamics described in the macro methods section are in fact driven specifically by Georgian Orthodox women (the treatment group) as opposed to women of other religions (i.e. Muslims, Armenian Orthodox, Catholics etc; the control group).

4.1 Macro Evidence: Synthetic Control Method

Using the Synthetic Control Method proposed by Abadie et al. (2010) we identify an anomalous increase in Georgian fertility occurring immediately after Patriarch Ilia II's announcement. This method is widely used in similar studies where there are a few or just one treated unit within a larger defined sample (Abadie et al., 2010, 2015). By using the synthetic control method we can estimate the extent to which Georgian fertility deviated from what would be expected based on various underlying drivers of fertility as seen in otherwise similar countries. Provided that the synthetic control unit is credibly specified, the difference in the fertility rate between Georgia and its synthetic control unit i.e. a "counterfactual Georgia" can be construed as a causal impact of

Patriarch Ilia II's campaign.

This method does not provide a p-value for statistical inference and so instead we use placebo tests to estimate a "pseudo-p value". This is done by assigning a hypothetical treatment status to countries other than Georgia and then getting the distribution of the comparison between these placebo treatments and their synthetic controls. A pseudo-p-value can then be calculated for where Georgia's real treatment effect is located within that resultant distribution. If the pseudo-p-value is small i.e. if Georgia's treatment effect is located in the tail of the distribution of placebo tests then we can conclude that Georgia's treatment effect is significant.

In principle, the synthetic control method only needs to have a good matching of the outcome variable between the treatment and its synthetic control. However, we also include some control variables to assess the model fit. If the match between these variables in the treatment unit and its synthetic control unit is close then it provides further evidence that the synthetic control estimate is providing an unbiased estimate. Following the previous literature (Macunovich, 1996; Basu, 2002; Sato and Yamamoto, 2005; Kebede et al., 2019) the following variables are utilized to derive a synthetic control unit for Georgia: Total Fertility Rate (or Crude Birth Rate when used as a substitute) averaged from 1994 to 2007 with specific data points in 1994, 1997, 2000, and 2007; ratio of female to male labor force participation rate in 2007, average years of schooling for females in 2007, log (GDP PPP per capita) in 2007, urbanization rate in 2007, and growth rate of GDP (PPP) per capita from 2007 to 2016. Each variable is chosen ensure the accuracy and reliability of the synthetic control unit for Georgia.

Figure 4 shows the Total Fertility Rate (TFR) for Georgia and its counterfactual consisting of Bosnia and Herzegovina, Estonia, Montenegro and Romania. Beginning in 2008 and especially by 2010 Georgia's TFR had risen significantly more than its synthetic counterpart[5]. Table A.2 and A.3 show the balance between Georgia and its synthetic control and the weight that each country receives. Theoretically, it is better to restrict potential donors in order to make them share important characteristics of Georgia especially because some characteristics may not be easily quantified[6]. Since not every country shares Georgia's important socioeconomic features and history such as dominant religion, history of communist rule, etc., we only use the countries in Eastern Europe, Russia and Caucasus region as the potential donors for the synthetic control method[7]. Table A.4 shows the estimated size of impact and pseudo p-value for each year. The impact is

[5]The figure cuts off comparison after 2013 as in 2014 Georgia adopted a new system of vital registry which achieved greater compliance resulting in a mechanically increased estimate of births.

[6]Restricting the potential donors may yield a worse fit in fertility rate and other control variables compared to the case when all countries are utilized as the potential donors

[7]The list of the potential donor countries is: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, Ukraine. Figure A.1 in the Appendix plots the raw TFR data from Georgia and the aforementioned potential donor countries.

substantial with Georgia's TFR being almost 0.3 children higher, an increase of about 20 percent from the pre-intervention mean and 17 percent above the synthetic control unit. Pseudo p-values are also significant for 5 out of 6 years after the treatment.

We also present results for the crude birth rate per 1000, a more parsimonious estimator. The crude birth rate differs from TFR in that the latter controls for the age distribution of births and potential mothers; however, since the underlying population estimates may be erroneous, we turn toward the crude birth rate. Figure 5 shows the trend of Georgia's crude birth rate and its synthetic control unit. Similar to Figure 4 it shows that from 2008, the crude birth rate of Georgia increased substantially. Table A.5 and A.6 show the balance between Georgia and its synthetic counterpart and the weight each country receives. Table A.7 shows the estimated size of impact and the pseudo p-value of each year. The accumulated size of the treatment is substantial as it implies that from 2008 to 2013 there were 8.6 new additional births per 1000. In other words, there were approximately 38,000 additional births during this period as a result of the intervention. This is appreciably larger than the 20,000 or so baptisms conducted by Patriarch Ilia until 2013, suggesting that the intervention may have impacted lower-parity births as well.

The in-time placebo reinforces the validity and robustness of the main findings. The test is designed to ascertain whether the observed treatment effect manifests exclusively post actual implementation of the treatment. By hypothetically presuming that the treatment was instituted prior to the true treatment date, the test enables us to examine the credibility of the treatment effect. Essentially, the in-time placebo test helps in ensuring that the perceived effects are genuinely attributable to the treatment and not merely coincidental or attributed to pre-existing trends (Abadie et al., 2010). To test this, we run an in-time placebo test as if the treatment occurred in 2000 instead of 2007. Figures A.2 and A.3 accompanied by Tables A.8 - A.13 show that the estimated placebo effects between the fake treatment time and the actual treatment time are negligible, therefore bolstering our confidence in the significance of treatment effects, and supporting the conclusion that the increase in TFR and crude birth rate is in fact from 2008 i.e. after Patriarch Ilia II's announcement and not before[8].

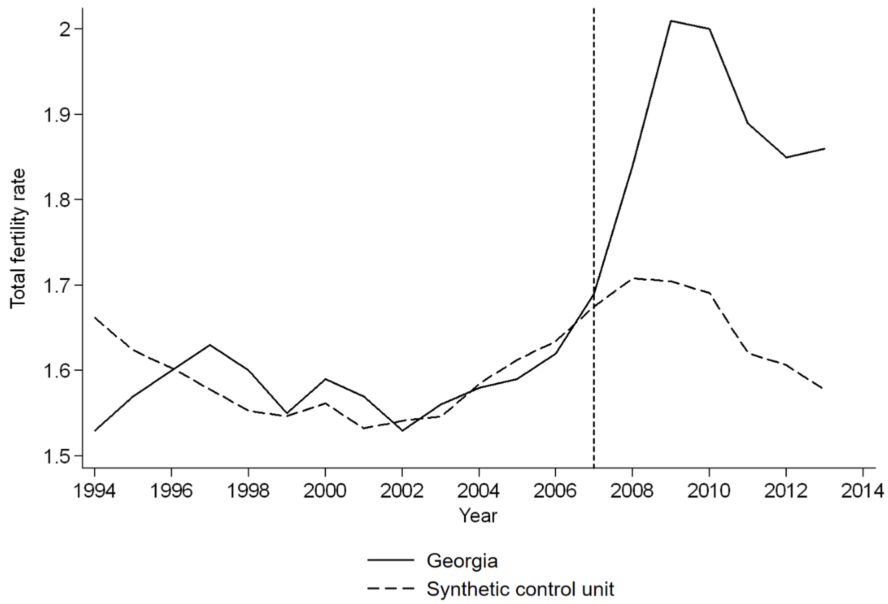


Figure 4: Total Fertility Rate comparison between Georgia and its synthetic control unit.

Note: Covariate balance, weights of countries in the synthetic control unit (Bosnia and Herzegovina, Estonia, Montenegro and Romania) and estimated size of the impact are provided in Tables A.2, A.3 and A.4.

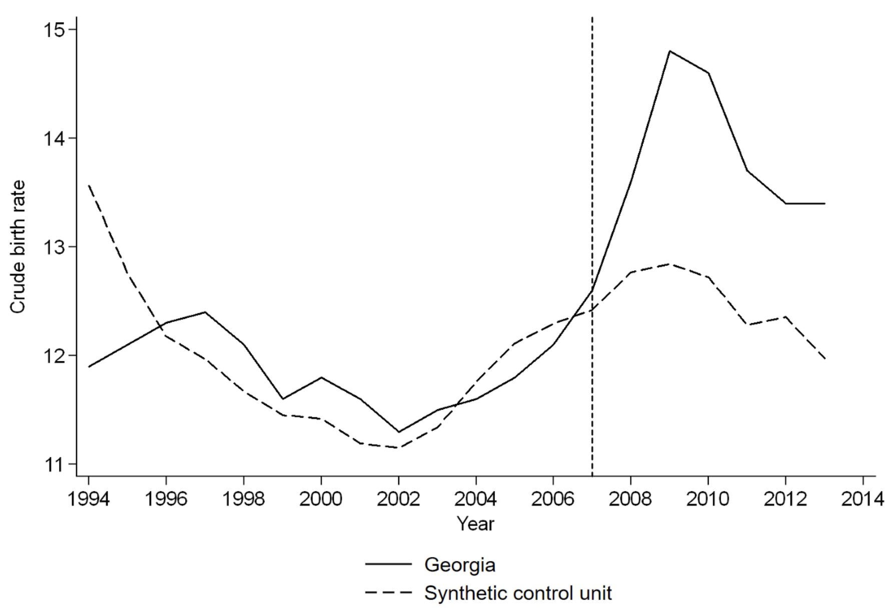
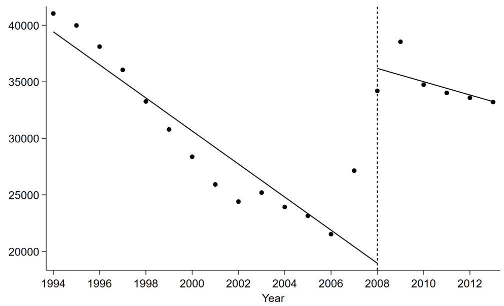
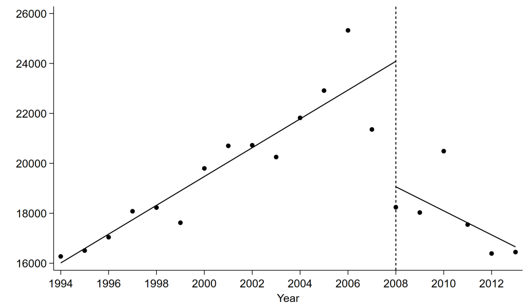


Figure 5: Crude birth rate per 1000 comparison between Georgia and its synthetic control unit.

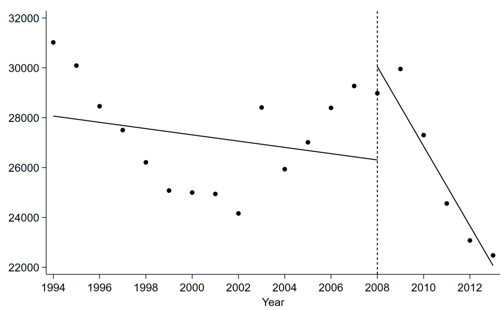
Note: Covariate balance, weights of countries in the synthetic control unit (Armenia, Azerbaijan, Estonia and Romania) and estimated size of the impact are provided in Tables A.5, A.6 and A.7.



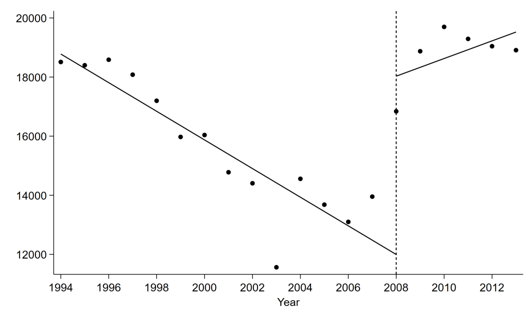
(a) Births in wedlock.



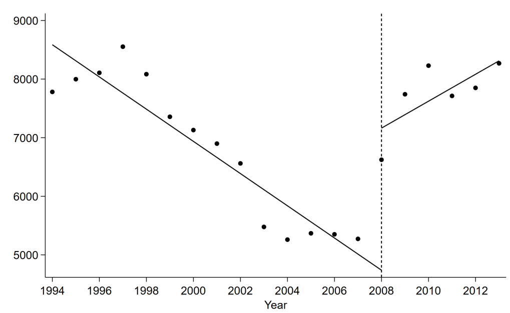
(b) Births out of wedlock.



(c) Annual births: 1st born.



(d) Annual births: 2nd born.



(e) Annual births: 3rd born or higher.

Figure 6: Interrupted Time Series: Figures a and b show the trend of annual births in and out of wedlock. Figures c, d and e show the trend of annual births by parity.

Note: Accompanied by Tables A.14 and A.15 which show the results by estimating specification (1).

4.2 Macro Evidence: Interrupted Time Series Method

Ideally one would like to use the synthetic control method for more nuanced indicators such as birth rates by age, parity, or marital status. However, paucity of data for many of the possible donor countries makes this challenging. To overcome this we use the interrupted time series method to investigate the intervention's impact on birth rates by year, age group and parity. This approach tests whether there were large changes in age or parity-specific trends before and after the intervention[9]. We model the interrupted time series using the following:

$$\mathrm{Y}_t = \beta_0 + \beta_1 \mathrm{T} + \beta_2 \mathrm{X}_t + \beta_3 \left(\mathrm{T} \times \mathrm{X}_t\right) + \epsilon_t \tag{1}$$

Where, Y_t is the outcome variable we are interested in at time t. T is the time from the start of sample. X_t is a dummy variable which is 0 for the pre-intervention period and 1 for the post-intervention period, and ϵ_t is the error term. β_0 represents the baseline level at $T = 0$ and β_1 is the time trend coefficient for the change in outcome associated with a unit time increase representing the underlying pre-intervention trend. β_2 is the level change in the outcome variable after the intervention and β_3 represents the change in the slope post intervention. A concern here is autocorrelation as it may result in incorrect standard errors, even though this does not create a biased estimate. To deal with this problem, we use Newey-West standard errors in parentheses, and by using Cumby-Huizinga tests for autocorrelation, we allow the maximum possible lags to calculate the standard error (Turner et al., 2021).

We examine the impact of Patriarch Ilia II's announcement on annual births by parity and marital status. Tables A.14 and A.15 show the results by estimating specification (1). We find that second-parity and third (or higher) parity births increased post the Patriarch's intervention. In the case of births by marital status, births in wedlock increased and births outside of wedlock in fact declined. Figure 6 highlights the trend of births by parity and marital status. The large level shifts observed in births by parity and marital status are a strong match to the baptism policy targets the Patriarch had in mind. In the next sub-section we explore these trends using individual level survey data.

[8] The following variables are utilized to derive a synthetic control unit for the in-time placebo test: TFR (or crude birth rate when used as a substitute for TFR) averaged from 1994 to 2000, with specific data points in 1994, 1997, and 2000; ratio of female to male labor force participation rate in 2000; average years of schooling females in 2000; log (GDP PPP per capita) in 2000; urbanization rate in 2000 and growth rate of GDP per capita from 2000 to 2010.

[9] Interrupted time series method is used in the case when there is only one series before and after the intervention or treatment (Bernal et al., 2017; McDowall et al., 2019)

4.3 Micro Evidence: Difference-in-Differences Estimation

In order to validate that the effects estimated in the macro approaches described above are indeed caused by the baptism announcement, we next turn to micro-level evidence which allows us to more precisely identify the treatment group. Using MICS household survey data, in this section, we estimate the causal impact of the unexpected announcement by Patriarch Ilia II in December 2007 on Georgian women's fertility by estimating the following difference-in-differences (DID) specification :

$$\mathrm{Y}_{ijrt} \quad = \quad \beta_0 + \beta_1\,(\mathrm{Treated}_{ijr} \times \mathrm{Post}_t) + \gamma\,\mathbf{X}_{it} + \alpha_i + \theta_t + \psi_{rt} + \epsilon_{irjt} \tag{2}$$

where Y_{ijrt} is the fertility outcome for a woman i of religion j from region r in year t. $\mathrm{Treated}_{ijr}$ takes the value of 1 for women that belong to the Georgian Orthodox faith and 0 for others. As the announcement was in December 2007, Post_t is a time dummy that takes the value 1 for years post 2007 and 0 for the years prior. Our main coefficient of interest is β_1 which captures changes in fertility outcomes between the treated (Georgian Orthodox) and control (other religions) group post Patriarch Ilia II's announcement i.e. β_1 is the average treatment effect on the treated (ATT). The specification includes a rich set of fixed-effects: θ_t year fixed effects to account for common time trends such as the information available to all women affecting the common evolution of fertility choices such as the global financial crisis. The individual fixed effects α_i which absorbs all differences across women due to time-invariant characteristics like ethnicity, literacy etc. To further strengthen the identification, we also include ψ_{rt} region $\times$ year fixed effects. These control for non-linear time trends specific to each of the eleven regions, capturing annual regional variation through the sample period. Finally, to isolate the effect of the announcement and to control for factors that maybe correlated with it and may impact the fertility decisions of women we also include a vector of controls $\mathbf{X}$: age group the woman i falls in year t and the lagged family size i.e. the total number of children in year $t-1$.[10]

To estimate the impact of this announcement on fertility outcomes we focus on four key indicators. Since the Patriarch's program exclusively targeted *married* Georgian Orthodox women and 3$^{\text{rd}}$ or

[10]Our identification strategy with FE does not control for any confounders/omitted variables that change within mothers overtime. One factor that influences decision to have a child is the number of existing children, which are changing over time for a women based on her births. We therefore include this as a control variable in our analysis. Lastly, women's fertility changes over her lifetime, which can impact not just her preference for children but also her ability to have children, independent of our announcement. We therefore account for this time varying effect by the age group variable that identifies the age group a women is at a particular year.

higher born children, the first outcome we investigate is the "Probability of giving birth to a 3rd or higher child in wedlock". To capture the overall effect of the announcement on fertility the second outcome we look at is the "Probability of giving birth in wedlock" which addresses the fact that women might have 1st or 2nd born children as part of a long term strategy to eventually access the prestigious 3rd child baptism; or they may resume fertility and have 4th or 5th order child to benefit from baptism. Figure B.1 in Appendix B plots the changes in probability of having 1st, 2nd, and 3rd child over time. Part B.1a shows a clear spike in births happening for 3rd child and part B.1b which plots the 5-year moving average shows that the increase is only sustained for the 3rd child overtime. This provides a good rationale for us to focus on the "Probability of giving birth to a 3rd or higher child in wedlock" as the primary outcome for our analysis.

Another key target of the Patriarch's campaign was to reduce the significantly high levels of abortion in Georgia where it was often used as the main source of contraception (Karpov and Kääriäinen, 2005). Therefore, the third indicator is the "Probability of having an abortion in wedlock" as it represents a desire to avoid having additional children.[11] Finally, we expand our sample to all women irrespective of their marital status and study the "Probability of getting married" which explores if Georgian Orthodox women adjusted their marital status in response to the intervention. In the appendix Table B.2 we show robustness of our results for the first three indicators by relaxing the constraint of measuring the outcomes within wedlock.

Results from specification 2 for the main DID estimate i.e. "**Treated** $\times$ **Post**" are shown in Table 1. Column 4 of Panel A indicates that for Georgian Orthodox women, post the Patriarch's announcement, there was a 1.3 percentage points increase in the probability of giving birth to a 3rd or higher child in wedlock compared to the control group women prior to the announcement. In relative terms, the propensity to have a third or greater child rises by 100 percent (relative to the mean of the dependent variable, which stands at 1.3 percent). Panel B of Table 1 presents the announcement effect on the probability of giving birth in wedlock in a given year. The estimate is sizeable and significant indicating that Georgian Orthodox women saw an increase in the propensity to have a *any* child by 3.5 percentage points. In relative terms, the propensity to have a child rises by 42 percent (relative to the mean of the dependent variable, which stands at 8.4 percent). This, in turn, translates into approximately 30-40,000 additional births 2008-2013 vs. a counterfactual scenario in which pre-treatment birth rates are held constant.

Table 2 reports on the other outcomes of our interest. The first column shows the impact of the announcement on the probability of having an abortion in wedlock by Georgian Orthodox women as compared to the control group in a given year. We can see that the announcement significantly reduced the use of abortions within married women indicating an increased desire to have children. The second column shows that the announcement led to a positive and significant

[11] It is important to note that abortion history is self-reported and may not be perfectly accurate.

impact on number of Orthodox women choosing to be married. All these results put together show that the announcement by Patriarch Ilia II was successful in achieving its intended effect i.e. increasing fertility and children born within marriage. In table B.2 columns 1, 2, and 3 report results on "Probability of giving birth to a 3^{rd} or higher order child", "Probability of giving birth", and "Probability of having an abortion" from our main specification but relaxing the condition that births or abortions happened in a wedlock. We find that the condition of wedlock does not alter our main results, indicating that our results are robust to different outcome specification.

Our DID estimation strategy relies on the underlying assumption that the average outcome among the treated and the control group follow parallel trends in the absence of the announcement and that the announcement has no causal effect before its implementation. Using an event study design we check both visually and statistically, whether there exist pre-existing differences in trends as a test of the plausibility of the parallel trends assumption. We use the following specification:

$$\text{Y}_{ijrt} \quad = \quad \beta_0 + \sum_{t=-4, t\neq -1}^{10} \beta_t \ \cdot \ \text{Treated}_{ijr} \cdot \text{Year}_t + \gamma \, \mathbf{X}_{it} + \alpha_i + \theta_t + \psi_{rt} + \epsilon_{irjt} \tag{3}$$

Figure 7 (a) shows the conditional parallel trends of our DID estimator for probability of giving birth to 3^{rd} or higher order child in a wedlock over the period 2003 to 2017 and period $t = 0$ is the year of the announcement 2007.[12] We can see that the 3^{rd} or higher parity birth trends among the treatment and control group only started differing significantly from 2010 onward while they largely remain insignificant for periods before 2007 (pre-announcement period). Figure 7 (b) shows the conditional parallel trends of our DID estimator for probability of any birth in a wedlock. Here we see significant differences in births between treatment and control women only emerging right after year 2008 while years before the announcement remain largely insignificant. While existence of parallel trends lend some confidence in our estimation strategy, in the next sub-section we also run some robustness checks that could threaten the causality of our results as well as briefly discuss the data limitations.

[12]The years in our data correspond to the years where a woman is fertile in our sample i.e. 15-49.

Table 1: Difference-in-Differences Main results

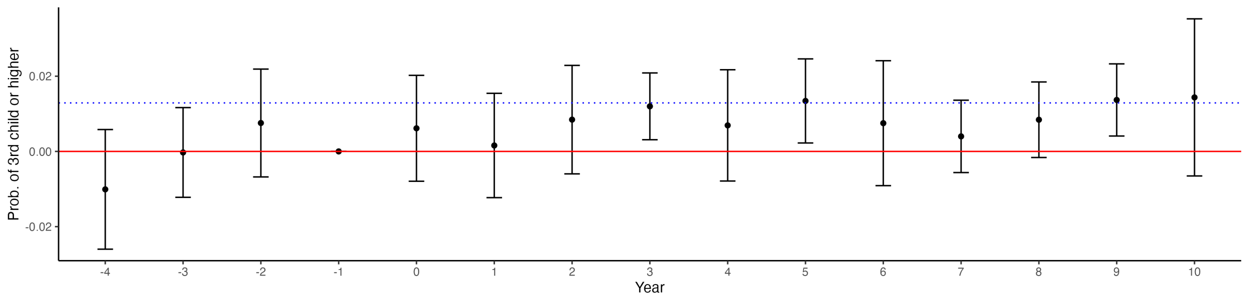
	(1)	(2)	(3)	(4)
Panel A: Probability of giving birth to a 3rd child or higher in wedlock.				
Treated × Post	0.0007	0.0108***	0.0107***	0.0129***
	(0.0012)	(0.0031)	(0.0029)	(0.0033)
Mean of Dep. Var.	0.013	0.013	0.013	0.013
Panel B: Probability of giving birth to a child in wedlock.				
Treated × Post	-0.0071	0.0502***	0.0470***	0.0354***
	(0.0053)	(0.0104)	(0.0097)	(0.0076)
Mean of Dep. Var.	0.084	0.084	0.084	0.084
Mother FE		Yes	Yes	Yes
Year FE		Yes	Yes	Yes
Region × Year FE			Yes	Yes
Controls				Yes
Observations	119,609	119,609	119,609	119,609
No. of women	6579	6579	6579	6579

Results use equation (2). The dependent variable in Panel A takes value 1 if the woman gave birth to a 3rd child or higher while married, and 0 otherwise; in Panel B the dependent variable takes value 1 if the woman gave birth to a child while married and 0 otherwise. Standard errors are wild cluster bootstrapped at the region and year level and presented in parenthesis. The controls include age group and lagged family size. *p<0.1; **p<0.05; ***p<0.01.

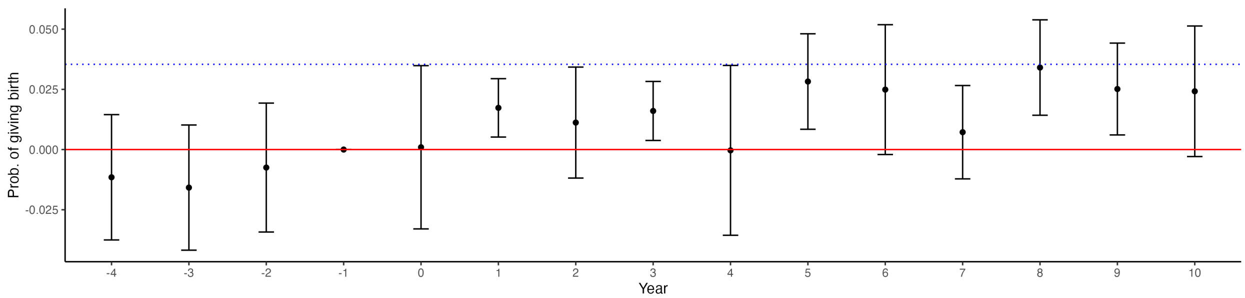
Table 2: Difference-in-Differences Additional Results

	Probability of:	
	having an abortion in wedlock	getting married
	(1)	(2)
Treated × Post	-0.0038*	0.1026***
	(0.0022)	(0.0235)
Observations	119,609	119,609
Mean of Dep. Var.	0.012	0.618

Results use equation (2). All columns control for age group, lagged family size, mother fixed effects, year fixed effects and region interacted with year fixed effects. The dependent variable in column (1) takes value 1 if the woman reports having an abortion while married, an 0 otherwise; in column (2) the dependent variable takes value 1 if the woman gets married and 0 otherwise in a given year. Standard errors are wild cluster bootstrapped at the region and year level and presented in parenthesis. *p<0.1; **p<0.05; ***p<0.01.



(a)



(b)

Figure 7: Event study estimates using (3). β_t captures the differential evolution of the fertility outcomes in treated and control group women over several years. The horizontal dotted blue line indicates the ATT. Figure shows the difference in the probability of giving birth to (a) 3^{rd} child or higher in wedlock and (b) any child in wedlock between Georgian Orthodox and non Georgian Orthodox women.

4.3.1 Robustness

In this sub-section, we test the validity and robustness of our micro evidence. Our estimation strategy accounts for any unobserved heterogeneity at the individual level, temporal effects and factors that vary over region and time. Further, we also include individual and time varying controls. However, there still may be some structural factors that might bias our estimates. As highlighted in the introduction and section 2.2, a key threat to our identification strategy is the 2008 Russo-Georgian war, as some prior literature has shown that exposure to conflict and wars often leads to changes in fertility (Urdal and Che, 2013).

Patriarch Ilia's intervention occurred eight months prior to Georgia's defeat during Russia's August 2008 invasion of sovereign Georgian territory. This war was a severe trauma for the Georgian society, yielding over 190,000 displaced individuals, including over 30,000 who were permanently displaced (Amnesty International, 2008). Several hundred Georgian civilians were killed in documented war crimes, and Georgian prisoners of war reported instances of torture. Moreover, this war led to thousands of ethnically-Georgian refugees fleeing from South Ossetia and Abkazia into Georgia.

This population may have had differential fertility themselves. This could potentially account for some small number of increased births between 2008 and 2014, however after 2014 such individuals would have been accounted for in the census. Beyond these direct effects, the war may have altered Georgian public opinion or ideation in difficult-to-foresee ways. In particular, the war may have increased the salience of national identity. We check for the war effects in three ways: first we interact the main DID estimator with the identifier if the mother is an internally displaced person (IDP), second we drop the regions that were bombed by Russia from our analysis and finally we employ a triple difference estimator.

The MICS dataset includes women who report that they are internally displaced at the time of the interview. To check if the war confounds our treatment effect we interact our DID estimator with a binary indicator for IDP mothers. While it is possible that war could have impacted the fertility choices of non displaced individuals as well, the impact of war is most likely to be highest/most intense on those that were displaced. If this is the case then we would expect significant effect of the IDP women on fertility and not just the treated women exposed to the announcement. This would then imply that the triple interaction with IDP women "**Treated** $\times$ **Post** $\times$ **IDP**" would be significant. Results for this estimation are shown in columns (1) and (2) of Table 3. We observe that while the primary DID estimator "**Treated** $\times$ **Post**" continues to be highly significant and remains largely unchanged in its magnitude, the coefficient for the triple interaction "**Treated** $\times$ **Post** $\times$ **IDP**" is not significant indicating that Georgian Orthodox women who were impacted by war did not change their fertility differently from the non-Georgian Orthodox women who were not impacted by the war, prior to the Patriarch's announcement. Moreover, it is of note that "**Post** $\times$ **IDP**" is also not significant indicating that the control group i.e. the non-Georgian Orthodox women who were exposed to the conflict *also* did not change their fertility differently from those who were not exposed, prior to the intervention. This evidence suggests that mothers, belonging to either groups, affected by war did not change their fertility due to conflict exposure.

An additional feature of this war was that the Russian air force attacked targets both within and beyond the conflict zone. Utilizing this, we estimate specification (2) but exclude from the sample the regions that were bombed, which includes the capital city Tbilisi which was notably affected. Areas bombed are more heavily impacted by the war and thus could significantly change the residents' fertility trend. Moreover, bombed regions were likelier to have larger Georgian Orthodox majorities. Thus, this robustness check implicitly assesses the effect both of excluding the most war-impacted regions and the regions with the largest Georgian Orthodox population shares. If the most war-exposed and most ethnically Georgian regions responded to the war with differentially higher fertility, then it should be the case that the DID estimator should become appreciably less significant when we drop these regions. Results are reported in columns (3) and (4), where we can see that the coefficient for "**Treated** $\times$ **Post**" remains robust to exclusion of these regions.

While the evidence presented above and in section 2.2 lend support to the theory that the 2008 Russo-Georgian war was not driving the post 2007 fertility boom observed in Georgia, however, one cannot completely rule out possible dynamic effects of war and wartime mobilization. Below we present results from triple difference estimation to counter the effect, if any, of the war on fertility and the possible bias in parallel trends that it creates for robust DID estimation. Additionally, it is important to also highlight the limitations of our estimation approach. Georgian Orthodox women represent over 80 percent of the sample and of Georgia's population. If all Orthodox women adopt a new fertility norm, it would therefore become normative throughout the vast majority of Georgian society. Untreated ethno-religious minorities may internalize that norm, or even undertake strategic fertility competition as envisioned in Bezin et al. (2018). Thus, since the Patriarch's intervention targets the vast majority of the population who might themselves exert influence on the norms and behaviors of the control group, we likely underestimate true effect sizes.

Triple Difference: Triple difference or "difference-in-difference-in-differences" (DDD) estimator is often used when the parallel trends assumption is violated in a DID estimation (Muralidharan and Prakash, 2017; Wing et al., 2018). This approach is useful when there exists some time-varying confounder that changes differentially across the treatment and control groups. DDD requires identifying two other groups of mothers that exist in both treatment and control groups such that only one group of these mothers are exogenously impacted by the announcement. The difference between the new groups within each treatment and control groups differences out any confounders impacting the groups differentially.

For our DDD estimation we additionally compare mothers who in 2007 were married and had 2 or more children and hence could be the first to benefit from the announcement. We call this group of mothers "**Parity at risk 3+**" implying that they were in 2007 at risk of having 3^{rd} or higher parity births. We then compare these mothers to those who in 2007 were married and had one or no children. Since being a mother with 2 or more children at the time of announcement is quasi-random, it provides an additional exogenous variation to the estimation which further strengthens the quasi-experimental nature of this estimation.

The underlying assumption with the DDD estimation is that while mothers in our treatment or control group could differentially be impacted by confounders, mothers with "**Parity at risk 3+**" children in 2007 and mothers with "**Parity at risk 2**" children are not differentially impacted. The triple difference estimator then takes the difference over time of these two parity at risk groups within the treatment and control groups, and then the difference between the treatment and control estimates. By first taking the difference between the additional two groups over time eliminates any diffrerential trends and confounders that bias comparison between our treatment and control groups. Then taking the difference of these two groups within the treatment and control groups provides an unbiased estimate of the announcement.

This approach is especially useful as it helps eliminate the effect of a shock such as war that could impact the outcome of interest in one group after the announcement. For instance if the war had a differential impact on the Georgian Orthodox mothers then the difference between mothers under "**Parity at risk 3+**" in 2007 and their counterpart eliminates this effect within the estimation. The triple difference model that we estimate is as follows:

$$
\begin{aligned}
\mathrm{Y}_{ijrt} &= \beta_0 + \beta_1 \left(\text{Treated}_{ijr} \times \text{Post}_t \times \text{Parity at risk } 3+_{ijr}\right) \\
&+ \beta_2 \left(\text{Treated}_{ijr} \times \text{Post}_t\right) + \beta_3 \left(\text{Post}_t \times \text{Parity at risk } 3+_{ijr}\right) \\
&+ \beta_4 \left(\text{Treated}_{ijr} \times \text{Parity at risk } 3+_{ijr}\right) + \gamma \, \mathbf{X}_{it} \\
&+ \alpha_i + \theta_t + \psi_{rt} + \epsilon_{irjt} \qquad (4)
\end{aligned}
$$

where Y_{ijrt} is probability of giving birth for a married woman i of religion j from region r in year t. Treated_{ijr} takes the value of 1 for women that belong to the Georgian Orthodox faith and 0 for others. Parity at risk $3+_{ijr}$ takes the value 1 for married mothers who had 2 or more children in 2007 and the years prior, and 0 for those who had one child or less. Similar to specification (2) Post_t is a time dummy that takes the value 1 for years post 2007 and 0 for the years prior. Our main coefficient of interest is β_1 which is our triple difference estimator.

The results of the estimation are presented in Table 4 where column (1) shows the main DID result for ease of comparison and column (2) shows the DDD estimation. The triple difference coefficient of "**Treated** × **Post** × **Parity at risk 3+**" shows that Georgian Orthodox women who had 2 or more children in 2007 or years prior were 2.8 percentage points more likely to give birth after the announcement compared to the control group women. This estimate is in line with our main DID results. The coefficient of "**Treated** × **Post**" is positive but not significant, implying that the announcement did not significantly impact births of treatment group women with 1 child or less. Finally, the negative and significant coefficient of "**Post** × **Parity at risk 3+**" indicates that post announcement the higher order births in the control group were significantly lower.

If the war was indeed the channel of increased fertility we would observe no differential impact on women who were at risk of having second or third and higher kids in 2007. However, we observe that the impact is significantly higher only for "**Parity at risk 3+**", the group that is targeted by the announcement. Therefore, the DDD results combined with the previous robustness checks indicate strongly that the changes in fertility observed were due to the announcement and not the war.

Table 3: Robustness Checks: 2008 Russo-Georgian War

	Probability of:			
	giving birth to 3rd child or higher wedlock		giving birth in wedlock	
	(1)	(2)	(3)	(4)
Treated × Post	0.0129**	0.0122***	0.0349***	0.0309***
	(0.0053)	(0.0026)	(0.0079)	(0.0079)
Post × IDP	-0.0007		-0.0202	
	(0.0347)		(0.0598)	
Treated × Post × IDP	0.0007		0.0225	
	(0.0350)		(0.0571)	
Observations	119,609	76,819	119,609	76,819
Sample	All	No war zones	All	No war zones

Results use equation (2). All columns control for age group, lagged family size, mother fixed effects, year fixed effects and region interacted with year fixed effects. Dependent variable is a dummy variable, for columns (1) and (2) takes value 1 if the woman gave birth to a 3^{rd} or higher child while married; and columns (3) and (4) takes value 1 if the woman gave birth to a child while married. IDP refers to internally displaced people. For columns (2) and (4) the following regions are dropped from the sample: Samegrelo and Zemo Svaneti, Shida Kartli and Tbilisi. Standard errors are wild cluster bootstrapped at the region and year level and presented in parenthesis. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table 4: Robustness: Triple difference estimation

	Probability of:	
	giving birth in wedlock	giving birth in wedlock
	(1)	(2)
Treated × Post	0.0354***	0.0044
	(0.0076)	(0.0095)
Post × Parity at risk 3+		-0.1222***
		(0.0215)
Treated × Post × Parity at risk 3+		0.0281**
		(0.0124)
Observations	119,609	119,609

Results use equation (4). Both columns control for age group, lagged family size, mother fixed effects, year fixed effects and region interacted with year fixed effects. Column (1) provides the baseline result from the DID estimation in Table 1 Panel B and column (2) shows the triple difference estimation. Parity at risk 3+ is a dummy variable for women with 2 or more children in 2007. Standard errors are wild cluster bootstrapped at the region and year level. *p<0.1; **p<0.05; ***p<0.01.

4.3.2 Heterogeneous Impact

The results presented so far show that Patriarch Ilia's announcement led to a significant increase in 3rd order births as well as overall births among the treatment group women. In this and the next subsection we try to unpack this result to understand possible mechanisms for this change. We start by first exploring if the increased births are due to changes in how families plan their fertility, indicated by timing of first birth or if the announcement changed their fertility preferences. Given the data limitations, which we discuss below, we are unable to assert any causal connections regarding potential mechanisms. Instead, we use existing evidence to understand the possible changes to fertility decisions and behaviours that the announcement caused.

We start by first testing our main specification in equation (2) on only a subset of women who were married prior to 2008 i.e. before the patriarch's announcement. Since the baptismal policy dynamically impacts the timing of a woman's decision to marry, looking at the sub-sample of women married prior to the announcement allows us to estimate the effect on fertility decisions on the sample of women who were not persuaded to marry due to this announcement. We find that in columns (1) and (2) of Table 5 the probability of having 3rd or higher order birth as well as any birth increases significantly.

One of the most common indicators for studying fertility is the age at first birth. Women who commence childbearing later may tend to have fewer children as the number of years available to them during their fertility cycle to bear children is reduced. Our main specification shown in equation (2) is unable to detect the effect of the announcement on this fertility indicator, as the age at first birth for a mother does not vary over time and hence gets wiped out by individual level fixed effects. To understand if the announcement changed the timing when a woman starts her child bearing, and also the timing of her marriage, we estimate equation (2) without individual level fixed effects but continue to include region $\times$ year fixed effects to control for any unobservable cultural, religious and other preferences varying across regions over time impacting the decision of age at first birth and marriage. The year in these estimations referes to either the year when the woman has her first child in the case of age at first birth estimation or the year of her marriage for the timinig of marriage estimation. Specifically the coefficient of Treated $\times$ Post will capture the difference in average age at first birth/ age at marriage for treatment and control groups in the years after the announcement compared to years before the announcement.

Columns (3) and (4) of Table 5 report results for age at first birth and age at marriage respectively. We see that the coefficient for column 3 is negative and significant in age at first birth. This indicates that women in treatment group are more likely to start their fertility earlier than those in the control group and their treatment counterparts prior to the announcement. Column 4 shows the results for age at marriage, which is also negative and significant. This result reflects that treatment group women not only start having children at a younger age, they are also more likely to marry at a younger age too, a behaviour likely to increase overall fertility.

Table 5: Exploring heterogeneity.

	Probability of:			
	giving birth to 3^{rd} & higher child in wedlock	giving birth in wedlock	Age at 1^{st} birth	Age at marriage
	(1)	(2)	(3)	(4)
Treated × Post	0.0168***	0.0404***	-0.3678**	-0.4764**
	(0.0038)	(0.0067)	(0.1759)	(0.2130)
Treated			0.9270***	1.237***
			(0.2298)	(0.2816)
Observations	76,417	76,417	96,443	109,040
Individual FE	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes
Sample	women married prior to announcement	women married prior to announcement	married and gave birth	married

Columns (1) and (2) use specification (2) for sub sample of women who were married prior to 2008. The dependent variables are dummy, in column (1) it takes the value 1 if the woman gave birth to a 3^{rd} child while married; and in column (2) it takes the value 1 if the woman gave birth to a child while married. Columns (3) and (4) report results without the individual fixed effects but includes region fixed effects for women who are married and for column (3) also gave birth to a child. The dependent variables in columns (3) and (4) are continuous and indicate the age at which the woman gave birth to her first child and the age at which she got married. Standard errors are wild cluster bootstrapped at the region and year level and presented in parenthesis. The controls include age group and lagged family size. *p<0.1; **p<0.05; ***p<0.01.

4.3.3 Changes in Fertility Preferences

One possible channel, discussed above, that explains increased births among treatment women after the announcement is early marriage and early child bearing. Due to paucity of data, we do not postulate any specific mechanism or channel of effect for the change in fertility trends, however, it may be that stated fertility preferences may also be the key motivations for those changes observed. Therefore, in this section we discuss and assess the descriptive evidence available for fertility preferences in Georgia. This evidence is presented in purely descriptive format without causal inference because cross-country fertility preference data is insufficiently regularized to enable a synthetic control approach, and individual-level time-varying preferences are sparsely reported in our micro-level sample.

To begin with, Figure 8 shows the results of all known surveys of family size preferences in Georgia with the pre- and post-treatment periods identified. Pre-intervention, several surveys such as the 2003 Evolution of Reproductive Mood and Behavior survey and the 2005 Reproductive Health Survey found "general social ideals" i.e. answers to questions such as *How many children are ideal for a family to have?* were approximately 3 children per woman. This has remained the case post-intervention. One can note a similar stability for "personal ideals or desires" i.e. answers to questions such as *How many children would you personally like to have?*. Stated personal desires averaged 2.7 in the two post-independence surveys on this topic prior to the treatment, and averaged 2.7 in the three post-treatment surveys on this topic (personal ideals averaged 2.78 in the MICS 2018 sample that we use for this study). Thus, there was no identifiable change in the number of children respondents saw as normative or generally ideal before and after treatment, and also no change in the number of children they personally reported desiring. This suggests that at least on the level of conscious, deliberative values, Patriarch Ilia II's intervention did not have a large effect. Both before and after the intervention, Georgia was essentially a society characterized by a 3-child family ideal.

However, there has been a large change in fertility expectations i.e. answers to questions like *How many children do you expect you will actually have?* In the 2003 Evolution of Reproductive Mood and Behavior survey, Georgian women expected just 1.9 children, a figure which had risen to 2.45 in the 2014 Evolution of Reproductive Mood and Behavior survey, and 2.65 in the 2017 Study of Reproductive Mood and Behavior in Young People. The rise in expected fertility alongside no change in stated numeric preferences implies that the gap between the number of children Georgian women report desiring and the number they actually expect to have has shrunk appreciably. These results give us some insight into possible mechanisms of effect on Georgia's fertility increase between 2007 and the 2010s. Without a change in expressed values, persuasive or cultural effects on conscious attitudes and beliefs do not seem to be a potential channel. To the extent that Patriarch Ilia II's intervention altered fertility, it seems that it did not do so by persuading Georgian women to adopt larger family size ideals, norms, or desires. Rather, a possibility is that those women adjusted their consciously-held beliefs about what kinds of family outcomes were plausible and obtainable. If this change is causally related to the baptism campaign, then it could be that the baptism campaign altered public perceptions of family and social support, or altered perceived hedonic or social-status benefits of children, encouraging women to accept previously undesirable trade offs associated with childbearing.

Another possible channel could operate through stigmatization of abortion: the campaign could

Figure 8: Results of all known surveys of fertility desires, ideals, expectations, and intentions ever conducted in Georgia.

Note: Adapted from Stone (2019). The following surveys have been used - Evolution of Reproductive Mood and Behavior (2003, 2014), VCIOM 1992, World Value Survey 1996, Caucasus Barometer (2010, 2011, 2012, 2013, 2015, 2017 and 2019), Reproductive Health Survey (1999, 2005, 2010), Study of Reproductive Mood and Behavior in Young People 2017, MICS 2018.

have reduced abortion access and thus increased unwanted births. The 2005 and 2018 MICS waves include limited data on the wantedness of last-born children as well. We do not undertake formal analysis of this data for reasons outlined above, but we do observe that there was no significant change in the share of last-births to non-Georgian Orthodox women which were unwanted, while the unwantedness share actually declined for Georgian Orthodox women. This suggests that decreasing abortion access and increased unwanted childbearing is not the most likely effect channel.

5 Conclusion

This paper investigates the influence of a religion based intervention on fertility decisions of women in industrialized, educated and low-fertility society. Specifically, it shows that active promotion of higher fertility by the Georgian Orthodox Church's Patriarch Ilia II's through his announcement to personally baptize any third- or higher parity child born to married Georgian Orthodox parents had a significant positive impact on the total fertility rate of Georgia. Macro (synthetic control) and micro (difference in difference) estimates yield highly compatible magnitudes of effect: approximately 38,000 additional births 2008-2013 estimated from macro models, and 30-40,000 from micro models. The striking results of these increases are readily visible in the figures shown above for Georgian fertility rates. These results are driven by increased fertility, specially for 3$^{\text{rd}}$ parity births within marriage, as well as increased marriage (and reduced abortion) among Georgian Orthodox women. This paper also shows that this increase in fertility is due to changes in behaviour as captured by early marriage and child-bearing among treatment group women rather than a change in consciously-reported preferences or increased unwanted childbearing; though fertility expectations did rise. These results suggest that the effect of the announcement did not operate by persuading individuals to adopt different conscious, explicit valuations of childbearing. Rather, it appears that women adjusted their intentions for childbearing to benefit from the baptism campaign.

These results imply that religion still plays an important role in shaping the fertility decisions of families in many industrialized, educated societies. Even though Georgia is a highly religious society compared to many developed post-demographic transition countries, many countries still have a large religious populations whose demographic behaviors might be responsive to the influence of religious authorities. Beyond religion, this study, in combination with the wider literature on social influence and fertility, suggests that demographic behaviors writ large may be sensitive to elite or celebrity discourse and role modeling, as these factors may be an element of individual preference-formation. Given the success of this initiative and the high costs relative to fertility increases observed for many pro-natal government fiscal policies, governments might consider the potential power of public discourses and role model effects among religious and nonreligious elites as a pathway to more effective pro-natal policy.

Ethics Declaration.

Conflict of Interest:

The authors declare that they have no conflict of interest.

References

Abadie, A., A. Diamond, and J. Hainmueller (2010). Synthetic control methods for comparative case studies: Estimating the effect of california's tobacco control program. *Journal of the American statistical Association 105*(490), 493–505.

Abadie, A., A. Diamond, and J. Hainmueller (2015). Comparative politics and the synthetic control method. *American Journal of Political Science 59*(2), 495–510.

Agadjanian, V. and N. Prata (2002). War, peace, and fertility in angola. *Demography 39*(2), 215–231.

Aksoy, O. and F. C. Billari (2018). Political islam, marriage, and fertility: evidence from a natural experiment. *American Journal of Sociology 123*(5), 1296–1340.

Alfano, M. (2022). Islamic law and investments in children: Evidence from the sharia introduction in nigeria. *Journal of Health Economics 85*(September).

Amnesty International, I. (2008). Georgia/russia: Civilians in the line of fire: The georgia-russia conflict.

Bassi, V. and I. Rasul (2017). Persuasion: A case study of papal influences on fertility-related beliefs and behavior. *American Economic Journal: Applied Economics 9*(4), 250–302.

Basu, A. M. (2002). Why does education lead to lower fertility? a critical review of some of the possibilities. *World Development 30*(10), 1779–1790.

Becker, S. O. and F. Cinnirella (2020). Prussia disaggregated: the demography of its universe of localities in 1871. *Journal of Demographic Economics 86*(3).

Bergsvik, J., A. Fauske, and R. K. Hart (2020). Effects of policy on fertility: A systematic review of (quasi) experiments. *Statistics Norway, Research Department* (Discussion Papers, No. 922).

Berman, E., L. R. Iannaccone, and G. Ragusa (2018). From empty pews to empty cradles: Fertility decline among european catholics. *Journal of Demographic Economics 84*(2).

Bernal, J. L., S. Cummins, and A. Gasparrini (2017). Interrupted time series regression for the evaluation of public health interventions: a tutorial. *International journal of epidemiology 46*(1), 348–355.

Bezin, E., B. Chabé-Ferret, and D. de la Croix (2018). Strategic fertility, education choices, and conflicts in deeply divided societies. *CEPR Discussion Paper* (DP13412).

Castro Torres, A. F. and B. P. Urdinola (2019). Armed conflict and fertility in colombia, 2000–2010. *Population Research and Policy Review 38*(2), 173–213.

Center for Insights in Survey Research (2023). Georgian survey of public opinions. Available online at: https://www.iri.org/resources/national-public-opinion-survey-of-residents-of-georgia-march-2023/.

Cetorelli, V. (2014). The effect on fertility of the 2003–2011 war in iraq. *Population and development review 40*(4), 581–604.

Crego, P. (2014). The georgian orthodox church. In *Eastern Christianity and politics in the twenty-first century*, pp. 140–160. Routledge.

Dharmalingam, A. and S. P. Morgan (2004). Pervasive muslim-hindu fertility differences in india. *Demography 41*(3), 529–545.

Doepke, M., A. Hannusch, F. Kindermann, and M. Tertilt (2023). The economics of fertility: A new era. In *Handbook of the Economics of the Family*, Volume 1, pp. 151–254. Elsevier.

Esslemont, T. (2009). Church leader sparks georgian baby boom. Available online at: http://news.bbc.co.uk/1/hi/world/europe/7964302.stm, last accessed on 31.01.2023.

Euronews (2020). 500 babies baptised in georgian mass ceremony. Available online at: https://www.euronews.com/2020/01/16/watch-500-babies-baptised-in-georgian-mass-ceremony, last accessed on 31.01.2023.

Farina, E. and V. Pathania (2020). Papal visits and abortions: evidence from italy. *Journal of Population Economics 33*(3), 795–837.

Floridi, G., M. Gargiulo, and J. M. Aburto (2023). Changes in fertility rates and desires in the wake of the homicide surge in mexico. *Retrieved from osf. io/preprints/socarxiv/mf9eb*.

Harper, S. (2014). Economic and social implications of aging societies. *Science 346*(6209), 587–591.

International Centre on Conflict and Negotiation (2008). Opinion of the population of tbilisi on the political developments in georgia.

Interpress (2020). The 63rd general baptism took place in the courtyard of the trinity cathedral.

Iyer, S. (2016). The new economics of religion. *Journal of Economic Literature 54*(2), 395–441.

Jardine, B. (2017). Georgia's baby boom and the union of church and birthrate. Available online at: https://eurasianet.org/georgias-baby-boom-and-the-union-of-church-and-birthrate, last accessed on 31.01.2023.

Karpov, V. and K. Kääriäinen (2005). "abortion culture" in russia: its origins, scope, and challenge to social development. *Journal of Applied Sociology* (2), 13–33.

Kaufmann, E. (2010). *Shall the religious inherit the Earth?* Profile Books.

Kearney, M. S., P. B. Levine, and L. Pardue (2022). The puzzle of falling us birth rates since the great recession. *Journal of Economic Perspectives 36*(1), 151–76.

Kebede, E., A. Goujon, and W. Lutz (2019). Stalls in africa's fertility decline partly result from disruptions in female education. *Proceedings of the National Academy of Science 116*(8).

Lanchava, L. (2014). Does religious activity affect childbearing decisions? the case of georgia. *The Case of Georgia (December 1, 2014). CERGE-EI Working Paper Series* (521).

Lehrer, E. L. (1996). Religion as a determinant of marital fertility. *Journal of Population Economics 9*(2), 173–196.

Lesthaeghe, R. (2014). The second demographic transition: A concise overview of its development. *Proceedings of the National Academy of Sciences 111*(51), 18112–18115.

Lesthaeghe, R. (2020). The second demographic transition, 1986–2020: sub-replacement fertility and rising cohabitation—a global update. *Genus 76*(1), 1–38.

Lindskog, E. E. (2016). The effect of war on infant mortality in the democratic republic of congo. *BMC public health 16*(1), 1–10.

Macunovich, D. J. (1996). Relative income and price of time: Exploring their effects on us fertility and female labor force participation. *Population and Development Review 22*, 223–257.

Malak, N., M. M. Rahman, and T. Yip (2019). Baby bonus, anyone? examining heterogeneous responses to a pro-natalist policy. *Journal of Population Economics 32*, 1205–1246.

McDowall, D., R. McCleary, and B. J. Bartos (2019). *Interrupted time series analysis*. Oxford University Press.

Mosher, W. D., L. B. Williams, and D. P. Johnson (1992). Religion and fertility in the united states: New patterns. *Demography 29*(2), 199–214.

Muralidharan, K. and N. Prakash (2017). Cycling to school: Increasing secondary school enrollment for girls in india. *American Economic Journal: Applied Economics 9*(3), 321–350.

Okun, B. S. (2017). Religiosity and fertility: Jews in israel. *European Journal of Population 33*, 475–507.

Prettner, K. (2013). Population aging and endogenous economic growth. *Journal of population economics 26*, 811–834.

Sato, Y. and K. Yamamoto (2005). Population concentration, urbanization, and demographic transition. *Journal of Urban Economics 58*(1), 45–61.

Sobotka, T., A. Matysiak, and Z. Brzozowska (2019). Policy responses to low fertility: How effective are they. *United Nations Population Fund*.

Stone, L. (2019). The global fertility gap. *Institute for Family Studies*.

Tembon, M., W. Fengler, and A. Kruse (2018). Georgia's destiny will be shaped by its demography. Available online at: https://www.brookings.edu/blog/future-development/2018/05/09/georgias-destiny-will-be-shaped-by-its-demography/, last accessed on 31.01.2023.

Tsuladze, G., N. Maglaperidze, and A. Vadachkoria (2002). Demographic overview of georgia (1960-2000). *United Nations Population Fund*.

Turner, S. L., A. Karahalios, A. B. Forbes, M. Taljaard, J. M. Grimshaw, and J. E. McKenzie (2021). Comparison of six statistical methods for interrupted time series studies: empirical evaluation of 190 published series. *BMC Medical Research Methodology 21*(1), 1–19.

Urdal, H. and C. P. Che (2013). War and gender inequalities in health: the impact of armed conflict on fertility and maternal mortality. *International Interactions 39*(4), 489–510.

Wang, L. C. (2020). Religious prohibition and sacrifice: evidence from the amish restriction on high school education. *Journal of Demographic Economics 86*(3).

Wing, C., K. Simon, and R. A. Bello-Gomez (2018). Designing difference in difference studies: best practices for public health policy research. *Annual review of public health 39*, 453–469.

Zaidi, B. and S. P. Morgan (2017). The second demographic transition theory: A review and appraisal. *Annual review of sociology 43*, 473–492.

Zhang, L. (2008). Religious affiliation, religiosity, and male and female fertility. *Demographic Research 18*, 233–262.

A Appendix - Macro Evidence

Table A.1: Summary statistics for macro-evidence.

	Obs	Mean	Std. Dev.	Min	Max
Total fertility rate (1994-2013)	22	1.59	0.29	1.34	2.67
Crude birth rate (1994-2013)	22	12.71	3.64	9.40	21.90
Ratio of female to male labor force participation 2000	22	76.55	7.25	59.17	92.12
Ratio of female to male labor force participation 2007	22	75.82	7.15	54.12	87.95
Avg. years schooling females 2000	22	9.74	1.80	4.70	12.32
Avg. years schooling females 2007	22	10.71	1.87	5.73	13.87
Log (GDP PPP per capita) 2000	22	8.79	0.54	7.89	9.80
Log (GDP PPP per capita) 2007	22	9.50	0.46	8.64	10.22
Urbanization rate 2000	22	59.64	9.89	41.74	73.99
Urbanization rate 2007	22	60.65	9.50	42.71	73.55
Growth rate of GDP per capita (2000-2010)	22	0.51	0.19	0.20	0.89
Growth rate of GDP per capita (2007-2016)	22	0.51	0.19	0.20	0.89

For Georgia, the data has been obtained from The National Statistics Office of Georgia (GEOSTAT) and for the donor countries the data has been taken from World Development Indicators by World Bank. The total fertility rate in a specific year is defined as the total number of children that would be born to each woman if she were to live to the end of her child-bearing years and give birth to children in alignment with the prevailing age-specific fertility rates. The crude birth rate is the ratio between the number of live births in a population during a given year and the total mid-year population for the same year, usually multiplied by 1000. Therefore, crude birth rate depends on the population structure (higher female share in total population implies higher crude birth rate naturally). However, TFR doesn't depend on the population structure, thus is a better measure of fertility rate and the main outcome as we don't want to conflate the impact of Patriarch's announcement and the change of age structure.

Table A.2: Covariate balance between Georgia and its synthetic control for TFR outcome.

Variables	Treated	Synthetic
Total Fertility Rate (average 1994-2007)	1.58	1.58
Total Fertility Rate 2007	1.69	1.68
Total Fertility Rate 2000	1.59	1.56
Total Fertility Rate 1997	1.63	1.58
Total Fertility Rate 1994	1.53	1.66
Ratio of female to male labor force participation 2007	73.54	75.42
Avg. years schooling females 2007	12.41	11.27
Log (GDP PPP per capita) 2007	8.83	9.64
Urbanization rate 2007	54.38	62.31
Growth rate of GDP per capita (2007-2016)	0.89	0.51

Accompanying Figure 4, the table shows covariate balance between Georgia and its synthetic control unit consisting of Bosnia and Herzegovina, Estonia, Montenegro and Romania.

Table A.3: Weight of countries in the synthetic control for TFR outcome.

Country	Weight
Bosnia and Herzegovina	0.05
Estonia	0.363
Montenegro	0.397
Romania	0.19

Accompanying Figure 4.

Table A.4: Estimated size of impact of treatment and pseudo p-value for TFR outcome.

Year	Estimates	Pseudo P-value
2008	0.132	0.143
2009	0.305	0.000
2010	0.309	0.000
2011	0.269	0.048
2012	0.243	0.095
2013	0.283	0.048

Accompanying Figure 4.

Table A.5: Covariate balance between Georgia and its synthetic control for crude birth rate outcome.

Variables	Treated	Synthetic
Crude birth rate (average 1994-2007)	11.85	11.91
Crude birth rate 2007	12.60	12.42
Crude birth rate 2000	11.80	11.42
Crude birth rate 1997	12.40	11.97
Crude birth rate 1994	11.90	13.56
Ratio of female to male labor force participation 2007	73.54	74.71
Avg. years schooling females 2007	12.41	10.65
Log (GDP PPP per capita) 2007	8.83	9.33
Urbanization rate 2007	54.38	58.61
Growth rate of GDP per capita (2007-2016)	0.89	0.59

Accompanying Figure 5, the table shows covariate balance between Georgia and its synthetic control unit consisting of Armenia, Azerbaijan, Estonia and Romania.

Table A.6: Weight of countries in the synthetic control for crude birth rate outcome.

Country	Weight
Armenia	0.385
Azerbaijan	0.033
Estonia	0.082
Romania	0.500

Accompanying Figure 5.

Table A.7: Estimated size of impact of treatment and pseudo p-value for crude birth rate outcome.

Year	Estimates	Pseudo P-value
2008	0.836	0.143
2009	1.957	0.095
2010	1.878	0.095
2011	1.417	0.143
2012	1.046	0.286
2013	1.428	0.190

Accompanying Figure 5.

Table A.8: Covariate balance between Georgia and its synthetic control for placebo test for TFR outcome.

Variables	Treated	Synthetic
Total Fertility Rate (average 1994-2000)	1.58	1.58
Total Fertility Rate 2000	1.59	1.56
Total Fertility Rate 1997	1.63	1.55
Total Fertility Rate 1994	1.53	1.69
Ratio of female to male labor force participation 2000	74.65	75.26
Avg. years schooling females 2000	11.78	10.13
Log (GDP PPP per capita) in 2000	8.04	8.79
Urbanization rate 2000	52.64	60.54
Growth rate of GDP per capita (2000-2010)	1.44	1.34

Accompanying Figure A.2, the table shows covariate balance between Georgia and its synthetic control unit consisting of Bosnia and Herzegovina, Latvia, Montenegro and Romania.

Table A.9: Weight of countries in the synthetic control for placebo test for TFR outcome.

Country	Weight
Bosnia and Herzegovina	0.025
Latvia	0.342
Montenegro	0.479
Romania	0.154

Accompanying Figure A.2.

Table A.10: Estimated size of impact of treatment and pseudo p-value for placebo test for TFR outcome.

Year	Estimates	Pseudo P-value
2001	.025	.286
2002	.028	.524
2003	-.021	.857
2004	-.012	.857
2005	.017	.952
2006	-.015	.952
2007	-.007	1
2008	.037	.762
2009	.158	.238
2010	.370	.048
2011	.414	0
2012	.342	.095
2013	.263	.143

Accompanying Figure A.2.

Table A.11: Covariate balance between Georgia and its synthetic control for placebo test for crude birth rate outcome.

Variables	Treated	Synthetic
Crude birth rate (average 1994-2000)	12.07	12.12
Crude birth rate 2000	11.80	11.78
Crude birth rate 1997	12.40	11.82
Crude birth rate 1994	11.90	12.95
Ratio of female to male labor force participation 2000	74.65	75.86
Avg. years schooling females 2000	11.78	10.04
Log (GDP PPP per capita) 2000	8.04	8.77
Urbanization rate 2000	52.64	60.75
Growth rate of GDP per capita (2000-2010)	1.44	1.35

Accompanying Figure A.3, the table shows covariate balance between Georgia and its synthetic control unit consisting of Bulgaria, Latvia, Montenegro and Romania.

Table A.12: Weight of countries in the synthetic control for placebo test for crude birth rate outcome.

Country	Weight
Bulgaria	0.087
Latvia	0.21
Montenegro	0.568
Romania	0.136

Accompanying Figure A.3.

Table A.13: Estimated size of impact of treatment and pseudo p-value or crude birth rate outcome.

Year	Estimates	Pseudo P-value
2001	0.022	0.524
2002	0.021	0.905
2003	-0.260	0.667
2004	-0.163	0.905
2005	-0.088	0.952
2006	-0.055	1.000
2007	0.161	0.905
2008	0.599	0.810
2009	1.530	0.286
2010	2.976	0.095
2011	3.203	0.095
2012	2.645	0.143
2013	2.269	0.190

Accompanying Figure A.3.

Table A.14: Interrupted Time Series regression with births by parity.

	First born	Second born	Third born or higher
	(1)	(2)	(3)
Year	-125.6044	-484.5714***	-274.8945***
	(198.2072)	(64.7140)	(32.0134)
Post 2008	3742.4139**	6033.9524***	2424.9231***
	(1751.3828)	(1067.4316)	(255.7650)
Year × Post 2008	-1470.9099***	783.1429***	504.6374***
	(206.8885)	(232.7910)	(70.3522)
Constant	28065.0000***	18780.2857***	8586.7429***
	(1589.2011)	(318.7559)	(282.3997)
Observations	20	20	20
F	84.1502	29.3616	67.4961

Newey-West standard errors in parentheses, Maximum lags are based on Cumby-Huizinga test for autocorrelation (Breusch-Godfrey). Refer to Tables A.16, A.17 and A.18. *p<0.1; **p<0.05; ***p<0.01.

Table A.15: Interrupted Time Series regression with births by marital status.

	Born in wedlock (1)	Born outside of wedlock (2))
Year	-1461.8637***	576.7934***
	(234.2649)	(96.9915)
Post 2008	17226.3590***	-5025.0696***
	(2335.8855)	(1294.4789)
Year X Post 2008	875.0637***	-1058.1934***
	(255.2944)	(203.1742)
Constant	39421.4000***	16010.6286***
	(1582.4381)	(412.2681)
Observations	20	20
F	18.3123	16.2930

Newey-West standard errors in parentheses, Maximum lags are based on Cumby-Huizinga test for autocorrelation (Breusch-Godfrey). Refer to Tables A.19 and A.20. *p<0.1; **p<0.05; ***p<0.01.

Table A.16: Cumby-Huizinga test for autocorrelation (Breusch-Godfrey): first born annual births. Accompanying Table A.14.

H0: $q = 0$ (serially uncorrelated)				H0: q = specified lag-1			
HA: s.c. present at range specified				HA: s.c. present at lag specified			
lags	chi2	df	p-val	lag	chi2	df	p-val
1 - 1	3.828	1	0.0504	1	3.828	1	0.0504
1 - 2	4.542	2	0.1032	2	1.668	1	0.1965
1 - 3	4.574	3	0.2058	3	0.361	1	0.5481
1 - 4	5.517	4	0.2383	4	0.471	1	0.4924
1 - 5	11.151	5	0.0485	5	7.735	1	0.0054
1 - 6	11.457	6	0.0752	6	2.140	1	0.1435

Table A.17: Cumby-Huizinga test for autocorrelation (Breusch-Godfrey): second born annual births. Accompanying Table A.14.

H0: $q = 0$ (serially uncorrelated)				H0: $q =$ specified lag-1			
HA: s.c. present at range specified				HA: s.c. present at lag specified			
lags	chi2	df	p-val	lag	chi2	df	p-val
1 - 1	0.018	1	0.8946	1	0.018	1	0.8946
1 - 2	0.028	2	0.9861	2	0.015	1	0.9038
1 - 3	0.060	3	0.9961	3	0.034	1	0.8533
1 - 4	2.288	4	0.6830	4	1.650	1	0.1990
1 - 5	2.426	5	0.7876	5	0.251	1	0.6160
1 - 6	4.343	6	0.6303	6	2.963	1	0.0852

Table A.18: Cumby-Huizinga test for autocorrelation (Breusch-Godfrey): third born or higher annual births. Accompanying Table A.14.

H0: $q = 0$ (serially uncorrelated)				H0: $q =$ specified lag-1			
HA: s.c. present at range specified				HA: s.c. present at lag specified			
lags	chi2	df	p-val	lag	chi2	df	p-val
1 - 1	2.179	1	0.1399	1	2.179	1	0.1399
1 - 2	4.023	2	0.1338	2	0.551	1	0.4579
1 - 3	4.055	3	0.2556	3	0.721	1	0.3959
1 - 4	4.085	4	0.3946	4	0.107	1	0.7436
1 - 5	5.107	5	0.4030	5	0.428	1	0.5127
1 - 6	12.341	6	0.0548	6	5.168	1	0.0230

Table A.19: Cumby-Huizinga test for autocorrelation (Breusch-Godfrey): annual births in wedlock. Accompanying Table A.15.

H0: $q = 0$ (serially uncorrelated)				H0: $q =$ specified lag-1			
HA: s.c. present at range specified				HA: s.c. present at lag specified			
lags	chi2	df	p-val	lag	chi2	df	p-val
1 - 1	0.486	1	0.4856	1	0.486	1	0.4856
1 - 2	6.492	2	0.0389	2	5.151	1	0.0232
1 - 3	6.497	3	0.0898	3	0.000	1	0.9998
1 - 4	8.082	4	0.0886	4	0.400	1	0.5271
1 - 5	10.375	5	0.0653	5	3.375	1	0.0662
1 - 6	13.671	6	0.0335	6	4.898	1	0.0269

Table A.20: Cumby-Huizinga test for autocorrelation (Breusch-Godfrey): annual births out of wedlock. Accompanying Table A.15.

H0: $q = 0$ (serially uncorrelated)				H0: $q =$ specified lag-1			
HA: s.c. present at range specified				HA: s.c. present at lag specified			
lags	chi2	df	p-val	lag	chi2	df	p-val
1 - 1	0.533	1	0.4655	1	0.533	1	0.4655
1 - 2	4.040	2	0.1327	2	2.823	1	0.0929
1 - 3	14.156	3	0.0027	3	3.352	1	0.0671
1 - 4	14.159	4	0.0068	4	4.829	1	0.0280
1 - 5	14.522	5	0.0126	5	0.870	1	0.3509

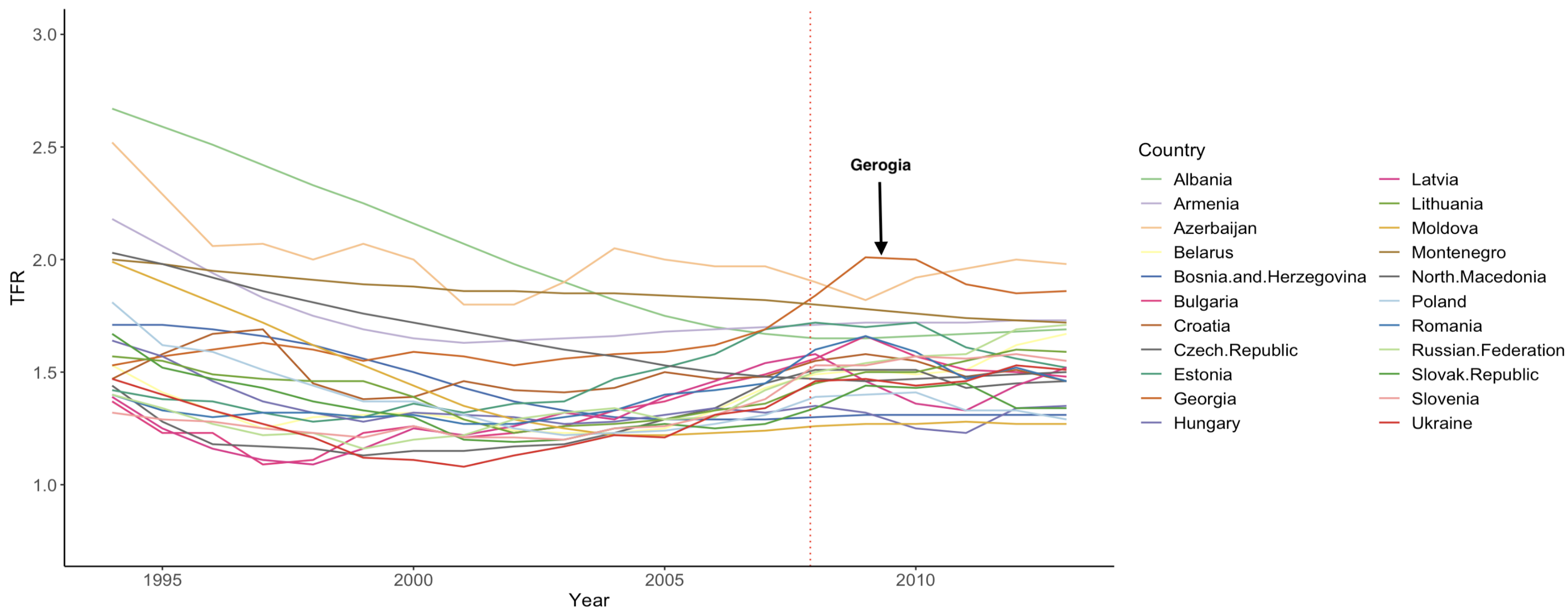


Figure A.1: Raw TFR data for Georgia and the potential donors.

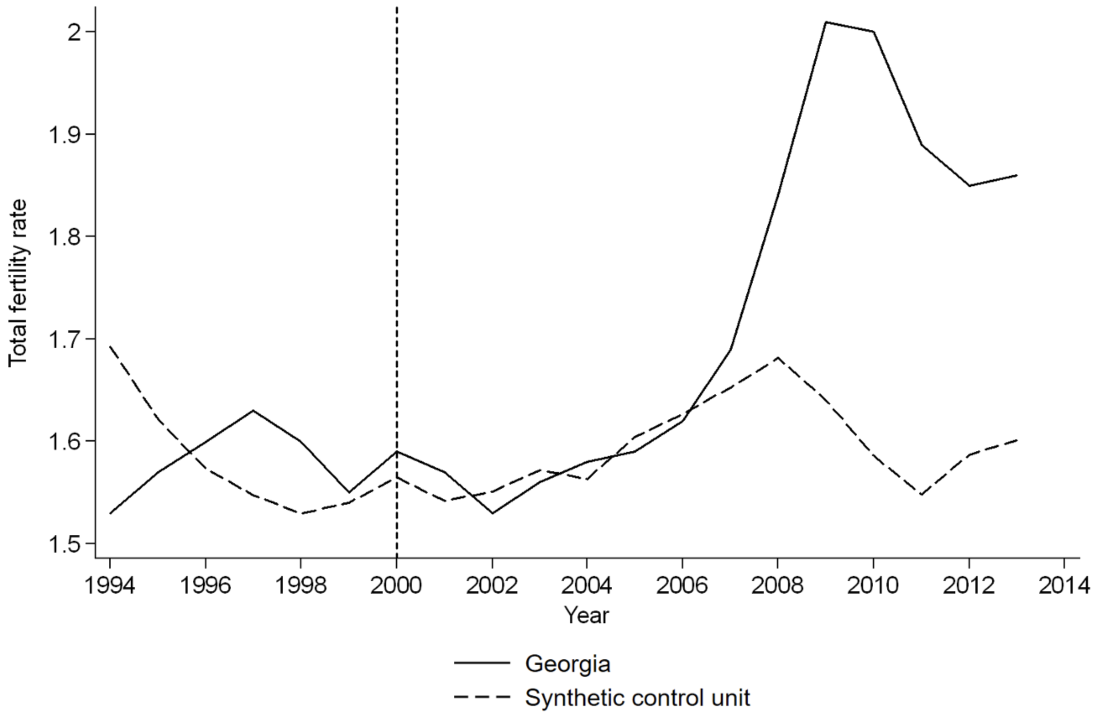


Figure A.2: In-time placebo test for Total Fertility Rate. Covariate balance, weights of countries in the synthetic control unit and estimated size of the impact are provided in Tables A.8, A.9 and A.10

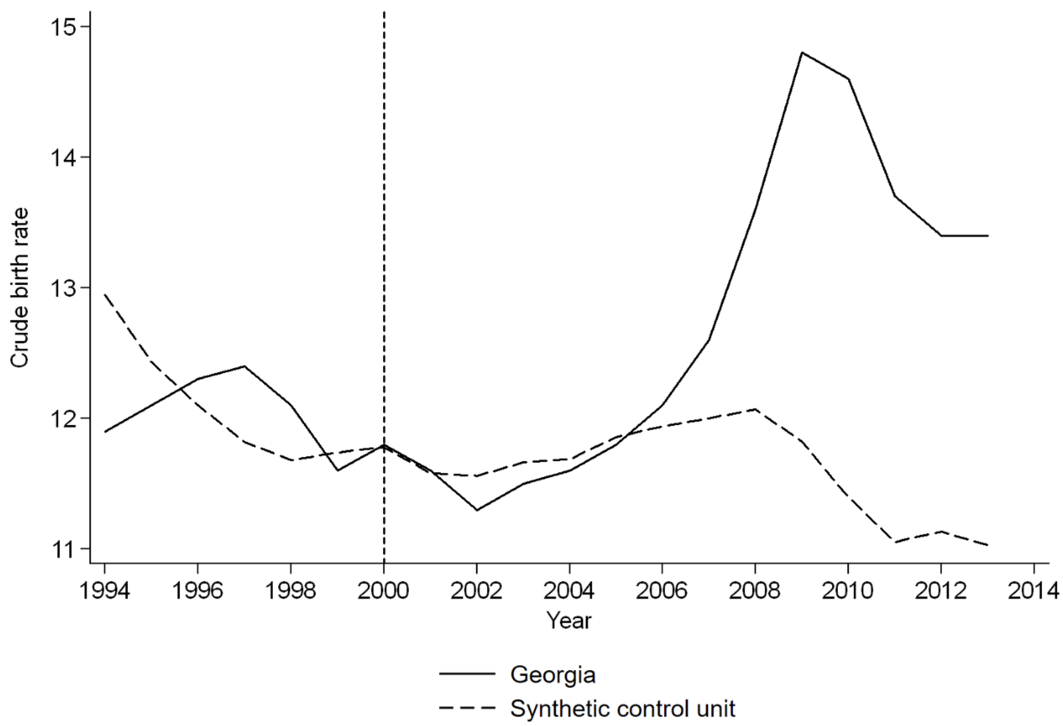


Figure A.3: In-time placebo test for Crude Birth Rate. Covariate balance, weights of countries in the synthetic control unit and estimated size of the impact are provided in Tables A.11, A.12 and A.13

B Appendix - Micro Evidence

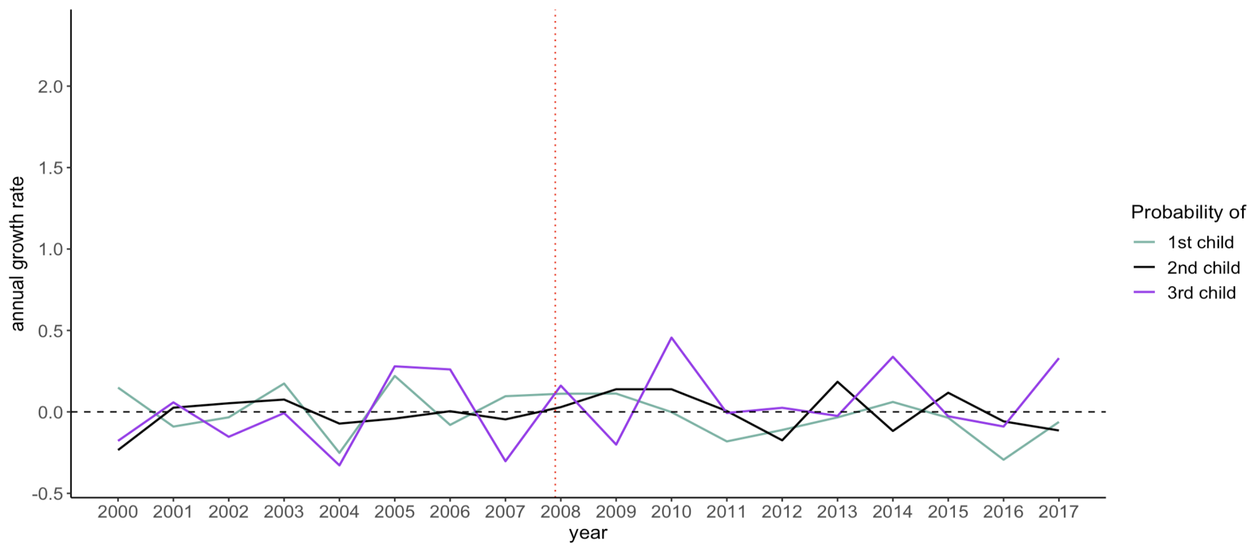
Table B.1: Summary statistics for micro-evidence: Pre-announcement sample

Variable	Treatment					Control				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Probability of:										
giving birth to 3rd or higher child in wedlock	51,099	0.010	0.099	0	1	9,046	0.025	0.155	0	1
giving birth in wedlock	51,099	0.081	0.273	0	1	9,046	0.121	0.326	0	1
having an abortion in wedlock	51,099	0.012	0.107	0	1	9,046	0.007	0.081	0	1
getting married	51,099	0.477	0.499	0	1	9,046	0.609	0.488	0	1
Total children	51,099	0.761	1.022	0	5	9,046	1.141	1.256	0	5
Age	51,099	24.303	5.548	17	49	9,046	23.871	5.374	17	40
Age at marriage	47,570	22.391	5.815	10	47	8,638	19.878	4.709	11	41
Age at 1st birth	44,976	24.832	5.357	17	47	8,267	22.646	4.134	17	40
Imputed births	51,099	0.185	0.522	0	6	9,046	0.451	0.843	0	5
Share of women with:										
1 birth	51,099	0.045	0.208	0	1	9,046	0.057	0.231	0	1
2 births	51,099	0.030	0.171	0	1	9,046	0.045	0.208	0	1
3 births	51,099	0.008	0.089	0	1	9,046	0.018	0.132	0	1
4 births	51,099	0.002	0.041	0	1	9,046	0.006	0.075	0	1
5 births	51,099	0.0004	0.020	0	1	9,046	0.002	0.047	0	1

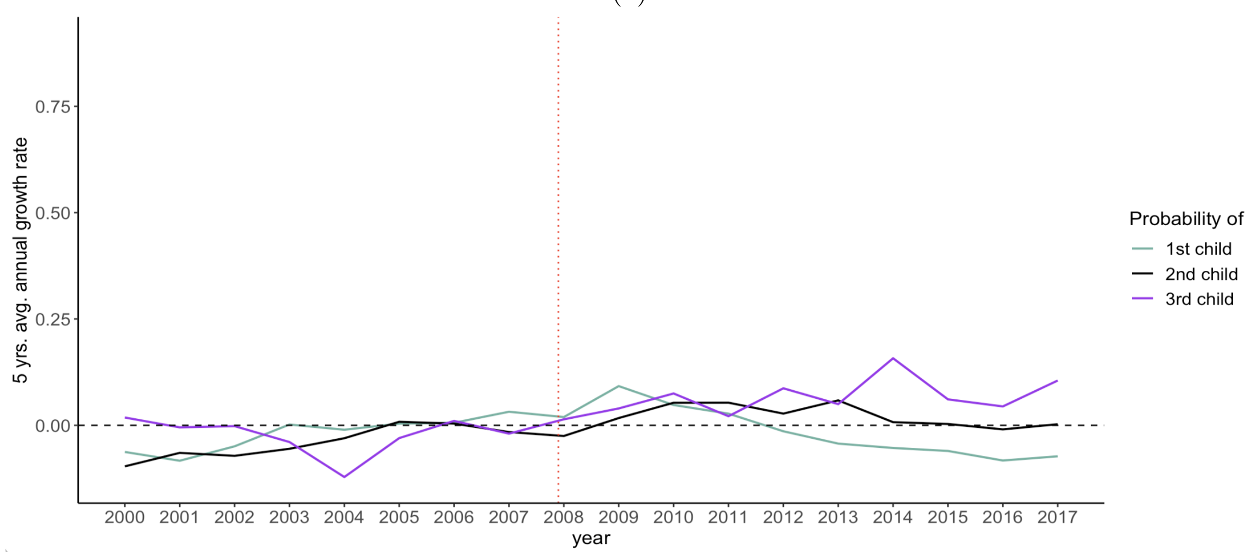
Table B.2: Robustness Checks 2

	Probability of:				
	giving birth to 3rd child	giving birth	having abortion	giving birth to 3rd child in wedlock	giving birth in wedlock
	(1)	(2)	(3)	(4)	(5)
Treated × Post	0.0132***	0.0340***	-0.0039*	0.0070***	0.0363***
	(0.0034)	(0.0084)	(0.0020)	(0.0026)	(0.0077)
Observations	119,609	119,609	119,609	116,893	116,893
Sample	All	All	All	No imputations for 2005-2010	No imputations for 2005-2010

Results use equation (2). All columns control for age group, lagged family size, mother fixed effects, year fixed effects and region interacted with year fixed effects. Columns (4) and (5) sub sample excluding all women with imputed births between 2005-2010. Standard errors are wild cluster bootstrapped at the region and year level. *p<0.1; **p<0.05; ***p<0.01.



(a)



(b)

Figure B.1: Panel (a) and Panel (b) show the annual growth rate and 5 years average annual growth rate in the average probability of having 1^{st}, 2^{nd} and 3^{rd} child amongst all Georgian women. The red dotted line represent Patriarch Ilia II's announcement in December 2007.