

# THE EFFECT OF PAID PARENTAL LEAVE AND A CHILD BENEFIT ON FERTILITY

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This paper examines a dramatic reform in Russia that provided one year of paid parental leave and a cash benefit at the birth of a child. The policy was implemented in waves around the country starting in 1981. I exploit the staggered implementation of the program in an event-study framework to identify its causal effect on fertility in the shorter- and longer-term. Fertility rises immediately after the policy starts and increases by approximately five percent over twelve months. Fertility rates evolve similarly before the policy introduction in both the early and late adopting regions; fertility rates increase discontinuously in a region only once it becomes eligible for the benefit. Fertility rates remain about five percent higher during the first six years of the policy; in the subsequent four years, the effect of the policy declines but still remains positive as the real value of the benefit is eroded by inflation. The increase in fertility rates is driven by higher parity births. Women who gave birth after the policy were older and had more children than those who gave birth before the policy. Moreover, childbearing increases by more in areas with a higher share of rural residents and a lower share of educated residents after the policy's introduction.

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## I. Introduction

Conscious of the financial difficulty of combining work and family responsibilities, most OECD countries offer subsidies or parental leave benefits for having a child. One goal of these benefits is to increase fertility. Low fertility is a concern for many countries: more than one hundred countries' total fertility rates are below replacement.<sup>2</sup> Parental benefits are also intended to decrease differences in financial wellbeing between individuals with and without children. Evidence on the behavioral responses to these benefits is important for optimal design of fertility policy and sheds light on how institutions can influence fertility. Changes in childbearing behavior can in turn affect employment and child outcomes.

Despite the frequent adoption of family policies, the effectiveness of these policies remains an open question. It is difficult to assess the causal effect of family policies on fertility due to insufficient information on the evolution of outcomes in the absence of the policy. Often policies are implemented nationally and at one time. In such circumstances, inference is hard due to pre-existing trends in outcomes. Moreover, it is difficult to evaluate the long-run consequences of a policy, which are important to determine the cost effectiveness of an intervention. Even if a policy results in temporary shifts in behavior, it may lead to no changes in outcomes in the long run.

I exploit the staggered implementation of a dramatic family policy change in Russia in 1981 that allows me to provide credible estimates of the effect of this family policy on both short-run and long-run fertility. The policy first went into effect in 37 oblasts (regions), and went

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<sup>2</sup> According to the 2013 CIA Factbook, the total fertility rate is below 2.1 in 113 countries.

into effect in 51 oblasts (regions) a year later. The goals of the policy were to increase fertility by providing “good conditions for population growth”, to “ease the status of working mothers”, and to “decrease the differences in standard of living depending on having children” (TSK KPSS, 1981). The policy reform provided three types of new benefits for mothers: partially paid parental leave until a child turns one, unpaid parental leave until a child turns a year and a half, and birth credits at the birth of the first, second and third child. The partially paid leave was about 20 percent of the average monthly salary, while the birth credit was about 30 and 60 percent for the first and subsequent births respectively. The policies lasted about ten years in real terms until the benefits gradually lost their monetary value as a result of increasing inflation; the benefits effectively ended after the dissolution of the Soviet Union.

I find that the introduction of new family benefits is associated with a significant sustained increase in fertility. The similar evolution of fertility rates between the early and late adopters of the policy is documented using a flexible event-study specification (Jacobson, LaLonde, and Sullivan, 1993), which provides a credible identification strategy that allows me to evaluate the effects of the policy over the period of its duration. Fertility rises *immediately* after the policy starts, and increases by approximately five percent in twelve months. Fertility in the early and late adopter regions only rises after they respectively receive the benefit. Moreover, this short-run increase in fertility *persists* in the long run. Fertility rates remained about five percent higher during the first six years of the policy; the effect of the policy began to decline but still remained positive after the real value of the benefit was eroded by inflation. These results indicate that women likely had more children as a result of the policy; fertility rates would rise temporarily only to fall below their previous levels if women simply adjusted the timing of childbearing.

My findings expand on the limited literature that studies the effects of paid parental leave on fertility. Lalive et al. (2009) demonstrate that extending the duration of paid parental leave in Austria leads to an increase of short-run and long-run fertility, while Rossin-Slater et al. (2013) examine partially paid maternity leave in California and find that the policy results in increases in the use of maternity leave. My paper also contributes to the literature on the effects of cash transfers on fertility that finds both positive effects on fertility (Milligan 2005; Gonzalez 2013) and negative effects on fertility (Hardoy and Schone 2005). Papers on the United States study effects of welfare policies on fertility rates of low income women, and find inconclusive evidence due to a large variation in results (Hoynes, 1997; Moffitt, 1998).

My paper makes several important contributions to this literature by overcoming methodological challenges found in previous studies in at least three ways. First, I provide rigorous evidence of no pre-existing differences in trends, which is a challenge for many studies using difference in difference methodology because they only focus on two time periods. Second, I analyze a policy that provided a large expansion of benefits from a previously low level. My study provides a valuable data point in a sparse literature, especially because other studies focus on expansions of already generous benefits or on small increases in benefits. Third, I can estimate the effects of the policy for the entire population, because it is applicable to the majority of women in the country. This is different from narrowly defined policies that only affect a small subset of the population. This near universal eligibility was due to high female labor force participation rates, and the provision of the same benefits for women in all income groups.<sup>3</sup>

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<sup>3</sup> In Russia, 85 percent of women age 16 to 54 were employed according to the 1979 census.

As a result of broad eligibility across Russia, I am able to study the long-run heterogeneity of responses to the policy across the population. This allows me to shed light on a longstanding question about the relationship between the cost of children, income and fertility (Becker, 1960; Heckman and Walker, 1990). I find evidence that more rural areas and less educated areas respond more to the policy. The paper provides strong evidence that labor market interventions and transfers have a profound effect on both short-run and long-run childbearing behavior.

## II. Institutional Setting and Hypotheses

### *Family Benefits in the Soviet Union*

The Soviet government provided monetary incentives to encourage childbearing for many years. Before 1981, the major beneficiaries of family subsidies were low income families or families with many children. From 1947, women received a one-time payment of 20 rubles beginning with her third child, where payments increased for higher parity births. Moreover, women received a monthly supplement of 4 rubles until the child's fifth birthday beginning with her fourth child, where payments increased for higher parity births.<sup>4</sup> From 1974, families with monthly per capita income under 50 rubles or 75 rubles in some regions received 12 rubles per month for each child under the age of eight.<sup>5</sup> These early benefits mostly benefited families that were already large. However, they did not provide incentives to an "average" family to have a second child.

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<sup>4</sup> For the birth of the 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup> and 11<sup>th</sup> child the woman can receive a one-time payment of 20/65/85/100/125/125/175/175/250 rubles and for the birth of the 4<sup>th</sup> through 11<sup>th</sup> child the woman can receive monthly payments until his fifth birthday of 4/6/7/10/10/12.5/12.5/15 rubles.

<sup>5</sup> People living in Siberia, the Far East and the Northern region of Russia had the 75 ruble requirement.

The government also provided some benefits that applied to all working mothers. The most generous benefit was a fully-paid maternity leave of 56 days before and 56 days after birth. Moreover, women could take an unpaid job-protected parental leave until a child turned one. Job protected leave was an important feature in the Soviet Union where women's labor force participation was high. In 1980, 51 percent of all workers were women. However, these benefits did not provide financial support for women who wanted to stay home with their child for a longer period of time.

In response to lower than desired birth rates and population aging, the government introduced an aggressive family policy in 1981 that provided generous benefits for most families. On January 22, 1981 the government made the first announcement about its plans for a new family policy. The policy was to be implemented in waves around the Soviet Union where the Far East, Siberia and the Northern regions of Russia would receive the benefits first. The announcement stated that the first wave of regions would start receiving benefits in 1981, but did not provide information on the exact date of the start of benefit eligibility in the first or the subsequent waves.

One of the new benefits that the policy introduced was partially paid parental leave. The women in the first wave of regions will receive 50 rubles per month until the child turns one, while women in the second wave of regions will receive 35 rubles per month of the parental leave. These benefits represented 20 and 30 percent of the average national monthly salary (169 rubles in 1980) in the first and second wave respectively. Moreover, women could keep their job while staying home until their child turned a year and a half. The policy also introduced a one-time birth credit of 50 rubles for the first child and a one-time birth credit of 100 rubles for the

second and third child. The amounts for the birth credit and monthly transfers for the fourth and subsequent children remained in place. Thus, the goal was to subsidize lower parity births.

A second announcement about policy implementation was published on September 2, 1981. This time it stated that the first wave of regions would receive benefits starting on November 1, 1981. The second wave of regions consisting of the rest of Russia and Ukraine, Estonia, Latvia, Lithuania, Moldavia, and Belorussia would receive benefits on November 1, 1982. The third and final wave of regions consisting of Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, Kirgizstan, Armenia, Azerbaijan, and Georgia would receive benefits on November 1, 1983.

Given the high female labor force participation and college going rates, the majority of women were eligible for the new child benefits. Women who have worked for at least a year, as well as students regardless of work experience could receive the benefit. Students from a wide variety of institutions could receive the benefit – universities, secondary special, professional-technical schools, clinical, and improvement of qualifications.

The timing of a woman's benefit eligibility depends on her location of permanent work or study and not on the place of birth of the child or residence. Only women who give birth after policy implementation are eligible to receive the one time birth transfer, while women can receive the monthly paid parental leave for the remaining months after implementation until the child turns one. For example, a woman who gives birth to her first child in November, 1981 in the early adopter regions receives 50 rubles as the birth transfer and twelve 50 ruble payments until her child turns one. But, a woman who gives birth to her first child in October, 1981 in the early adopter regions only receives eleven 50 ruble payments until her child turns one.

### *Duration of Policy*

In 1990 the government expanded the benefits so that a woman was eligible for partially paid parental leave until a child turns 18 months and unpaid leave until the child turns 3 years old. However, at the time the benefits were quickly losing their value. Inflation was rising, nominal wages were increasing, while the benefit stayed the same. In figure 2, I plot the Consumer Price Index against the value of the benefit (35 rubles) in 1981 rubles. In 1992, the benefit was worth almost nothing due to hyperinflation although I do not plot that year in the figure because of no consistent official statistics. Moreover, the government collapsed in 1992 which ended the benefit. Thus, the policy lasted about 10 years.

### *Hypotheses of Effects on Fertility*

Introducing paid parental leave and birth transfers reduces directly the cost of having a child for working women. This can encourage the woman to have a child she would not have otherwise had leading to a long run increase in fertility. Or, women may decide to have a child earlier than planned because of this reduction in cost. This will result in a short-run increase in fertility. However, even if mothers simply give birth to intended children earlier this may still increase completed childbearing. Women may not have the opportunity to have a desired child later if they experience an unexpected event such as a divorce, health problems, or an economic downturn.

To test whether the policy led to a change in timing of birth or a change in completed fertility, I examine birth rates by parity, the interval between births, as well as mother's age at birth. The one-time subsidy for the second child is fifty percent higher than for the first child, which may encourage women to have a second or third child. If first parity fertility rates do not



change, while higher order fertility increases as a result of the policy, this provides evidence of an increase in completed fertility. This result may indicate that women did not simply have first births sooner, but had higher parity births they otherwise would not have had. If mothers give birth at older ages after the policy, this points to a permanent increase in childbearing.

Women should adjust their childbearing behavior only while the policy is in place. This family policy lasted about ten years, while during the last few years benefits were losing their value. I expect the response of fertility rates to be positively related to the monetary value of the benefits for mothers. As a result of this policy, I expect fertility rates to respond the most during the first years of policy implementation, respond by less as the benefits lose their value, and stop responding at all once the policy stops.

I expect that some women may respond by more to the policy based on their income, the opportunity cost of their time, the length of leave they would have taken before the benefit, and the quality of a child they want to have. Women who would have taken a full year of leave when they had a child benefit the most financially from the provision of paid leave. Thus, it is reasonable to expect that these women are more likely to choose to have a child as a result of the policy. Women with a lower opportunity cost of having a child due to the nature of their work may adjust their childbearing by more than women with a higher opportunity cost. Women who prefer to have a lower quality child who requires less financial investments may also adjust their childbearing by more. Finally, I expect that low income women will respond more to the policy compared to high income women because the flat amount of the benefits results in a higher earnings replacement ratio for them.

To test these predictions, I compare fertility rates in areas with a larger share of rural women to areas with a larger share of urban women; I also compare fertility rates in areas with a larger share of less educated individuals to areas with a larger share of more educated individuals.

I expect women in rural areas to benefit the most from the policy and consequently adjust their childbearing the most. Rural areas in Russia had a shortage of preschool facilities compared to urban areas, which may lead women in rural areas to have to take longer leaves from work. Women in rural areas were mostly employed as manual laborers and were heavily underrepresented in the prestigious occupations of machine operators which required special training and skill (Bridger 1987). As a result, the nature of women's work was seasonal, which gave them greater flexibility in caring for a child compared to women in urban areas. In general, individuals in rural areas earned less than individuals in urban areas, which especially applied to women due to their prevalence in the most low-paying occupations.<sup>6</sup> Thus, the flat benefit represents a larger share of income for women in rural areas than for women in urban areas.

I expect less educated women to also benefit more from the policy. It may be less costly for less educated women to take long leaves, because they do not lose their skills while they are away from work. Also, the lower earnings of less educated women results in a higher replacement rate of the leave amount. On the other hand, the new benefit now provides job protection until a child turns 18 months. This protection may be more valuable to mothers with firm specific human capital (such as more educated mothers), because it is more costly for them to lose their job.

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<sup>6</sup> According to reports in the yearbook "Narodnoe Hozjajstvo" in 1980 individuals in rural areas earned 10 percent less than individuals in urban areas.

### III. Data and Preliminary Evidence

#### *Data and Variable Construction*

Ideally, the analysis calls for official data on the number of births by month and by region. However, such vital statistics data are not published. I only have access to official information in the Human Fertility Database on the national yearly number of births for my time period of interest. Instead, I use 1989, 2002 and 2010 Russian censuses to construct region-level estimates of fertility rates.<sup>7</sup> I estimate the number of children born in year  $y$  and location  $o$  as the number of people present in the census and who list their birth year as  $y$  and their location as  $o$ . My estimate for the number of births using census data will provide an under estimate of the true number of births due to mortality and mobility. In the census, I do not observe children born in Russia, but who emigrated from Russia or died by the time of the census.

Estimates of fertility rates are the most reliable when using the 1989 census, because they are the least affected by measurement error due to mortality and mobility. By 1989 less people who were born earlier had a chance to emigrate or die than by 2002 or 2010. The 1989 census data provides counts of people living in Russia in 1989 by age and region of residence.<sup>8</sup> These data only provide place of residence and not place of birth. However, I find that my results are not sensitive to measurement error in location at birth, after I correct for it by adapting the approach in Card and Krueger (1992).

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<sup>7</sup> The census data is not micro-level, but table-level data which allows me to create counts of people with certain characteristics (e.g. counts within each region and a birth year).

<sup>8</sup> I estimate birth year using age in 1989. The census took place between January 12-January 19 in 1989. Thus, year of birth = 1989 – age -1. This calculation will only understate the birth year of people born between January 1<sup>st</sup> and January 11<sup>th</sup>.

I use 2002 Russian census data because it allows me to estimate the monthly number of births. These data provide counts of persons present in Russia in 2002 by birth year, birth month and region at birth. Moreover, I use 2010 Russian census data because it allows me to estimate number of births by parity. These data provide counts of women present in Russia in 2010 by birth year and birth month of their first child. I do not have information on location at birth of their first child, but I proxy for it with the woman's location at birth.

To estimate fertility rates, it is important to have information on the number of women of childbearing age. Information on the age structure of the population by region is only published in the decennial censuses. The 1989 census data is the closest to policy start, compared to 2002 and 2010 census data, and should be the least affected by measurement error due to mortality and mobility. Only individuals who have not died or moved out of the country appear in the census, thus the number of women of childbearing age calculated using 2002 census data will underestimate the true number of such women. The 1989 census data provide counts of men and women in one year age groups by region of residence as of January, 1989. I use these data to backward-estimate the number of women each year (from 1976 until 1988) who are of childbearing age – ages 15 to 44.<sup>9</sup>

My main outcome of interest is the General Fertility Rate (GFR) which is the number of births per thousand women of childbearing age. I estimate the GFR in month  $m$ , year  $y$  and region  $o$  as the number of children born in month  $m$ , year  $y$  and oblast  $o$  and present in Russia in the 2002 Census per thousand women aged from 15 to 44 in year  $y$ , and living in oblast  $o$  in 1989 as recorded in the 1989 Census.

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<sup>9</sup> The number of women who are 15-44 in 1979 is the same as the number of women who are 25-54 in 1989.

$$(a) GFR_{m,y,o}^{2002} = \frac{\text{Number of Births}_{m,y,o} \text{ from 2002 Census} * 1000}{\text{Number of Women Age 15 to 44}_{y,o} \text{ from 1989 Census}}$$

Moreover, I estimate GFR in year  $y$  and region  $o$  as the number of children born in year  $y$ , and living in oblast  $o$  in 1989 as recorded in the 1989 Census per thousand women aged from 15 to 44 in year  $y$ , and living in oblast  $o$  in 1989 as recorded in the 1989 Census.

$$(b) GFR_{y,o}^{1989} = \frac{\text{Number of Births}_{y,o} \text{ from 1989 Census} * 1000}{\text{Number of Women Age 15 to 44}_{y,o} \text{ from 1989 Census}}$$

I will compare my results using both  $GFR_{m,y,o}^{2002}$  and  $GFR_{y,o}^{1989}$  as outcome variables. The analysis is more convincing if it produces similar results using both measures of GFR.<sup>10</sup>

In my analysis comparing the effect of the policy on first and higher parity births I will construct fertility rates (FR) by parity. I estimate fertility rates for first births in month  $m$ , year  $y$ , and region  $o$  as the number mothers born in oblast  $o$  and present in Russia during the 2010 Census who report that their first child was born in month  $m$ , and year  $y$  per thousand women aged from 15 to 44 in year  $y$ , and living in oblast  $o$  in 1989 as recorded in the 1989 Census.

$$(c) FR(1^{st} \text{ Birth})_{m,y,o}^{2010} = \frac{\text{Number of First Births}_{m,y,o} \text{ from 2010 Census} * 1000}{\text{Number of Women Age 15 to 44}_{y,o} \text{ from 1989 Census}}$$

Second, I estimate fertility rates for all higher parity births in month  $m$ , year  $y$ , and region  $o$  as the total number of births in month  $m$ , year  $y$ , and region  $o$  minus the number of first births estimate used in (c) per thousand women aged from 15 to 44 in year  $y$ , and living in oblast  $o$  in 1989 as recorded in the 1989 Census.

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<sup>10</sup> GFR calculated using the 1989 census is nearly identical to that produced using official data on births. My estimate of GFR using 2002 census data for number of births and 1989 census data for the number of women of childbearing age is about 15 to 20 percent smaller than the estimate using the official yearly number of births. My estimate of GFR using 2002 census data follows roughly the same pattern as the official GFR estimate from 1975 until 1980, but the pattern changes from 1981 until 1983.

$$(d) FR(Higher Parity Birth)_{m,y,o}^{2010} \\ = \frac{(Number\ of\ Births - Number\ of\ First\ Births)_{m,y,o}\ from\ 2010\ Census * 1000}{Number\ of\ Women\ Age\ 15\ to\ 44_{y,o}\ from\ 1989\ Census}$$

I will also make use of 1979 Russian census data in order to analyze what types of regions responded to the policy the most. These data contain region-level information as of January, 1979 on the share of women of childbearing age who live in urban areas, as well the share of women with elementary, high school and college education. I need to make use of 1979 data, because my heterogeneity analysis requires region-level information shortly before the policy start.

Moreover, I will use the Generations and Gender Survey conducted in 2004 to analyze what types of women gave birth after the policy. The sample was representative of all of Russia and consisted of roughly 11,000 individuals aged 18 to 79. These data contain information on childbearing such as the birth year of every child and the number of children.

### *Measurement Error Correction*

It is important to correct my measure of GFR using 1989 census which is based on oblast of residence in 1989 instead of oblast at birth. This measure is otherwise the least noisy measure of fertility rates because it is computed at a time the closest to the time of the policy start. I adjust the approach in Card and Krueger (1992) to calculate GFR by oblast at birth using my estimates for GFR by oblast of residence in 1989. For ease of presentation, fix year of birth as  $y$ . The estimated GFR in year  $y$  and oblast of residence  $o$  in 1989 is equal to

$$GFR_o = \sum_{j \in \text{every oblast}} p_{j,o} * GFR_j^*$$

where  $p_{j,o}$  is the probability of living in oblast  $o$  in 1989, while being born in oblast  $j$  in year  $y$ , and  $GFR_j^*$  is the GFR in oblast of birth  $j$  and year  $y$ . In matrix notation, this can be expressed as

$$GFR = P * GFR^*$$

where GFR is a (number of oblasts x 1) vector while P is a (number of oblasts x number of oblasts) matrix. I estimate  $p_{j,o}$  using 2002 Census for each birth year  $y$ .<sup>11</sup> This formulation allows me to calculate the true GFR for each oblast, where I can apply the formula separately for each birth year.

$$GFR^* = P^{-1} * GFR$$

If my corrected estimates of GFR by oblast of birth lead to similar analysis results as the estimates of GFR using oblast of residence in 1989, then measurement error in location does not play a large role in my estimates.

#### *Descriptive Evidence on Fertility Responses using Official National Data*

After the introduction of the policy in 1981, government expenditures on social insurance for families (including maternity leave, parental leave and birth transfers) grew dramatically. Figure 3 plots yearly expenditures per birth in the Soviet Union that evolve continuously from 1974 until 1981 when they were 347 rubles per child born, but jump to 432 rubles per child born in 1982 when only women in the early adopter regions received the benefits for the whole year.<sup>12</sup> Finally, expenditures per child reach 687 rubles in 1984 when families in all parts of the Soviet Union became eligible for these benefits.

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<sup>11</sup> The 2002 census allows me to create counts by birth year, oblast at birth and oblast of residence in 1989.

<sup>12</sup> These statistics were only published for the whole Soviet Union and not on Russia alone.

The potential effect of these benefits on fertility rates can be observed in panel A of figure 4 that graphs GFR using official national data on the number of births. While GFR remains relatively flat from 1975 through 1980, it starts increasing in 1981 while reaching its peak in 1986, and drops in 1988. The drop in GFR in 1988 is in part due to the deteriorating economic conditions in Russia at the time. It was a time of economic uncertainty with a rising inflation, deteriorating economy, and economic reforms. Panel B plots the total fertility rate, which also exhibits a dramatic increase in 1981. The increase in fertility rates may also be accompanied by a decrease in abortions, which was the main method of contraception in Russia. Panel C plots the number of abortions per 100 births, which shows a discontinuous drop in abortions starting from 1983.<sup>13</sup>

Moreover, figures 5 and 6 that graph parity and age specific fertility rates indicate that the increase in fertility comes from second and subsequent births from mothers between the ages of 25 and 39. The increase in higher order births to older mothers after policy start points to a permanent effect of the policy, when older women have a second or subsequent child that they would not have had before.

#### *Descriptive Evidence on Fertility Responses using Regional Census Data*

I expect women to respond to the policy after the announcement in January, if the policy was effective at encouraging births. Women in the early adopter regions had advance notice about the benefit, so I expect them to change their childbearing decisions immediately. Thus, I expect the fertility rate in these regions to jump starting at the earliest from mid-October. Women knew that benefits will start in 1981 but did not know the exact date of start, so it is likely that

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<sup>13</sup> The data on abortions in Russia is not very reliable, however.



they adjusted their childbearing decisions after the announcement in January, 1981. However, the adjustment will not be immediate if it takes women a period of time to get pregnant.

The behavior of women in the late adopter regions is less clear. They also had advance notice of the policy, but they did not know when their regions will start receiving benefits until September, 1981. They may have decided to postpone having children right after the announcement to collect the new benefits once they are established in their place of residence. This will result in a reduction of fertility in these regions from mid-October, 1981 through October, 1982. Alternatively, they may not have changed their childbearing decisions until the second announcement in September, 1981. Women may have decided to postpone having a child in September, which will result in a reduction in fertility from May, 1982 through October, 1982. However, the incentive to postpone was not as strong because they would still receive some benefits even if they gave birth before their region became eligible.

Figures 7, 8 and 9 provide preliminary evidence about differential responses to benefit announcement by the early and late adopter regions. Figure 7 plots GFR using 1989 census data, while figure 8 plots month-level GFR using 2002 census data separately for early and late adopter regions. Both figures convey the same message. Early adopter and late adopter regions had similar trends in fertility rates before program start. However, the GFR in the early adopter regions jumps after November, 1981, while the GFR in the late adopter regions stays on the same trend and does not jump at that time. This indicates that women in the late adopting regions did not delay childbearing after benefits announcement. GFR in the late adopter regions only jumps after November, 1982. Figure 9 plots the difference in GFR between the early and late adopters for monthly data, and shows an immediate increase in the difference in November, 1981. In fact, this difference stays constant before policy implementation, jumps up during twelve months after

implementation, and then goes back to its original level once the late adopter regions receive the benefits.

Moreover, I examine fertility rates by parity and region of birth before and after the policy. Figure 10 plots the difference in monthly GFR using 2010 census data for first and all higher parity births between early and late adopter regions. These figures indicate that women did not change the timing of first births, because the difference in fertility rates for first births stays on the same trend after policy implementation. However, women appear to have more higher parity births as a result of the policy.

#### **IV. Identification Strategy**

##### *Short-Run Analysis*

I exploit the staggered introduction of parental leave and child subsidy benefits to estimate the effect of the family policy reform on fertility. I use a difference in difference framework, where I compare the difference in fertility rates in regions that received the benefits first (early adopters) before and after the policy introduction (first difference) to the difference in fertility rates in regions that received the benefits second (late adopters) before and after the policy introduction (second difference). I conduct the analysis using both my yearly (using 1989 census data for the number of births and defined in (b)) and monthly (using 2002 census data for the number of births and defined in (a)) measures of GFR. I also use monthly estimates of GFR by parity (defined in (c) and (d)) as outcome variables. Moreover, I use the event study framework (Jacobson, LaLonde, and Sullivan, 1993) which is a generalized difference-in-difference model where the early adopters are the treatment group, the late adopters are the

control group and the post treatment period is the month the early adopters become eligible for benefits. Equation (1) models yearly data, while equation (2) models monthly data.

$$GFR_{o,y}^{1989} = \alpha + \gamma_y + \sum_{t=1974}^{t=1979} \theta_y * T_o * 1(y=t) + \sum_{t=1981}^{t=1988} \pi_y * T_o * 1(y=t) + \delta_o + \varepsilon_{o,y} \quad (1)$$

$$GFR_{o,y,m} = \alpha + \gamma_y + \gamma_m + \sum_{t=1978,k=11}^{t=1980,k=10} \theta_{y(m)} * T_o * 1(y=t,m=k) + \sum_{t=1981,k=11}^{t=1983,k=10} \pi_{y(m)} * T_o * 1(y=t,m=k) + \delta_o + \varepsilon_{o,y,m} \quad (2)$$

In equation (1),  $GFR_{o,y}$  is the General Fertility Rate in oblast  $o$  and year  $y$  (defined in (a)),  $\gamma_y$  are year fixed effects that capture changes in policy common to all regions within Russia,  $T_o$  equals one if an oblast was an early adopter (eligible to receive paid parental leave in November, 1981), and  $\delta_o$  are oblast fixed effects that capture time-invariant oblast level differences. The definitions in equation (2) are similar to those in equation (1) with some exceptions. In equation (2),  $GFR_{o,y,m}$  is measured in oblast  $o$ , year  $y$  and month  $m$  (defined in (b)),  $\gamma_m$  are month fixed effects that capture systematic differences in fertility by month (seasonality effects). Equation (2) allows me to define the post treatment period for the early adopter regions more precisely, because 1() is a dummy for every month observation. This lets me estimate the treatment effect during the first year of program implementation more precisely. Additionally, the flexible evolution of fertility rates at the monthly frequency allows me to better identify the timing of fertility response.

The coefficients of interest are  $\theta_y$  or  $\theta_{y(m)}$  and  $\pi_y$  or  $\pi_{y(m)}$  which capture the covariate-adjusted differences in GFR between the early and late adopter oblasts six years before and eight years after the first oblasts were treated. In equation (1), I omit the dummy for the year before benefit establishment,  $1(y = 1980)$ , which normalizes the estimates for  $\theta_y$  and  $\pi_y$  to zero in 1980. In equation (2), I omit the dummy for the twelve month period before benefit establishment,  $1(y = 1980, m \geq 11 \text{ or } y = 1981, m \leq 10)$ .

The coefficients on  $\theta_y$  and  $\theta_{y(m)}$  test for differences between the early adopters and late adopters before the early adopters received benefits. If these coefficients do not change over time before program implementation, it indicates parallel trends in GFR in the two groups of locations. The coefficients on  $\pi_{1981}$  and  $\pi_{1982}$  capture the treatment effect of the policy on the early adopter regions when they were treated for two months, and when they were treated for a year. The coefficients  $\pi_{1981(11)}$  through  $\pi_{1982(10)}$  capture the treatment effect of the policy for each of the twelve months after policy implementation. The coefficients  $\pi_{1983}$  to  $\pi_{1988}$  or  $\pi_{1982(m)}$  to  $\pi_{1988(m)}$  capture the differences in GFR between both groups of locations once everyone is treated. If the late adopters also adjust their fertility rates, these coefficients will be muted compared to the coefficients  $\pi_{1982}$  or  $\pi_{1982(m)}$  to  $\pi_{1988(m)}$ .

### *Threats to Identification*

If women in the late adopter regions delayed childbearing in response to policy announcement, it will introduce bias in the second difference and lead to an over estimate of the true effect of the policy. Thus, I test whether GFR in the late adopter regions falls in response to the announcement in January, 1981. I perform the following regressions for the sample of late adopter regions:

$$GFR_{o,y,m} = \alpha + \gamma_1 y(m) + \beta_3 post + \delta_o + \delta_m + \varepsilon_{o,y,m} \quad (3)$$

The linear term in  $y(m)$  – time in months – accounts for any smooth fertility trends.<sup>14</sup> I also include month fixed effects,  $\delta_m$ , to account for seasonality in births,  $post$  is an indicator that equals one during the period from November, 1981 to October, 1982. The coefficient of interest is  $\beta_3$  which tests for a discontinuous change in GFR in the late adopter regions during the year when they are not eligible for benefits but the early adopter regions are. If this coefficient is zero or positive, then there is no evidence that the late adopter regions lowered their fertility in response to policy announcement.

For my estimates to capture the effect of the new family policy, nothing else should be changing discontinuously around the time of policy introduction. In particular, other things may not change discontinuously starting in November, 1981 in the early adopter regions, and they may not change discontinuously in November, 1982 in the late adopter regions. Given that to be a threat to the identification strategy, a policy, economic indicators or the composition of women must be changing in a particular order and in particular dates in the two sets of regions, it is unlikely that another change in policy or other factors are generating the treatment effects that I am observing.<sup>15</sup>

#### *Identification Strategy: Long-Run Effect*

To evaluate the long run consequences of the policy, it is important to examine whether fertility rates remained higher for the duration of the policy. I exploit the differential timing of

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<sup>14</sup> The inclusion of higher order polynomials in  $y$  does not change my results.

<sup>15</sup> I compare the evolution of several economic indicators in half of the oblasts (data available only on a subset of oblasts) in the first wave to the evolution of those variables in the rest of Russia. I find that all indicators visually stay on the same trend after implementation in the first wave of regions as well as nationally. These results provide evidence against specific changes in economic conditions in the early adopter regions at the time of policy implementation. The indicators I focus on are: growth of industrial product, production of oil, production of natural gas, and number of employed individuals.

the introduction of the policy in the early adopter and the late adopter regions within an event-study framework (Bailey, 2012). I estimate the following equations using both data from the 1989 census and data from the 2002 census.

$$GFR_{o,y}^{1989} = \alpha + \gamma_y + \delta_o + \sum_{t=-6}^{t=-1} \theta_t 1(t=y-y^*) + \sum_{t=1}^{t=6} \pi_t 1(t=y-y^*) + \varepsilon_{o,y} \quad (4)$$

$$GFR_{o,y,m}^{2002} = \alpha + \gamma_y + \gamma_m + \sum_{t=-6}^{t=-1} \theta_t * 1(t=y(m)-y^*(m)) + \sum_{t=1}^{t=10} \pi_t * 1(t=y(m)-y^*(m)) + \delta_o + \varepsilon_{o,y} \quad (5)$$

In this specification  $y^*$  is the year before people in a region were eligible to receive paid parental leave.  $y^*$  is 1980 for the early adopters or 1981 for the late adopters in equation 5;  $y^*(m)$  is the period from November, 1980 to October, 1981 for the early adopters and the period from November, 1981 to October, 1982 for the late adopters in equation 6. In equation 6,  $y(m)$  is a twelve month interval that starts in November of 1973.  $1()$  is an indicator function and represents time (in 12 month intervals) relative to the introduction of paid parental leave, where  $t=0$  is omitted. For example in equation 6,  $1(1=y(m)-y^*(m))$  represents the period from November, 1981 until October, 1982 for the early adopter regions and the period from November, 1982 until October, 1983 for the late adopter regions.

The coefficients of interest are  $\pi_t$  which show the effect of the introduction of partially paid parental leave on fertility  $t$  years after implementation. The coefficient  $\pi_t$  when  $t=1$  should be the smallest in equation 5, because in 1981 the early adopter regions while in 1982 the late adopter regions only received the benefit for two months. The flexible specification allows me to quantify changes in the policy effect for its duration and helps determine whether the policy induced short-term adjustments in fertility timing or long-term changes in completed fertility. Moreover, estimates of  $\theta$  represent the evolution of fertility rates before the benefit start. These

coefficients document whether pre-existing trends bias estimates of  $\pi$ , and whether the “effects” preceded the program.

For this analysis to measure the causal effect of the policy on fertility rates, the timing of the benefits in the early and late adopter regions has to be independent of previous fertility trends in those locations. The results will not be biased, if the government did not decide the order of benefits based on previous trends in fertility. My short-run analysis that compares the trends in fertility rates between the early adopter and late adopter regions tests this assumption. The government chose the order of treatment geographically, most likely based on fixed characteristics of regions, which makes the early adopter regions to differ from the late adopter regions. Thus, the inclusion of oblast fixed effects is crucial to account for any fixed differences across areas.

### *Heterogeneity Analysis*

The family policy may result in heterogeneous responses in fertility for different subgroups of women. Women with a lower income and a lower opportunity cost of work may have more incentives to respond to the policy. To establish whether the effects of the family policy are heterogeneous across women, I analyze whether more rural or less educated areas appear to respond more to the policy. My empirical strategy compares changes in fertility rates in areas where I expect women to benefit from the policy more to areas where the policy is less important following the methodology in Finkelstein (2007). My empirical specification is

$$GFR_{o,y}^{1989} = \alpha + \gamma_y + \sum_{t=-7}^{t=-1} \theta_t * Z_o * 1(t=y-y^*(m)) + \sum_{t=1}^{t=6} \pi_t * Z_o * 1(t=y-y^*) + \delta_o + \varepsilon_{o,y} \quad (6)$$

$$GFR_{o,y,m}^{2002} = \alpha + \gamma_y + \gamma_m + \sum_{t=-7}^{t=-1} \theta_t * Z_o * 1(t=y(m)-y^*(m)) + \sum_{t=1}^{t=10} \pi_t * Z_o * 1(t=y(m)-y^*(m)) + \delta_o + \varepsilon_{o,y,m}$$

(7)

where  $GFR_{o,y}$  is GFR in oblast  $o$  and year  $y$ ,  $\gamma_y$  are year fixed effects,  $y(m)$  is a twelve month interval that starts in November of every year, and  $\delta_o$  are oblast fixed effects.  $Z_o$  represents several variables at the oblast level measured in 1979 to be included in separate regressions: share of women age 15 to 44 in an oblast who are living in a rural area in 1979, share of individuals age 10 and older who have completed elementary education, and share of individuals age 10 and older who have not completed high school but have more than elementary education as of 1979. In these specifications  $y^*$  is the year before people in a region were eligible to receive paid parental leave. In equation 7,  $y^*$  is 1981 for the early adopter regions and 1982 for the late adopter regions. In equation 8,  $y^*$  is the period from November, 1980 to October, 1981 for the early adopters and the period from November, 1981 to October, 1982 for the late adopters.

The share of women in rural areas and the share of educated individuals are not randomly distributed across regions. Areas that differ in composition of residents may also differ in their level or growth of fertility rates. Thus, the empirical strategy tests for a break in any pre-existing differences in the level or trend of the fertility rate around the time of policy start. The identifying assumption is that without the policy change the differences before the policy change would continue on the same trends.

The coefficients of interest  $\theta_t$  and  $\pi_t$  show the pattern over time in GFR in regions where the policy may have had a greater impact on fertility relative to areas where it may have had a smaller impact. Thus, the change in the trend or level of these coefficients after the policy start provides an estimate of the heterogeneous effects of the policy across different types of areas.



## V. Results

I will perform my analysis separately for two sets of fertility rate estimates using either the 2002 Russian Census or the 1989 Russian Census. The results from both sources will not be the same and I expect estimates using the 1989 census to be closer to the truth. Estimates of the number of births using 1989 census suffer less from measurement error, because in it people are observed the closest in time to policy start. It is valuable to also examine results using the 2002 census, because they allow the analysis of fertility rate adjustment at the monthly level, and allow the construction of the period before and after policy start more precisely than if using annual data from 1989 (the program started in November). My results are more convincing if both sets of estimates point to the same conclusions.

### *Short-Run Analysis of Effect of Policy on GFR*

Panels A and B in figure 11 present event-study estimates from specifications 1 and 2 for annual GFR estimated using 1989 census and monthly GFR estimated using 2002 census. Panel A in figure 11 presents results based on GFR where location in 1989 is assumed to be the location at birth, as well as based on GFR adjusted for measurement error in location at birth. Results are nearly identical using either measure of GFR, which indicates that this type of measurement error is not important in this context. As a result, all the following analysis using 1989 census data will use GFR where I assume that location in 1989 is location at birth. Panel A of table 1 summarizes the magnitudes of event-study estimates and their joint significance in a difference in difference specification. The results are weighted by the population of women aged 15 to 44 in 1980 in each oblast. The standard errors are clustered at the oblast-level to allow for an arbitrary correlation structure within oblast.

These covariate-adjusted results support the findings from and are directly comparable to the unadjusted series from figures 7 and 8 respectively. The results indicate that there is no difference in trend in the early adopter and late adopter regions six years before program implementation, where the point estimates for these years are individually not distinguishable from zero and follow a flat trend in panel A. Thus, potential bias is not due to variables correlated with long-run trends in fertility, but may only be due to factors that change at the same time as the policy.

Panel A of table 1 indicates that the GFR, calculated using 1989 census data, in the early adopter regions jumps by 4.9 births per 1,000 women of childbearing age in the first year (1982) of benefits which is a 6.9 percent increase over a mean of 72 in the years before benefit introduction in the early adopter regions. Once the late adopter regions are eligible for treatment in November, 1982, the difference between the fertility rates of the early and late adopter regions shrinks and is negative yet not statistically significant. This indicates that the late adopter regions respond to the policy once they become eligible for it. Results using GFR calculated using 2002 data at the monthly level support those found using the 1989 census and imply a 4.3 percent increase in fertility rates. Estimates of  $\pi$  in panel B of figure 11 demonstrate an immediate response in fertility rates – during each of the twelve months after the policy introduction GFR in the early adopter regions is generally higher than in the late adopter regions especially compared to the differences before policy start.

I also test whether the fertility rate in the late adopter regions changes discontinuously between November, 1981 and October, 1982. I find no evidence of this, because the coefficient on  $\beta_3$  in equation 3 presented in panel B of table 1 is positive and not statistically different from zero. This result is robust to the inclusion of flexible polynomials in time. This result suggests

that women in the late adopter regions did not delay childbearing in response to the policy announcement, and thus are a good control group for women in the early adopter regions.

It is striking that women responded to the new family benefits so soon after the announcement. This indicates that women were constrained in having children by the difficulty of combining work with family, particularly right after having a child. Moreover, the typical contraception used can likely explain women's fertility responses. In the 1980s, women in Russia had limited access to and education on contraception. The most widely used method of fertility regulation was abortion (Popov, 1991). Thus, such immediate responses to the policy could arise from women deciding not to have abortions they would have had in the absence of the policy. One would expect that if women were using a contraceptive method that required medical help to remove or a waiting period until full fecundity, the adjustment of fertility rates would not be so immediate.

#### *Long-Run Analysis of Effect of Policy on GFR*

The new benefits may have changed the timing as well as the number of children a woman had. Women likely had more children as a result of the policy if fertility rates stayed consistently higher for the duration of the policy. If women simply had intended children sooner, fertility rates should rise temporarily, but then fall below their previous levels. I test for the presence of long-run effects of the policy by estimating changes of fertility rates for the duration of the policy. My short-run analysis established that there was no difference in trend in fertility rates between the early and the late adopter regions. Thus, it does not appear that the government chose the order of benefits based on pre-existing trends in fertility rates. This supports the causal

interpretation of the effect of the introduction of the policy on fertility rates for the duration of the benefits.

Figure 13 presents results from specifications 4 and 5 with yearly and monthly GFR, while panel C of table 1 summarizes the magnitudes of the estimates and their joint significance in a difference in difference specification.<sup>16</sup> Estimates of  $\theta$  show the evolution of fertility rates conditional on covariates before new family benefits and show whether a preexisting trend may confound the estimates. Moreover, they also show whether effects preceded the treatment. Estimates of  $\theta$  are individually statistically indistinguishable from zero in the six years leading up to the policy introduction. Thus, there is no evidence that differential pre-existing trends may bias this analysis.

The introduction of new family benefits is associated with a sustained increase in GFR for the duration of the policy. Using 1989 census data, GFR increases by 7 and 4 percent (5.1 and 3.9 births per 1,000 women of childbearing age) 1 to 3 and 4 to 6 years after policy start respectively; using 2002 census data, GFR increases by 4.7, 4.9 and 2.7 percent 1 to 3, 4 to 6, and 7 to 10 years after policy start. Thus, the effect of the policy diminishes with time which is consistent with the gradual devaluation of the constant benefit as a result of inflation and increase in nominal wages. However, the introduction of the benefits was associated with a consistent positive change in fertility rates, which suggests that women had more children.

*Effect of Policy on Fertility Rates by Parity (Short and Long Run)*

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<sup>16</sup> I perform the analysis using estimates of monthly fertility rates from 2002 census data from years 1974 until 1992. I also perform the analysis using estimates of yearly fertility rates from 1989 census data from years 1974 until 1988.

To further test whether the policy led to a permanent decline in childbearing, I perform the analysis separately for first and higher parity fertility rates. Figure 12 presents the results from specification (2) using measures of GFR described in (c) and (d), while panel A in table 1 summarizes the magnitudes of the estimates and their joint significance in a difference in difference specification. This analysis supports the findings from the unadjusted series in figure 10. Higher parity fertility rates in the early adopter and late adopter regions follow a parallel trend six years before program implementation, where the point estimates for these years are individually not distinguishable from zero and follow a flat trend in panel B. Panel A of table 1 indicates that the higher parity fertility rate in the early adopter regions increases by 11.2 percent (3.7 increase over a mean of 32.8) in the first year of benefit receipt. The late adopter regions respond to the policy after they become eligible for it; the difference between the fertility rates of early and late adopter regions shrinks and is positive yet not statistically significant once everyone is eligible for benefits. Estimates of  $\pi$  in panel B of figure 12 demonstrate an immediate response in higher order fertility rates – during each of the twelve months after the policy introduction fertility rate in the early adopter regions is higher than in the late adopter regions especially compared to the differences before policy start.

However, first birth fertility rates do not appear to change after the policy. Panel A in figure 12 shows that first birth fertility rates decrease more rapidly in early adopter than in late adopter regions before policy implementation, and continue to do so without any visible change in level or trend in the years after policy implementation.

The introduction of new family benefits is associated with a sustained increase in higher parity fertility rates for the duration of the policy, along with no change in first birth fertility rates. Panel B in figure 13 presents results from specification 5, while panel C of table 1

summarizes the magnitudes of the estimates and their joint significance in a difference in difference specification. Higher order fertility rate increases by 12.7, 9.3, and 5.8 percent 1 to 3, 4 to 6, and 7 to 10 years after policy start. There is no evidence that differential pre-existing trends may bias this analysis, because estimates of  $\theta$  display a flat trend in the six years before policy introduction. However, fertility rates for first births do not change as a result of the policy, evidenced by an absence of a jump in  $\theta$  after policy introduction. These results suggest that women had more children as a result of the policy.

#### *Composition of Mothers before and after Policy*

Changes in demographic characteristics of mothers as a result of the policy provide further evidence of a permanent effect of the family policy on women's childbearing decisions. Figure 14 presents the results from specification 4 and table 2 summarizes the magnitudes of the estimates and their joint significance in a difference in difference specification, where I use age of mother at birth, years since last birth and number of previous children at the time of birth as dependent variables.<sup>17</sup> Women who give birth 1 to 3 years after the policy are 2.3 percent older, have 30 percent more previous children, and waited 33 percent more years to give birth to their current child since their last birth than women who gave birth before the policy. Moreover, estimates of  $\theta$  in figure 14 for six years leading up to the policy start indicate no difference in trend in women's characteristics before the policy. However, estimates of  $\pi$  increase sharply after the policy, which indicates that this policy is associated with the change in composition of mothers. These results rule out that fertility rates increased merely due to women having desired children sooner, and suggest that older women respond by deciding to have another child they may not have had before.

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<sup>17</sup> Time relative to treatment is 0 if birth year is 1981 for early adopters and if birth year is 1982 for late adopters.

### *Heterogeneity Analysis*

Analysis that characterizes areas that responded more to the introduction of the policy can shed light on the types of women most responsive to the benefits. I expect lower income areas and areas with lower educated women to respond more to the benefits due to the flat benefit structure and lower opportunity costs of having a child.

Figure 15 presents estimates of  $\theta$  and  $\pi$  from equations 6 and 7 using estimates of GFR from 2002 Census and 1989 Census. I perform separate regressions using three independent variables measured in 1979: share of women who are ages 15 to 44 living in rural areas, share of individuals older than 10 with only elementary education, and share of individuals older than 10 with less than high school and more than elementary education. The time pattern of  $\pi$  presents changes in fertility rates after policy introduction in areas where I expect the benefits to have a larger effect on childbearing behavior relative to areas where I expect the benefits to have a smaller effect. The dashed lines indicate a 95 percent confidence interval for each coefficient.

Panel A of figure 15 demonstrates that the policy is associated with a greater response in fertility rates among rural areas compared to urban areas. The coefficients on  $\theta$  are individually statistically indistinguishable from zero and follow a slight downward trend in the years leading up to benefit introduction. This indicates that before benefit establishment fertility rates evolve similarly or even increase by less over time in areas with a high share of rural women relative to areas with a high share of urban women. However, after program establishment the coefficients on  $\pi$  jump discontinuously, which indicates a larger increase in GFR in more rural areas compared to more urban areas. This discontinuous jump together with similar trends in fertility rates in more rural and more urban areas before policy start provide strong evidence that the new

policy is associated with a larger response in fertility rates in more rural areas. After the initial jump, the GFR in more rural areas evolves similarly to the GFR in more urban areas for the first six years after program start. Seven to ten years after program start fertility rates in more rural areas compared to more urban areas remain higher than before the policy but they increase by less over time. This is consistent with benefits losing their value over time due to increasing inflation.

I provide evidence in panels B and C of figure 15 that areas with a higher share of less educated individuals have responded more to the policy. There is a similar evolution of fertility rates between areas with more educated and less educated individuals using 1989 census data, while fertility rates in less educated areas increase by less than in more educated areas using 2002 census data. However, after program start the coefficient on  $\pi$  jumps discontinuously which indicates a larger increase in GFR in less educated areas compared to more educated areas. The differential responses to the policy among more and less educated areas dissipate ten years after policy start when the policy ends.

Paid parental leave results in a reduction in the price of having a child, which may affect the number of children a woman has through income and substitution effects. Thus, an increase in fertility rates as a result of the policy reflects a positive substitution towards more children when they become cheaper and either a positive or negative income effect. Women in rural or less educated areas may experience both a larger substitution, and a larger income effect as a result of the policy. Thus, women in rural or less educated areas may adjust their childbearing by more due to either a positive substitution effect or a positive income effect. My findings probably result from a combination of these two effects, and provide novel empirical evidence about the relationship between income, the opportunity cost of a child and fertility.



## VI. Conclusion

Low fertility rates are a concern for many OECD countries, who have implemented various family friendly policies. I find an immediate response in fertility rates after the introduction of paid parental leave and birth credits in Russia. Moreover, I find that effects on fertility persist in the long run. These results indicate that the policy affected both the timing and the number of children women had. This study provides an important contribution to a hotly debated topic about whether family policy can affect fertility. This paper provides credible evidence that a policy aiming to improve the work-life balance for working women was effective at providing incentives for women to have more children.

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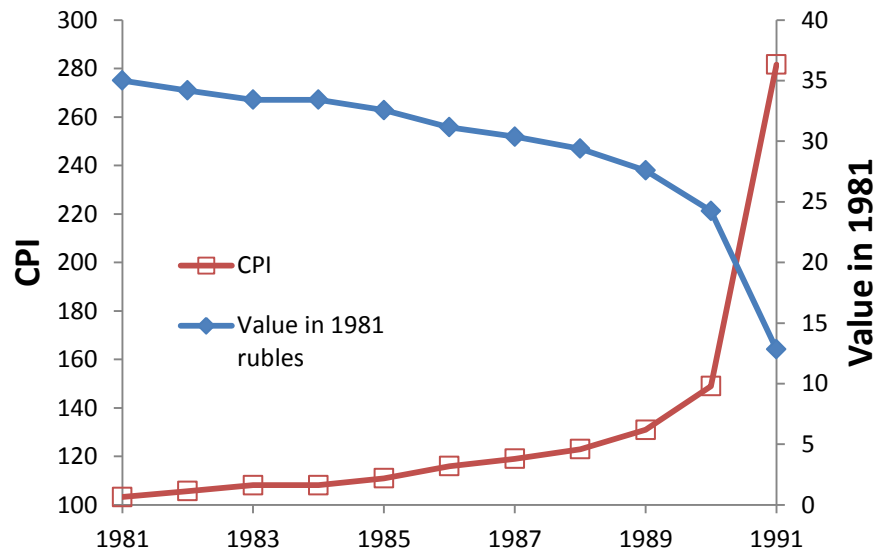
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**Figure 1: Map of Benefit Roll-Out Across Russia**



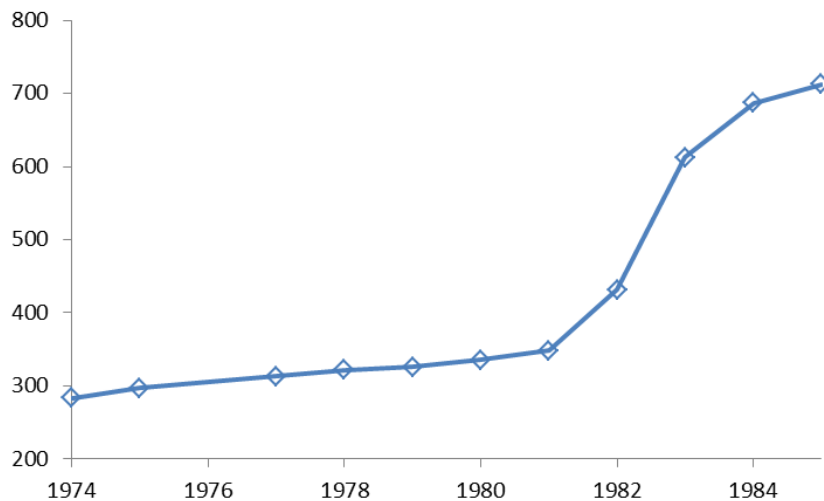
Notes: The regions in the shaded area (Northern, Siberia and Far East regions) received the benefits in November, 1981. The regions in the white area received the benefits in November, 1982.

**Figure 2: CPI and Value of the 35 Ruble Benefit in 1981 Rubles**



Notes: I plot estimates of the Consumer Price Index, and the value of the 35 ruble benefit (which did not change) in 1981 rubles using inflation rates estimated from the CPI. CPI could no longer be estimated consistently in 1992 due to hyperinflation. The value of the benefit can safely be assumed as 0 in 1992. Sources: Handbook of Economic Statistics 1986, 1990, 1991, 1992 (published by the CIA)

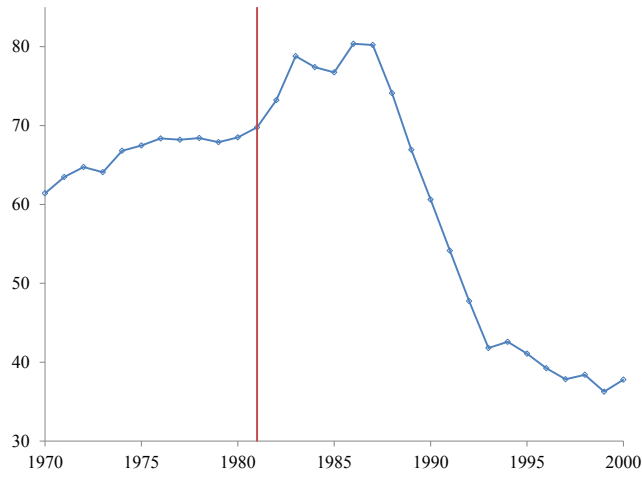
**Figure 3: Government Expenditures on Family Benefits per Birth (in rubles)**



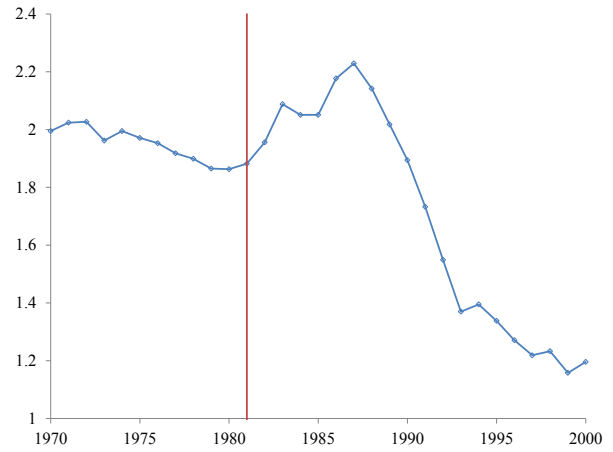
Notes: These are expenditures on family benefits in the Soviet Union per birth in rubles. Expenditures are for maternity leave only from 1974 until October, 1981. After November, 1981 expenditures include partially paid parental leave and one-time birth transfers for first, second, and third births. Source: “Vestnik Statistiki”

**Figure 4: Fertility and Abortion Rates**

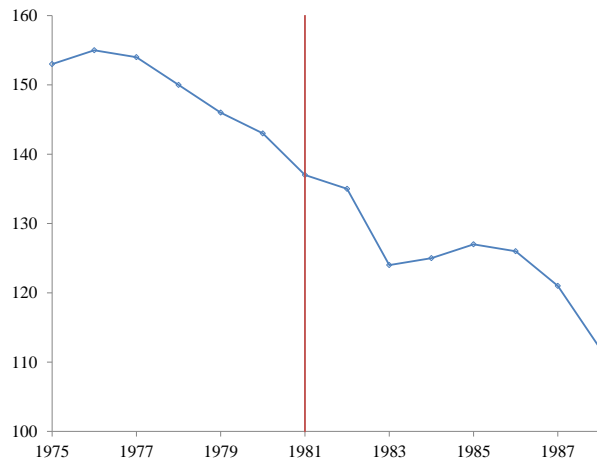
**A. General Fertility Rate**



**B. Total Fertility Rate**

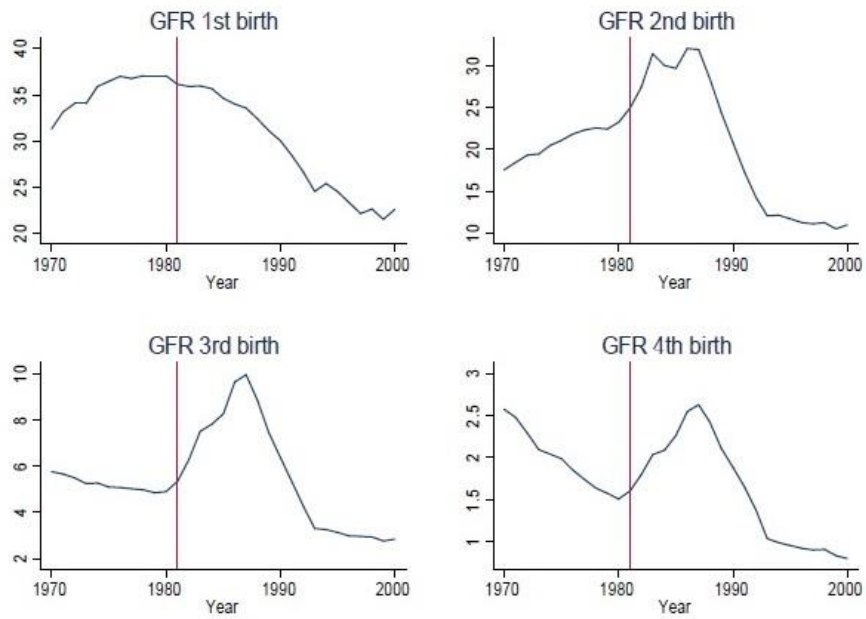


**C. Abortions per 100 Births**



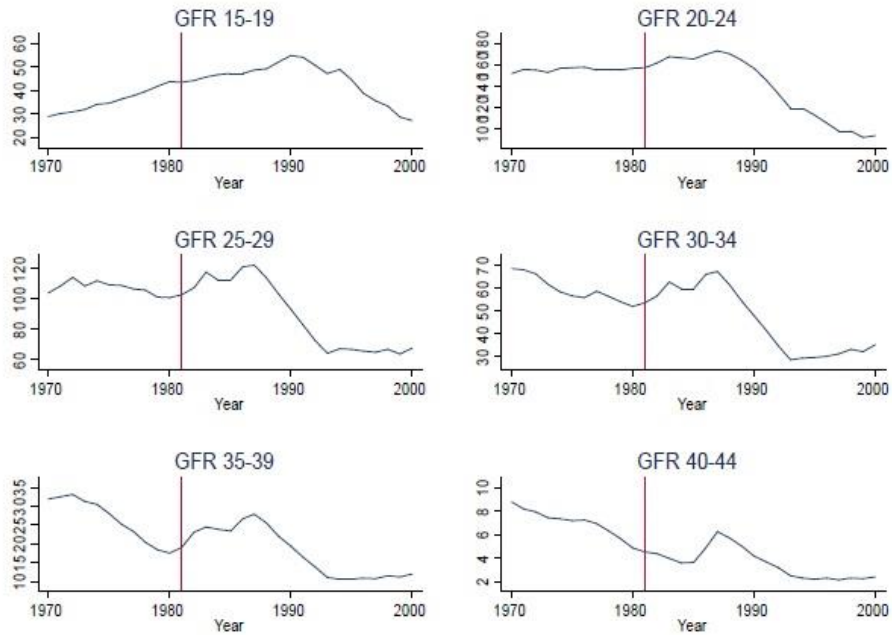
Notes: GFR is the number of births per 1,000 women age 15 to 44. The vertical line is drawn in year 1981. Source: Human Fertility Database (official statistics for the number of births and estimates of the number of women of childbearing age using interpolations between the censuses). Johnston's archive (<http://www.johnstonsarchive.net/policy/abortion/ab-russia.html>)

**Figure 5: Parity-Specific Fertility Rates**



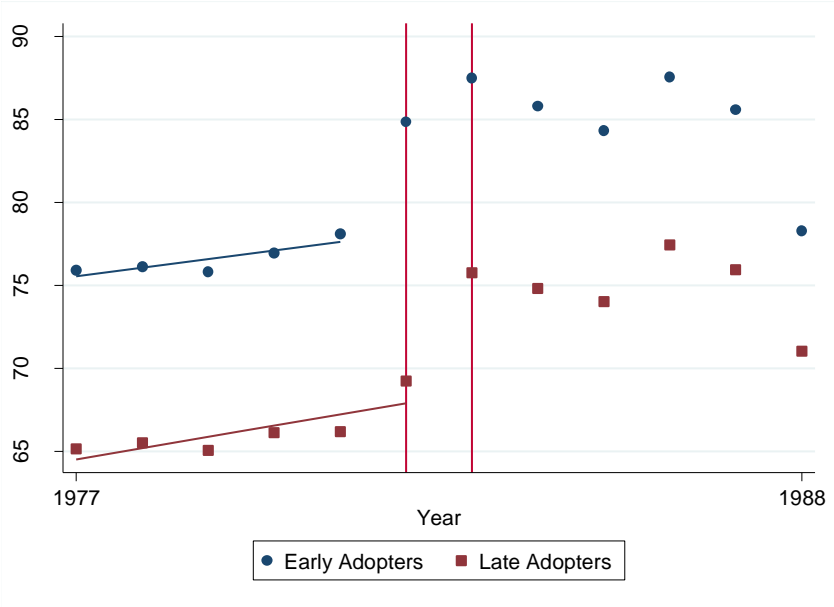
Notes: GFR for 1st birth is the number of 1st births per thousand women age 15 to 44. The vertical line is drawn in year 1981. Source: Human Fertility Database

**Figure 6: Age-Specific Fertility Rates**



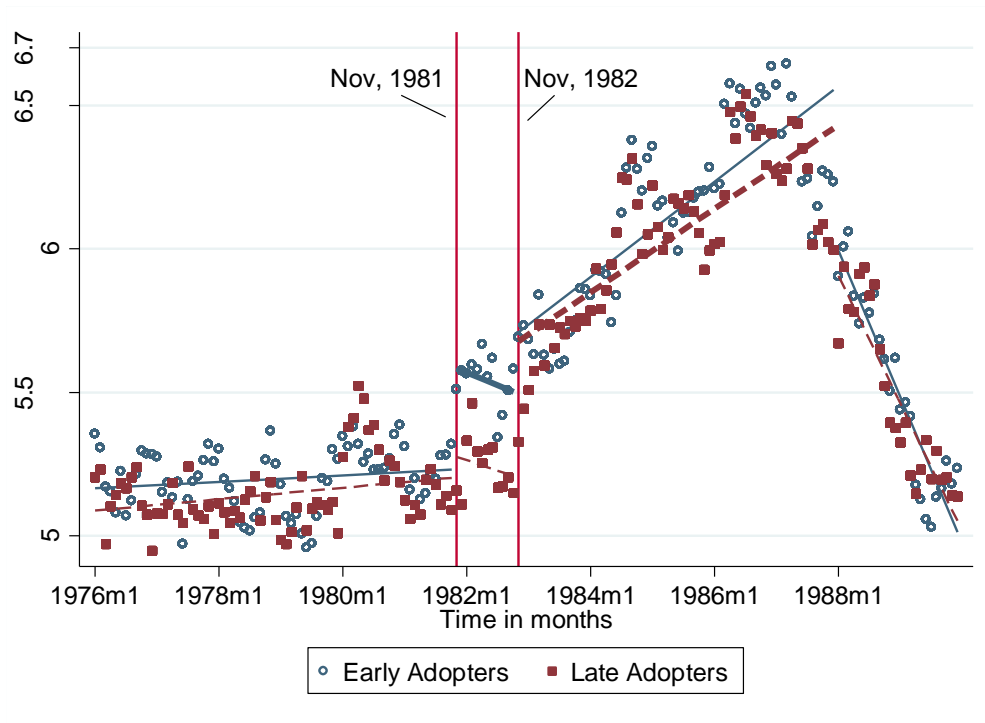
Notes: GFR 15-19 is the number of births to women ages 15 to 19 per thousand women who are ages 15 to 19. The vertical line is drawn in year 1981. Source: Human Fertility Database

**Figure 7: GFR for Early and Late Adopter Regions using 1989 Census**



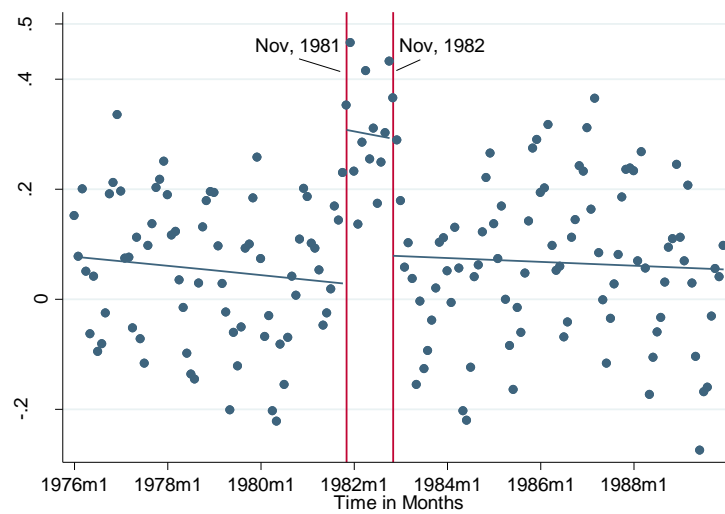
Notes: Regions treated 1<sup>st</sup> are the ones who became eligible for the benefit on November, 1981 (early adopters), regions treated 2<sup>nd</sup> are the ones who became eligible for the benefit on November, 1982 (late adopters). Source: 1989 Russian Census

**Figure 8: GFR for Early and Late Adopter Regions using 2002 Census (Monthly)**



Notes: GFR is seasonally adjusted. The solid line goes through the early adopter regions, while the dashed line goes through the late adopter regions. Source: 2002 and 1989 Russian Census

**Figure 9: Difference in GFR between the Early and Late Adopter Regions**

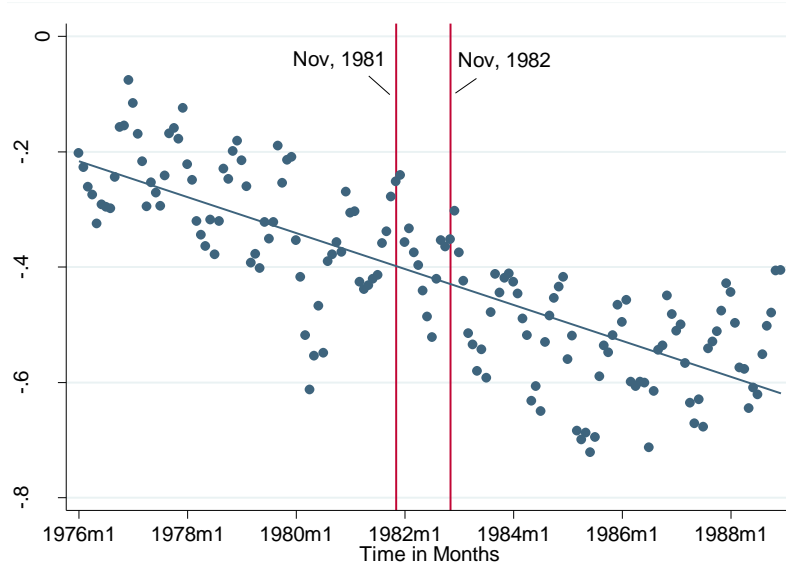


Notes: GFR early adopters – GFR late adopters. Source: 2002 and 1989 Russian Census.

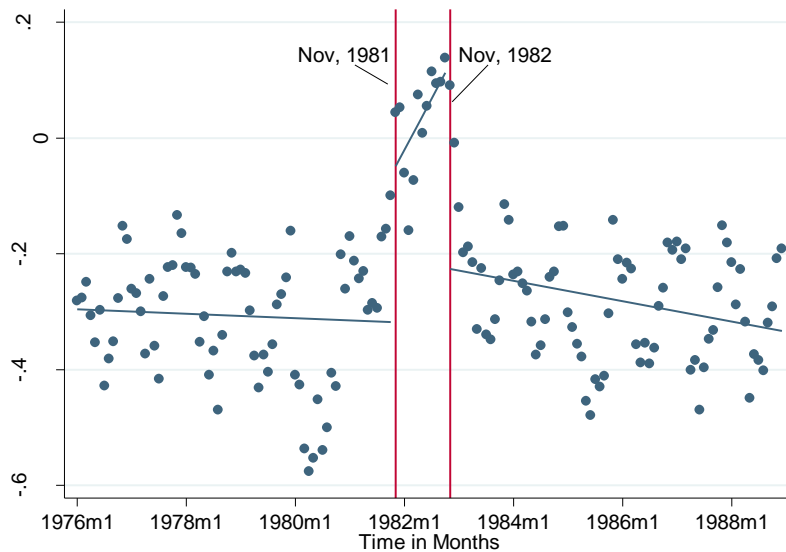


**Figure 10: Difference in Fertility Rates by Parity between the Early and Late Adopter Regions**

A. Fertility Rates for First Births



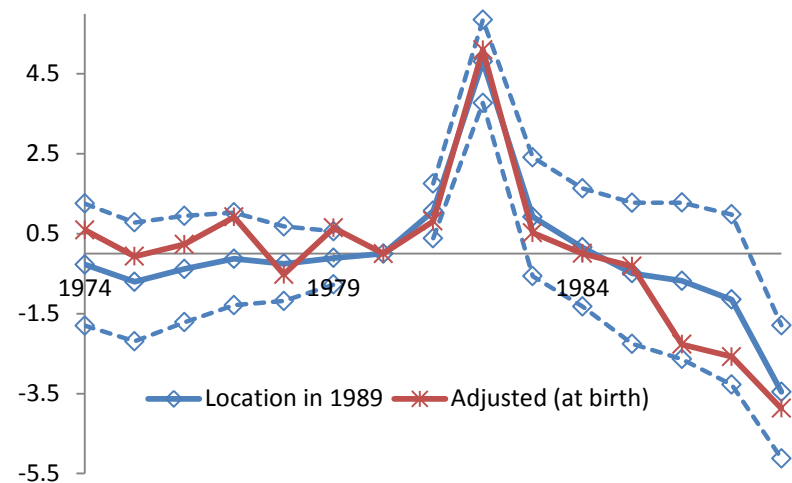
B. Fertility Rates for Higher Parity Births



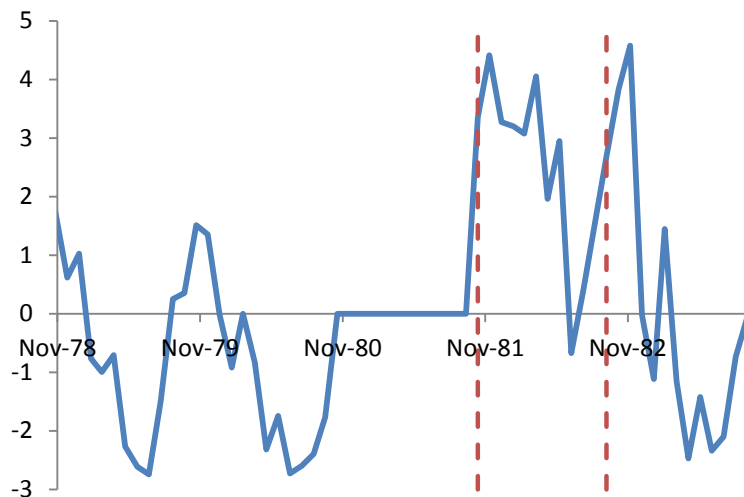
Notes: This presents the difference every month between fertility rates in early adopter regions and the late adopter regions. Panel A presents number of first births per 1,000 women ages 15-44. Panel B presents number of higher parity births per 1,000 women ages 15-44. Source: 2010 Russian Census.

**Figure 11: Estimates of Effect of Parental Leave and Birth Credits on Short-Run GFR**

A. General Fertility Rate using 1989 Census (Yearly)



B. General Fertility Rate using 2002 Census (Monthly)

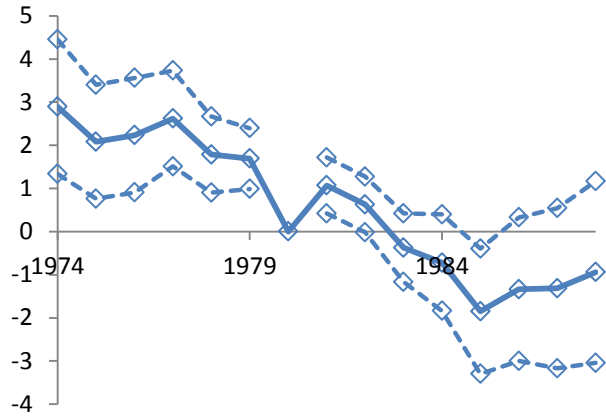


Notes: Panel A. I present  $\theta$  and  $\pi$  from equation 1 using GFR (number of births per 1,000 women age 15 to 44) as a dependent variable. I plot GFR measured based on oblast of residence in 1989, as well as GFR adjusted for measurement error to reflect oblast at birth. These coefficients represent the difference in GFR between the early adopters compared to the late adopters in each year relative to the difference in 1980. The coefficient on year 1981 presents the effect of the policy when the early adopters received benefits for 2 months, while the coefficient on year 1982 presents the effect of the policy when the early adopters received benefits for the whole year. I use yearly GFR constructed using 1989 Census data to estimate the number of births. The model includes year and oblast fixed effects. Weights are the number of women who are ages 15 to 44 living in an oblast in 1980. Heteroskedasticity-robust standard errors clustered by oblast construct 95-percent, point-wise confidence intervals (dashed lines). Source: 1989 Russian Census

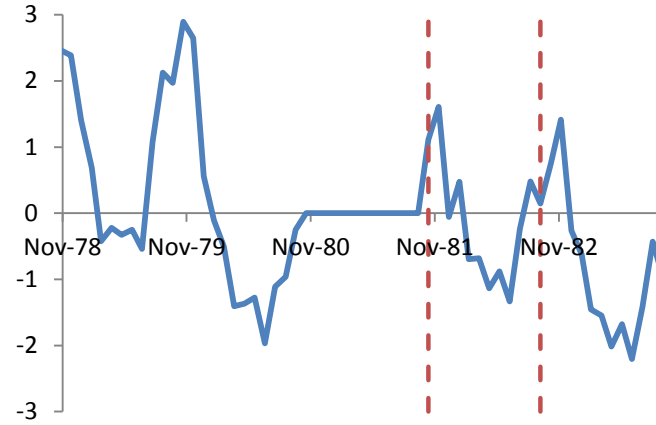
Panel B. I present  $\theta$  and  $\pi$  from equation 2 using GFR as a dependent variable. I use monthly GFR constructed using 2002 Census data to estimate the number of births, and multiply it by 12 to match the scale of annual GFR in panel A. These coefficients represent the difference in GFR between the early adopters and the late adopters in each month relative to the difference in the period from November, 1980 until October, 1981, which is 0 by construction. The model includes year, oblast, and month fixed effects. The vertical dashed lines are drawn at November, 1981 and October, 1980. Weights are the number of women who are ages 15 to 44 living in an oblast in 1980. I use heteroskedasticity-robust standard errors clustered by oblast. Sources: 1989 and 2002 Russian Census

**Figure 12: Estimates of Effect of Parental Leave on Short-Run Fertility Rates by Parity Using 2010 Census**

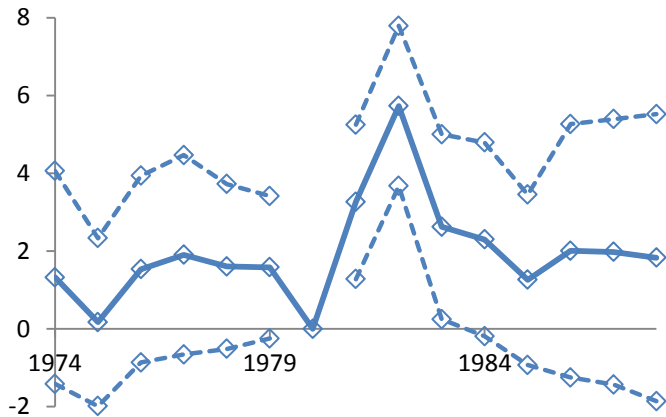
**A. Fertility Rates for First Births (Year-level)**



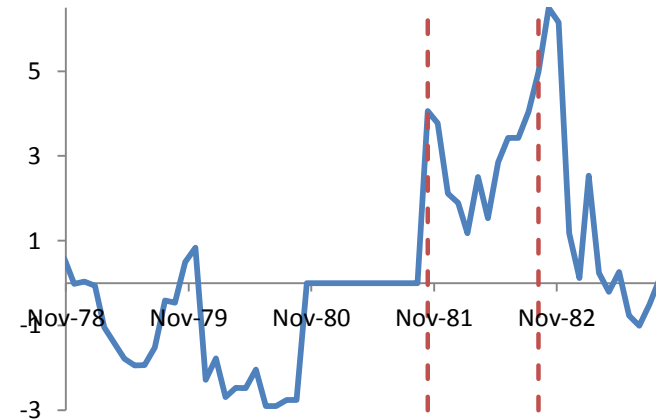
**B. Fertility Rates for First Births (Month-level)**



**C. Fertility Rate for Higher Order Births (Year-level)**



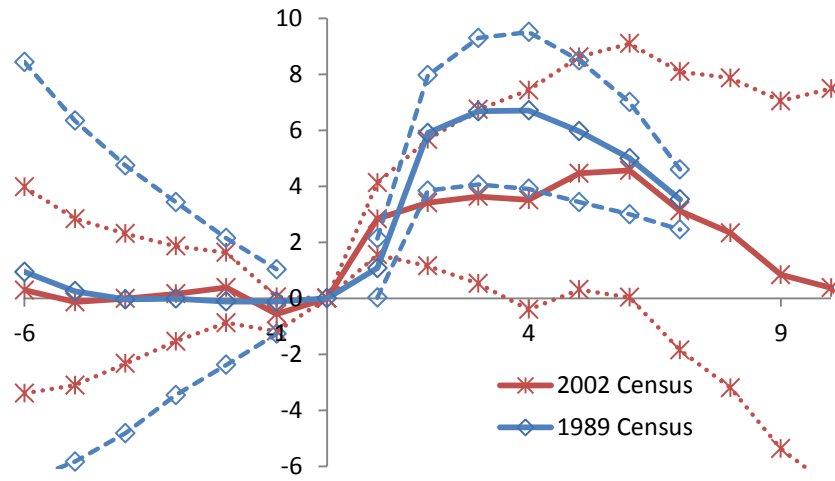
**D. Fertility Rate for Higher Order Births (Month-level)**



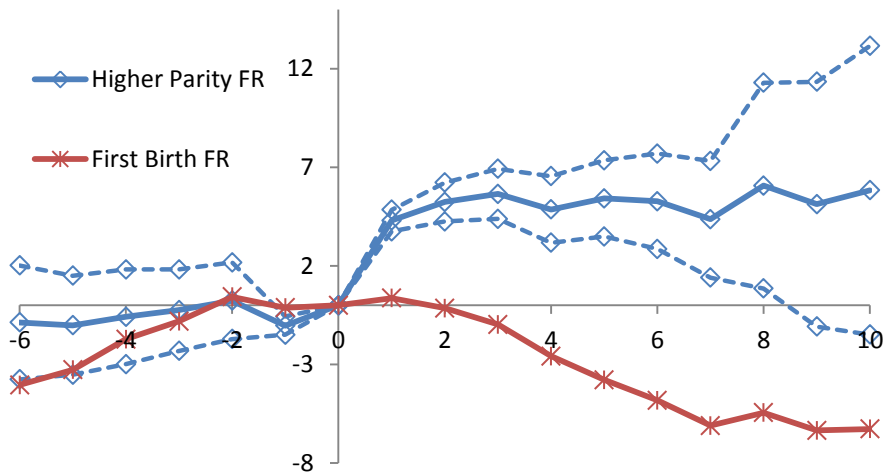
Notes: For panels A and B, see notes for panel A in Figure 10. For panels C and D, see notes for panel B in Figure 11. Fertility Rates for first births are calculated as number of first births per thousand women age 15-44, while fertility rates for higher order births are calculated as all non-first births per thousand women age 15-44. Sources: 2010 Census, 1989 Census.

**Figure 13: Estimates of the Effect of Family Policy on Long-Run Fertility Rates**

A. GFR



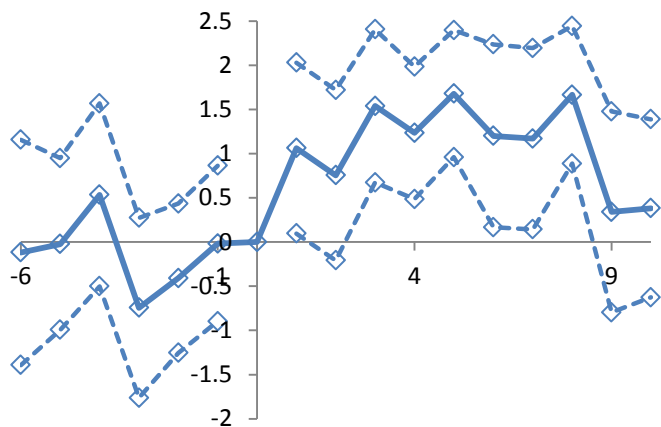
B. Fertility Rates by Parity (using 2010 Census)



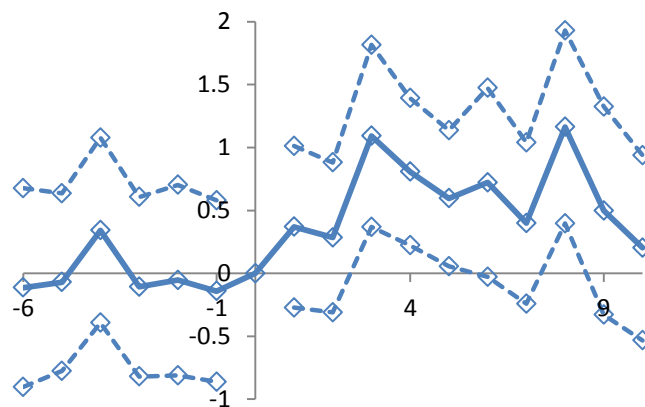
Notes: I present  $\theta$  and  $\pi$  from equations 4 and 5 using GFR (number of births per 1,000 women age 15 to 44) as a dependent variable in panel A. These coefficients show the evolution of fertility rates conditional on covariates before and after the introduction of family benefits. I use yearly GFR constructed using the number of births from 1989 census during years 1974 through 1988. I use monthly GFR constructed using the number of births from 2002 census during years 1974 through 1992. I multiply this measure of monthly GFR by 12 to match in scale estimates of yearly GFR from 1989 census. Weights are the number of women who are ages 15 to 44 living in an oblast in 1980. Heteroskedasticity-robust standard errors clustered by oblast construct 95-percent, point-wise confidence intervals (dashed lines). Source: 1989 Russian Census, 2002 Russian Census

**Figure 14. Estimates of Effect of Family Policy on Demographic Composition of Mothers**

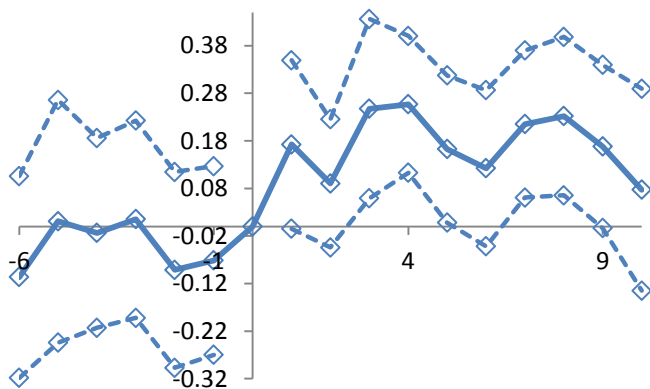
A. Mean Mother's Age at Birth



B. Mean Interval From Previous Birth



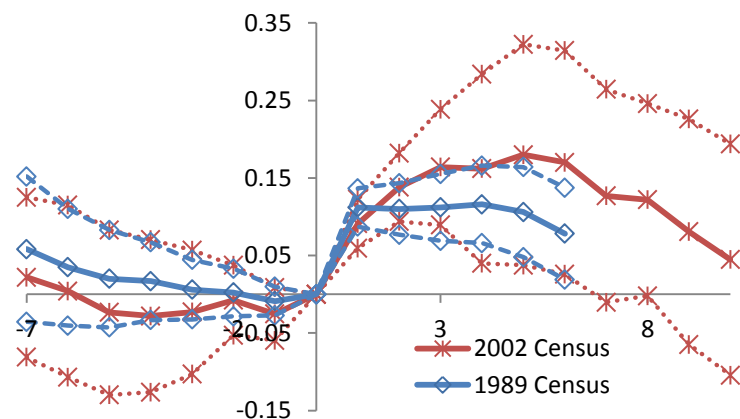
C. Mean Number of Older Siblings of Child



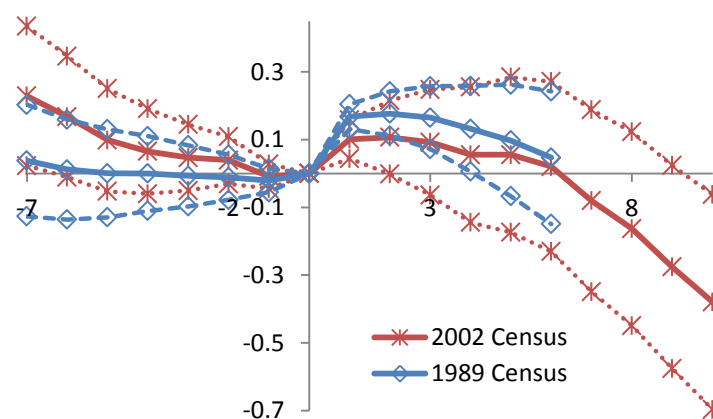
Notes: I present  $\theta$  and  $\pi$  from equation 4 using mother's demographic characteristics as dependent variables. These coefficients show the evolution of demographic composition of mothers conditional on covariates before and after the introduction of family benefits. Years since treatment = 0 if birth year = 1981 in early adopters, and if birth year = 1982 for late adopters. The coefficient on years since treatment = 0 is normalized to zero. Source: Generations and Gender Survey

**Figure 15: Heterogeneous Responses of GFR to the Family Policy for Different Types of Areas**

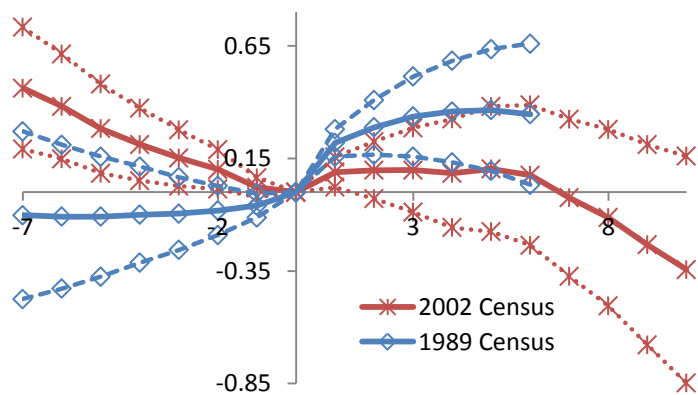
A. Share of Women Age 15 to 44 Living in Rural Areas



B. Share of Individuals with Only Elementary Education



C. Share of Individuals with Less than High School Education



Notes: I present  $\theta$  and  $\pi$  from equations 6 and 7 using GFR as a dependent variable and interacting event study dummies with an oblast level characteristic as reported in the 1979 census. The coefficients show the pattern over time in GFR in regions where the policy may have had a greater impact on fertility relative to areas where it may have had a smaller impact. See notes from Figure 11. Sources: 1979 Census, 1989 Census, 2002 Census.

**Table 1: The Effect of Parental Leave and Child Benefit on Fertility Rates**

<i>Short Run</i>						
A.	<i>GFR</i>		<i>Higher Order FR</i>	B.	<i>GFR</i>	
	2002 Census	1989 Census	2010 Census		2002 Census	<i>Higher Order FR</i> 2010 Census
Year 0		1.251 [0.586]				
Year 1	2.871 [1.016]	4.996 [0.748]	3.669 [0.506]	Nov, 1981 -- Oct, 1982	0.394 [0.414]	1.697 [0.413]
Years 2 to 7	0.762 [1.282]	-0.806 [0.749]	0.917 [0.795]			
R-squared	0.939	0.971	0.938	R-squared	0.956	0.951
Oblasts	88	88	88	Oblasts	51	51
Observations	15,840	1,320	15,840	Observations	5,304	5,304
Mean FR	66.06	72.27	32.82	Mean FR	61.848	30.276
<i>Long Run</i>						
C.	<i>GFR</i>		<i>Higher Order FR</i>			
	2002 Census	1989 Census	2010 Census			
Year 0		0.67 [0.398]				
Years 1 to 3	3.045 [0.837]	5.083 [0.791]	4.104 [0.443]			
Years 4 to 6	3.143 [1.3308]	3.939 [0.574]	3.018 [0.742]			
Years 7 to 10	1.749 [1.2987]		1.868 [0.766]			
R-squared	0.936	0.972	0.909			
Oblasts	88	88	88			
Observations	16,896	1,320	16,896			
Mean FR	63.816	72.27	32.388			

Notes: For all panels, GFR and fertility rate for higher order births at the month level calculated using 2002 and 2010 census data respectively is multiplied by 12 to match GFR at the annual level calculated using 1989 census. Models using 1989 census include year and oblast fixed effects, while models using 2002 or 2010 censuses add month fixed effects. *Panel A*: This table summarizes the magnitudes of the event-study estimates using equations 1 and 2 and their joint significance in a difference in difference model. Using 1989 data, Year 0 is a dummy variable for 1981 (early adopters received benefits for only 2 months); Year 1 is a dummy for year 1982, and Years 2 to 7 is a dummy for years 1983 through 1988. Using 2002 or 2010 data, Year 1 is a dummy for up to 12 months after policy start; Years 2 to 7 is a dummy for 13 months to 7 years after policy start. *Panel B*: This presents coefficient  $\beta_3$  in equation 3 -- coefficient on a dummy for the period from November, 1981 through October, 1982. *Panel C*: This table summarizes the magnitudes of event-study estimates using equations 4 and 5 and their joint significance in a difference in difference model. Using 1989 data, Year 0 is a dummy for 1981 for early adopters and 1982 for late adopters; Years 1 to 3 is a dummy for 1982-1984 for early adopters and 1983-1985 for late adopters; Years 4 to 6 is a dummy for 1985-1987 for early adopters and 1986-1988 for late adopters. Using 2002 data, Years 1 to 3 is a dummy for up to three years after policy start; Years 4 to 6 is a dummy for 3 to 6 years after policy start; Years 7 to 10 is a dummy for 7 to 10 years after policy start.

**Table 2. Effect of Paid Parental Leave on Characteristics of Mothers**

	<b>Age at Birth</b>	<b>Number of Children Before Birth</b>	<b>Interval From Previous Birth</b>
Years 1 to 3	1.585 [0.322]	0.231 [0.0615]	0.899 [0.207]
Years 4 to 6	2.089 [0.432]	0.219 [0.101]	1.191 [0.272]
Years 7 to 10	1.799 [0.578]	0.23 [0.146]	1.368 [0.438]
R-squared	0.041	0.04	0.036
Oblasts	69	69	69
Observations	4,457	4,457	3,327
Mean Dep Var	24.85	0.782	2.723

Notes: This table summarizes the magnitudes of event-study estimates using equation 4 and their joint significance in a difference in difference model. However, the unit of observation is an individual (it was oblast in previous analysis). Years 1 to 3 is a dummy for up to three years after policy start; Years 4 to 6 is a dummy for 3 to 6 years after policy start; Years 7 to 10 is a dummy for 7 to 10 years after policy start. The omitted category is 7 to 0 years before policy start. Source: Generations and Gender Survey