APPENDIX A

References to Soviet Laws and Newspaper Articles

Soviet Laws

Goskomtrud and Secretariat VTsSPS. 1970. "About Offering Additional Unpaid Leave to Women until the Child is One Year Old." Resolution no.89/11 from March 30.

Goskomtrud and Secretariat VTsSPS. 1982. "The Order of Offering Women Partially Paid Leave for a Child Younger than One and Unpaid Leave for a Child Younger than 18 Months." Clarification no.7/10-30 from July 6.

Presidium Verhovnogo Soveta USSR. 1947. "About the Size of Government Transfer to Mothers who Have Many Children and Single Mothers." Ruling no. 41 on November 25.

Presidium Verhovnogo Soveta USSR. 1974. "About the Introduction of Payments for Children to Poor Families." Ruling no. 52 on September 25.

Presidium Verhovnogo Soveta USSR. 1981. "About Arrangements to Increase Government Help to Families with Children." Resolution no. 5571-X on September 2.

Sovmin RSFSR, 1981a. "About Arrangements to Increase Government Help to Families with Children." Resolution no. 228 on April 24.

Sovmin USSR, VTsSPS. 1981b. "The Order of Offering Women Partially Paid Leave after a Child less than a Year Old and Unpaid Leave until the Child is a Year and a Half." Resolution no. 865 on September 2.

Sovmin USSR, VTsSPS. 1989. "About Increases in Length of Leave for Women with Young Children." Resolution no. 677 on August 22.

TSK KPSS, Sovmin USSR. 1981. "About Arrangements to Increase Government Help to Families with Children." Resolution no. 235 on January, 22.

Soviet Newspaper Articles

Izvestija, "Project of 26th Gathering of the Party 'Main Directions of Economic and Social Development for 1981-1985 and for the Period until 1990'." (December 2, 1980, p.2).

------, "For the Good of the Family." (January 30, 1981a, p.1).

------, "Survey of Newspaper Post. Government and the Family." (February 13, 1981b, p.2).

------, "TSK KPSS and SM USSR Adopted a Ruling "About Arrangements to Increase Government Help to Families with Children "." (March 31, 1981c, p.1).

------, "To the Woman-Worker, and Woman-Mother." (September 8, 1981d, p.1).

Pravda, "Project of 26th Gathering of the Party 'Main Directions of Economic and Social Development for 1981-1985 and for the Period until 1990'." (December, 2, 1980, p. 5).

--------, "For a Soviet Person." (January 14, 1981a, p. 1).

--------, "From the Mothers." (January 15, 1981b, p.3).

--------, ""TSK KPSS and SM USSR Adopted a Ruling "About Arrangements to Increase Government Help to Families with Children"." (March 31, 1981c, p.1).

APPENDIX B

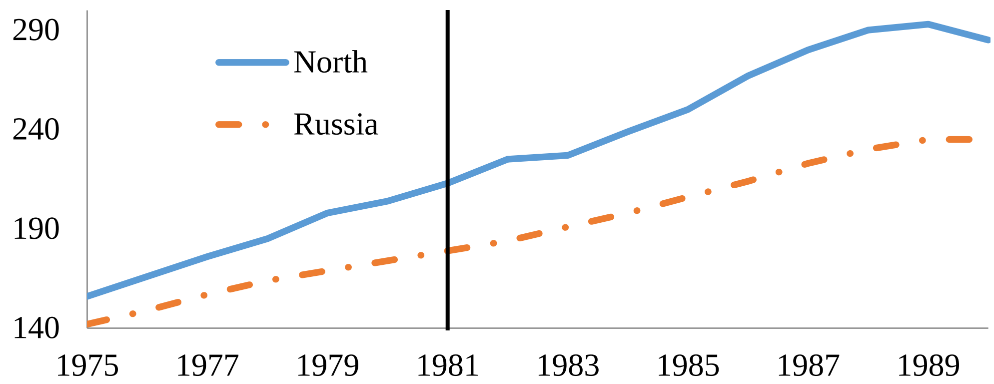
Supplementary Figures and Tables

Figure B1. Map of Benefit Roll-Out Across Russia

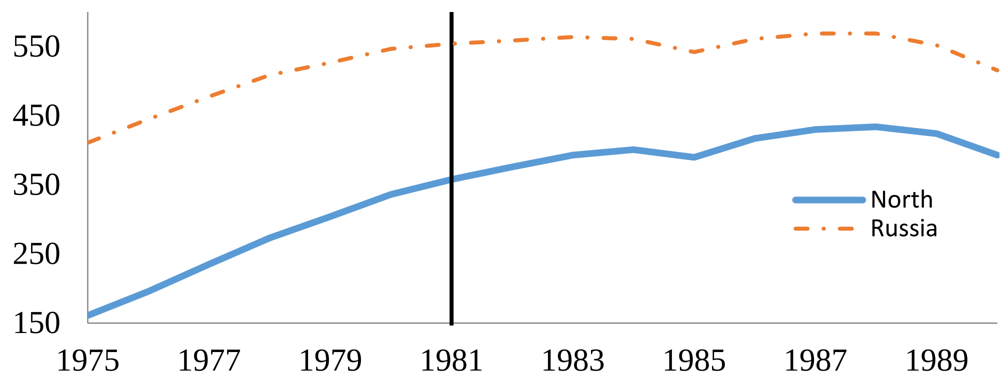
Notes: The early beneficiaries, where maternity benefits started in November, 1981, are shaded. The late beneficiaries, where maternity benefits started in November, 1982, are white.

Figure B2. Evolution of Economic Indicators in the North and the Rest of Russia

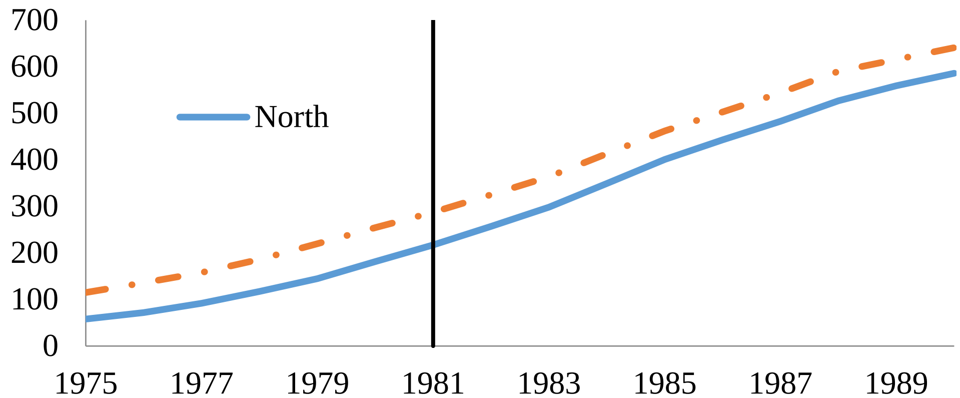
A. Growth of Industrial Product (1970=100)



B. Oil Production (million tons)

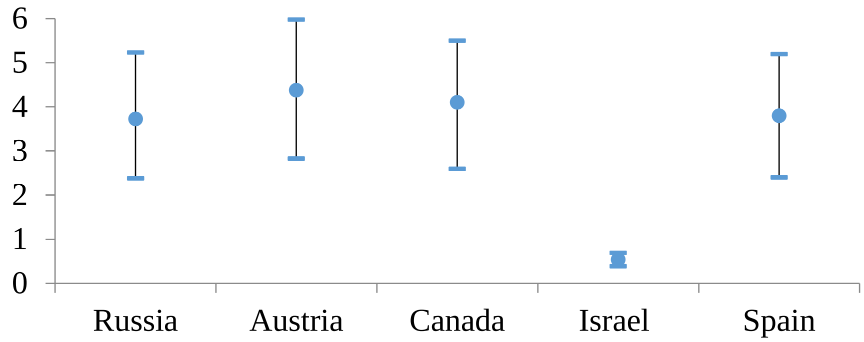


C. Gas Production (milliard cubic meters)



Notes: The North is composed of 16 early beneficiary oblasts: Jakutsk ASSR, Murmansk, Kamchatsk, Magadan, Sahalin, Komi and Burjat ASSR, Krasnojarsk kraj, Primorsk, Habarovsk, Archangelsk, Tomsk, Tyumen, Irkutsk, Chitinsk, Amur oblasts. Sources: 1975-1990 “Narodnoe Hozyaystvo” yearbooks

Figure B3. Comparison of Short-Run Childbearing Elasticities across Countries



Notes: This plot presents estimates of short-run elasticities of childbearing with respect to the cost of a child until the child is 18 years old in Russia (this paper) and in other countries (other studies). The estimates are surrounded by their 95-percent confidence interval. See appendix F for elasticity and confidence interval construction.

Table B1. Heterogeneous Fertility Rate Increases to Maternity Benefits across Regions

	(1)	(2)
Dependent variable	*A. General Fertility Rate*	
Before Program		
(Event Years -5 to -1) ∗ % Rural	0.026	0.023
	[0.0207]	[0.0250]
After Program		
(Event Years 1 to 3) ∗ % Rural	0.116***	0.127***
	[0.0413]	[0.0424]
(Event Years 4 to 6) ∗ % Rural	0.129*	0.148**
	[0.0687]	[0.0713]
(Event Years 7 to 10) ∗ % Rural	0.140	0.157*
	[0.0921]	[0.0885]
R-squared	0.913	0.914
Dependent variable	*B. General Fertility Rate*	
Before Program		
(Event Years -5 to -1) ∗ % Less than HS	0.007	0.007
	[0.0159]	[0.0158]
After Program		
(Event Years 1 to 3) ∗ % Less than HS	0.149***	0.149***
	[0.0287]	[0.0295]
(Event Years 4 to 6) ∗ % Less than HS	0.181***	0.181***
	[0.0498]	[0.0507]
(Event Years 7 to 10) ∗ % Less than HS	0.182***	0.179***
	[0.0640]	[0.0646]
R-squared	0.915	0.915
Covariates	Year FE, Oblast FE	Year FE, Oblast FE, $X_{o,y}$
Oblast-year cells	1,444	1,444
Oblasts	82	82

Notes: These coefficients present interactions of grouped event-year dummies with a continuous oblast level characteristic measured in 1979 (share of women age 15 to 44 living in rural areas {panel A}; share of individuals with less than high school education {panel B}). See the description of event-year dummies in table 5. Standard errors clustered at the oblast level are in brackets. These coefficients are directly comparable to the coefficients presented in figure 6. Weights are the number of women who are ages 15 to 44 living in an oblast in 1980. Statistically significant at ***0.01, **0.05, *0.10. Sources: see sources in figure 6.

Table B2. Comparison of Soviet Russia in 1980 to OECD Countries in 2013

	1980	2010-2013				
	Russia	**USA**	**Austria**	**Italy**	**Spain**	**Sweden**
Total Fertility Rate	1.9	1.9	1.4	1.4	1.3	1.9
% Childless Women	9.5	14	21	24	13	13
% in Formal Care (age <3)	34	43.2	13.9	24.2	39.3	46.7
% in Formal Care (age 3-6)	63	66.5	75	90	91	92
Female Labor Force Participation	85	67	70	54.4	70	79
Female/Male Wage Ratio	70	82.2	80.8	72.6	93.9	85.7
Gini Coefficient	0.29	0.39	0.28	0.32	0.34	0.27

Sources: 1979 Russian census, 1980 “Narodnoe Hozyaystvo” Yearbook, OECD Statistics.

APPENDIX C

Expected Effects of Maternity Benefits on Childbearing

PROPOSITION 1: The effect of parental leave, a, on childbearing, n, is positive if the difference of the true income elasticity for quantity and the true income elasticity for quality, $\eta_n - \eta_q$, is sufficiently large enough (condition for the income elasticity to be positive).

Proof of Proposition 1

I derive the effect of family benefits on the number of children by maximizing utility, $U(n,q,z)$, subject to the lifetime budget constraint, $\pi qn + [t(w_f - a) - b]n + \pi_z z = T(w_f + w_m)$. The budget constraint is nonlinear in n and q, which leads to the ambiguous effect of the benefits on the number of children discussed in the paper. This problem is associated with the following first order conditions: $\frac{U_n}{U_q} = \frac{\pi q + t(w_f - a) - b}{n\pi}$ (i), $\frac{U_q}{U_z} = \frac{\pi n}{1}$ (ii), $\frac{U_n}{U_z} = \frac{\pi q + t(w_f - a) - b}{1}$ (iii). Notably, the shadow price of quantity, p_n, depends on quality, q, while the shadow price of quality, p_q, depends on quantity, n.

I take the total derivative of the budget constraint and the first order conditions. I impose standard assumptions on the utility function $U_n > 0, U_q > 0, U_z > 0, U_{nn} < 0, U_{qq} < 0, U_{zz} < 0$, and I assume that the utility function is additively separable such that $U_{nz} = U_{zn} = U_{nq} = U_{qn} = U_{qz} = U_{zq} = 0$. The consumption good, z, serves as the numéraire and its price is set to one. The total derivatives of the first order condition (i) with respect to a is $\pi n\left(\frac{dq}{da}\right) + \pi q\left(\frac{dn}{da}\right) + \left(\frac{dn}{da}\right)\left(t(w_f - a) - b\right) - nt + \left(\frac{dz}{da}\right) = 0$, of condition (ii) is $U_{nn}\pi n\left(\frac{dn}{da}\right) + U_n\pi\left(\frac{dn}{da}\right) = U_{qq}\left(\frac{dq}{da}\right)\left(\pi q + t(w_f - a) - b\right) + U_q\left(\pi\left(\frac{dq}{da}\right) - t\right)$, and of condition (iii) is $U_{qq}\left(\frac{dq}{da}\right) = U_{zz}\left(\frac{dz}{da}\right)\pi n + U_z\pi\left(\frac{dn}{da}\right)$, $U_{nn}\left(\frac{dn}{da}\right) = U_{zz}\left(\frac{dz}{da}\right)\left(\pi q + t(w_f - a) - b\right) + U_z\left(\pi\left(\frac{dq}{da}\right) - t\right)$.

After some algebraic manipulation of the total derivatives, I derive the following effect of parental leave on childbearing,

$$\frac{dn}{da} = \frac{\pi n^2 t U_{ZZ}\left(U_{qq}\left(\pi q + t(w_f - a) - b\right) + U_q\pi\right) - U_q t\left(U_{qq} + \pi n U_{zz}\right)}{\left(U_{nn}\pi n + U_n\pi\right)\left(U_{qq} + \pi n U_{zz}\right) - \left(U_{zz}\left(-\pi^2 qn - \left(t(w_f - a) - b\right)n\pi + U_z\pi\right)\left(U_{zz}\left(\pi q + t(w_f - a) - b\right) + U_q\pi\right)\right.}$$

whose sign is ambiguous. I decompose the above formula,

$$\frac{dln(n)}{dln(a)} = \frac{atn}{I}\left(\underbrace{\frac{dln(n)}{dln(I)}\Big|_{\pi s\ constant}}_{Income\ Elasticity}\right) + \underbrace{\frac{dln(n)}{dln(a)}\Big|_{I\ constant}}_{Substitution\ Elasticity}$$

where the elasticity of childbearing with respect to paid leave is the sum of income and substitution elasticities. This general formula does not make clear what generates the ambiguity of the sign of the overall effect.

To obtain more intuitive expressions for the income and substitution elasticities, I solve the maximization problem by replacing the non-linear budget constraint with a linear one by making it a function of shadow prices: $p_n n + p_q q + p_z z = I - \pi qn = R$. The shadow price of n is $p_n = \pi q + t(w_f - a) - b$, the shadow price of q is $p_q = \pi$ and of z is $p_z = \pi_z$, which means that: $dln(p_n) =$

$\left(\frac{1}{k_n}\right)[\left(dln(\pi)+dln(q)\right)k+dln(t)\left(\frac{(w_f-a)tn}{R}\right)+dln\left(w_f\right)\frac{tnw_f}{R}-dln(a)\frac{ant}{R}-dln(b)\frac{bn}{R}]$ and $dln\left(p_q\right)=(\frac{k}{k_q})(dln(\pi)+dln(n))$. In these equations, $k=\frac{nq\pi}{R}; k_n=\frac{p_n n}{R}; k_q=\frac{p_q q}{R}$.

To derive the income and substitution elasticities I use the following propositions:

$$dln(n)=\eta_n dln\left(\frac{R}{p}\right)+k_z\sigma_{nz}dln(p_z)-(1-k_n)\overline{\sigma_n}dln(p_n)+k_t\sigma_{nt}dln(p_t)$$

$$dln(t)=\eta_t dln\left(\frac{R}{p}\right)+k_z\sigma_{tz}dln(p_z)+k_n\sigma_{nt}dln(p_n)-(1-k_t)\overline{\sigma_t}dln(p_t)$$

where the σ's are the Allen partial elasticities of substitution in the utility function, and $\overline{\sigma_n}$ is the average elasticity of substitution of *n* against *z* and *q*, and $\overline{\sigma_t}$ is the same elasticity for *t* against *z* and *n*. The average elasticities are always positive. Also define: $p=k_z dln(p_z)+k_n dln(p_n)+k_t dln(p_t)$.

To derive the income elasticity, let income, *I*, change while holding the π's constant, which results in: $dln(p_n)=\left(\frac{k}{k_n}\right)dln(q)$, and $dln\left(p_q\right)=(\frac{k}{k_q})dln(n)$, and $dln\left(\frac{R}{p}\right)=(1-k)dln(I)$. Plugging these into the above propositions, I obtain the following expression:

$$\frac{D}{1-k}\underbrace{\left(\frac{dln(n)}{dln(I)}\right)|_{\pi's\ constant}}_{Income\ Elasticity}=\left(1-k\sigma_{nq}\right)\eta_n-\frac{k(1-k_n)\overline{\sigma_n}}{k_n}\eta_q$$

where $D=\left(1-k\sigma_{nq}\right)^2-\frac{k^2(1-k_n)(1-k_q)\overline{\sigma_n}\,\overline{\sigma_q}}{k_n k_q}$ and $(1-k\sigma_{nq})$ must be positive by the second order conditions. In the equation, η_q is the true elasticity of quality with respect to income, where it uses a measure of income that is calculated using shadow prices (marginal costs) whose ratios in equilibrium are equal to the marginal rates of substitution in the utility function, while η_n is the true elasticity of quantity with respect to income. Thus, if $\eta_q>\eta_n$ by a sufficiently large enough magnitude, then the income elasticity could be negative. The sufficient condition for the income effect to be positive is if: $\left(1-k\sigma_{nq}\right)\eta_n>\frac{k(1-k_n)\overline{\sigma_n}}{k_n}\eta_q$.

In a similar manner I also derive the elasticity of substitution:

$$D\frac{dln(n)}{dln(a)}|_{I\ const}=\frac{(1-k_n)\overline{\sigma_n}ant}{k_n R}$$

and the sign is unambiguously positive.

COROLLARY 1: The effect of cash transfers (*b*) on childbearing is positive if the difference of the true income elasticity for quantity and the true income elasticity for quality, $\eta_n-\eta_q$, is sufficiently large enough.

Proof of Corollary 1

Following the same procedure as in the proof of proposition 1, I derive the following effect of the cash transfer, *b*, on childbearing:

$$\frac{dn}{db}=\frac{\pi n^2 U_{ZZ}\left(U_{qq}\left(\pi q+t\left(w_f-a\right)-b\right)+U_q\pi\right)-U_q\left(U_{qq}+\pi n U_{zz}\right)}{(U_{nn}\pi n+U_n\pi)\left(U_{qq}+\pi n U_{zz}\right)-(U_{zz}\left(-\pi^2 qn-\left(t\left(w_f-a\right)-b\right)n\pi+U_z\pi\right)\left(U_{zz}\left(\pi q+t\left(w_f-a\right)-b\right)+U_q\pi\right)}$$

where the sign of the expression is ambiguous. The elasticity of childbearing with respect to cash transfers is:

$$\frac{dln(n)}{dln(b)} = \frac{bn}{I}\left(\underbrace{\frac{dln(n)}{dln(I)}\Big|_{\pi s\ constant}}_{Income\ Effect}\right) + \underbrace{\frac{dln(n)}{dln(b)}\Big|_{I\ constant}}_{Substitution\ Effect}$$

where it is the sum of income and substitution elasticities. This general formula does not make clear what generates the ambiguity of the sign of the overall effect.

To obtain more intuitive expressions for the income and substitution elasticities, I follow the procedure outlined in proposition 1. The expression for the income elasticity is the same as in proposition 1, whose sign is positive under the same conditions. The elasticity of substitution can be expressed as: $\frac{dln(n)}{dln(b)} = \frac{(1-k_n)\overline{\sigma_n} bn}{k_n R}$, and is always positive.

PROPOSITION 2: The effect of parental leave, a, on childbearing is positive if the difference of the true income elasticity of quantity and the true income elasticity of time off, $\eta_n - \eta_t$, is sufficiently large enough (condition for the income elasticity to be positive) and the partial elasticity of substitution between *n* and *t*, σ_{nt}, is positive (condition for the substitution elasticity to be positive).

<u>Proof of Proposition 2</u>

I derive the effect of family benefits on the number of children by maximizing, $U(n,t,z)$, subject to the lifetime budget constraint, $\left[t\left(w_f - a\right) - b\right]n + \pi_z z = T(w_f + w_m)$. The budget constraint is nonlinear in *n* and *t*, which leads to the ambiguous effect of the benefits on the number of children discussed in the paper. This problem is associated with the following first order conditions: $\frac{U_N}{U_Z} = \frac{t(w_f - a) - b}{1} = \frac{p_n}{p_z}$, $\frac{U_n}{U_t} = \frac{t(w_f - a) - b}{(w_f - a)n} = \frac{p_n}{p_t}$, $\frac{U_t}{U_z} = \left(w_f - a\right)n = \frac{p_t}{p_z}$. Note that the shadow price of quantity, p_n, depends on time off from work, *t*, while the shadow price of time off from work, p_t, depends on quantity, *n*.

I take the total derivative of the budget constraint and the first order conditions. I impose standard assumptions on the utility function $U_n > 0, U_t > 0, U_z > 0, U_{nn} < 0, U_{tt} < 0, U_{zz} < 0$, and I assume that the utility function is additively separable such that $U_{nz} = U_{zn} = U_{nt} = U_{tn} = U_{tz} = U_{zt} = 0$. The consumption good *z* serves as the numeraire and its price is set to one. After substituting the total derivative formulas into each other I obtain the following expression,

$$\frac{dn}{da} = \frac{(-U_{zz}n\left(w_f - a\right)\pi_n + U_z\left(w_f - a\right))n(U_{zz}nt\left(w_f - a\right) - U_z) + (t(U_{zz}\pi_n n - U_z))(U_{tt} + U_{zz}n^2\left(w_f - a\right)^2)}{(U_{nn} + U_{zz}\pi_n^2)\left(U_{tt} + U_{zz}n^2\left(w_f - a\right)^2\right) - (-U_{zz}n\left(w_f - a\right)\pi_n + U_z\left(w_f - a\right))(-U_{zz}\pi_n\left(w_f - a\right)n + U_z\left(w_f - a\right)}$$

where $\pi_n = t\left(w_f - a\right) - b$. The sign of this effect is ambiguous. I derive the elasticity of childbearing with respect to paid leave as:

$$\frac{dln(n)}{dln(a)} = \frac{ant}{I}\left(\underbrace{\frac{dln(n)}{dln(I)}|_{\pi's\ const}}_{Income}\right) + \underbrace{\frac{dln(n)}{dln(a)}|_{I_{const}}}_{Substitution}$$

where it is a combination of income and substitution elasticities. This general formula does not make clear what generates the ambiguity of the sign.

To derive more intuitive expressions of income and substitution effects, I linearize the budget constraint, such that it equals to: $p_n n + p_t t + p_z z = R = I + tn(w_f - a)$, where $p_n = t(w_f - a) - b$ and $p_t = (w_f - a)n$. Thus, $dln(p_t) = dln(w_f)\left(\frac{w_f nt}{R}\right)\left(\frac{1}{k_t}\right) + dln(a)\left(\frac{ant}{R}\right)\left(\frac{1}{k_t}\right) + dln(n)$, and $dln(p_n) = \left(\frac{1}{k_n}\right)[-dln(b)\left(\frac{bn}{R}\right) + dln(t)k_t + dln(w_f)\left(\frac{tw_f n}{R}\right) - dln(a)\left(\frac{ant}{R}\right)]$, where $k = \frac{tn(w_f - a)}{R}$, $k_n = \frac{p_n n}{n}$ and $k_t = \frac{p_t t}{R} = k$.

To calculate the income elasticity, hold prices constant which leads to: $dln(p_t) = dln(n)$; $dln(p_n) = dln(t)\left(\frac{k_t}{k_n}\right)$; $dln\left(\frac{R}{p}\right) = (1-k)dln(I)$. This leads to the following expression:

$$\frac{dln(n)}{dln(I)}|_{\pi s\ const} = \frac{1}{1 - k_t\sigma_{nt}}\left(\eta_n(1 - k_t\sigma_{nt}) - \eta_t\frac{k_t^2(1-k_n)(1-k_t)\overline{\sigma_n}}{k_n k_t}\right)$$

where the income elasticity is positive if, $\eta_n(1 - k_t\sigma_{nt}) > \eta_t\frac{k_t^2(1-k_n)(1-k_t)\overline{\sigma_n}}{k_n k_t}$. This is true if $\eta_n - \eta_t$ is large enough.

In a similar manner obtain the elasticity of substitution:

$$D\frac{dln(n)}{dln(a)}|_{I\ const} = \frac{k_a\left((1-k_n)\overline{\sigma_n} + \sigma_{nt}k_n\right)(1 - \sigma_{nt}k_t) + k_a\left(\overline{\sigma_n} + \frac{(1-k_t)\overline{\sigma_q}}{k_t}\right)}{(1-k_n)\overline{\sigma_n}k_t k_n}$$

where $D = (1 - k_t\sigma_{nt})^2 - \frac{(1-k_t)\overline{\sigma_q}(1-k_n)\overline{\sigma_n}k_t^2}{k_n k_t}$ and $(1 - k\sigma_{nt})$ are positive by the second order conditions. The sign of the substitution elasticity is positive if $\sigma_{nt} > 0$.

COROLLARY 2: The effect of cash transfers (b) on childbearing is positive if $\eta_n - \eta_t$ is sufficiently large enough.

Proof of Corollary 2

Following the same procedure as in the proof of proposition 1, I derive the following effect of paid leave on childbearing:

$$\frac{dn}{db} = \frac{\left(-U_{zz}n(w_f - a)\pi_n + U_z(w_f - a)\right)\left(nU_{zz}n(w_f - a)\right) + (U_{zz}\pi_n n - U_z)(U_{tt} + U_{zz}n^2(w_f - a)^2)}{(U_{nn} + U_{zz}\pi_n^2)\left(U_{tt} + U_{zz}n^2(w_f - a)^2\right) - (-U_{zz}n(w_f - a)\pi_n + U_z(w_f - a))(-U_{zz}\pi_n(w_f - a)n + U_z(w_f - a))}$$

where the sign is ambiguous. The elasticity of childbearing with respect to cash transfers is:

$$\frac{dln(n)}{dln(b)} = \frac{bn}{I}\left(\underbrace{\frac{dln(n)}{dln(I)}|_{\pi's\ const}}_{Income}\right) + (\underbrace{\frac{dln(n)}{dln(a)}|_{I_{const}}}_{Substitution}) ,$$

which is a combination of income and substitution effects. The formula for the income effect as well as the condition for it to be positive are the same as in proposition 2. The substitution elasticity is: $D\left(\frac{b}{n}\right)\frac{dln(n)}{dln(b)}|_{I\ const} = \frac{(1-k_n)\overline{\sigma_n}bn}{k_nR}$ and is always positive.

APPENDIX D

Estimation of Fertility Rates Using Census Data

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 the year of maternity benefits expansion, compared to 2002 and 2010 census data, and should be the least affected by misclassification error due to mortality and emigration. 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 estimate birth year of the woman using her *age* in 1989 as 1989-*age*-1, because the census took place between January 12 and January 19 in 1989. This calculation will only understate the birth year of women born between January 1st and January 11th. I use these data to backward-estimate the number of women each year (from 1975 to 1989) who are of childbearing age – ages 15 to 44. For instance, the number of women who are age 15 to 44 in 1979 is the same as the number of women who are age 25 to 54 in 1989. For years 1990 to 1992, I use published statistics in Rosstat on the number of women by age in each oblast.

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 GFR in year *y* and region *o* as the number of children born in year *y* (except those who were still born), in oblast *o* as recorded in Rosstat data per thousand women aged from 15 to 44 in year *y*, and living in oblast *o* in 1989 as recorded in the 1989 census. This is the GFR measure I use for analysis presented in figures 2, 3, 5, 6 and 7; and in tables 2 (columns 1 to 3), 5 (column 1), and G.1.

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

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. This is the GFR measure I use for analysis presented in figure 4.

$$(b)\ GFR^{2002}_{m,y,o} = \frac{Number\ of\ Births_{m,y,o}\ from\ 2002\ Census * 1000}{Number\ of\ Women\ Age\ 15\ to\ 44_{y,o}\ from\ 1989\ Census}$$

In my analysis comparing the effect of the program 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 oblast, *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. This is the GFR measure I use in table 3.

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

Second, I estimate fertility rates for all higher parity births in month, *m*, year, *y*, and oblast, *o*, as the total number of births in month, *m*, year, *y*, and oblast, *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. This is the GFR measure I use in tables 3 and 5 (columns 4 to 6).

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

Because measures (b), (c) and (d) use census data, estimates of the number of births using these data may suffer from measurement error due to emigration or mortality. To correct for this issue, I adjust each measure using the official data on the number of births. Specifically, I calculate the proportion of births that are still present in the census, $p_{o,y} = (Births_{o,y}^{Census})/(Births_{o,y}^{Vital})$, where $Births_{o,y}^{Census}$ is the number of births in oblast, *o*, in year, *y*, recorded in the census, and $Births_{o,y}^{Vital}$ are the number of births in oblast, *o*, in year, *y*, in the vital statistics data. To adjust census estimates of the number of births, I scale them by the proportion of births that are still present in the census: $Births_{o,y,m}^{adjusted} = \frac{Births_{o,y,m}^{Census}}{p_{o,y}}$.

This adjustment of first birth fertility rates (measure (c)), and higher parity fertility rates (measure (d)) for measurement error in mortality and emigration assumes that this measurement error is the same for first and higher parity births. I have data on aggregate number of births by parity. Below I present a graph of the aggregate pattern of first and higher parity fertility rates constructed using two methods: (1) using census data and adjusted using official statistics (as described in the previous paragraph) (2) using official data on the number of births by parity. The time trends appear fairly similar, which indicates that it is unlikely that my findings are driven by measurement error. Moreover, in both time-series there does not appear to be an increase in first births, but there does appear to be an increase in higher parity births, which is consistent with my finding that the increase in fertility rates is due to the increase in higher parity births.

Figure C.1 First Birth Fertility Rate Using Official and Census Data

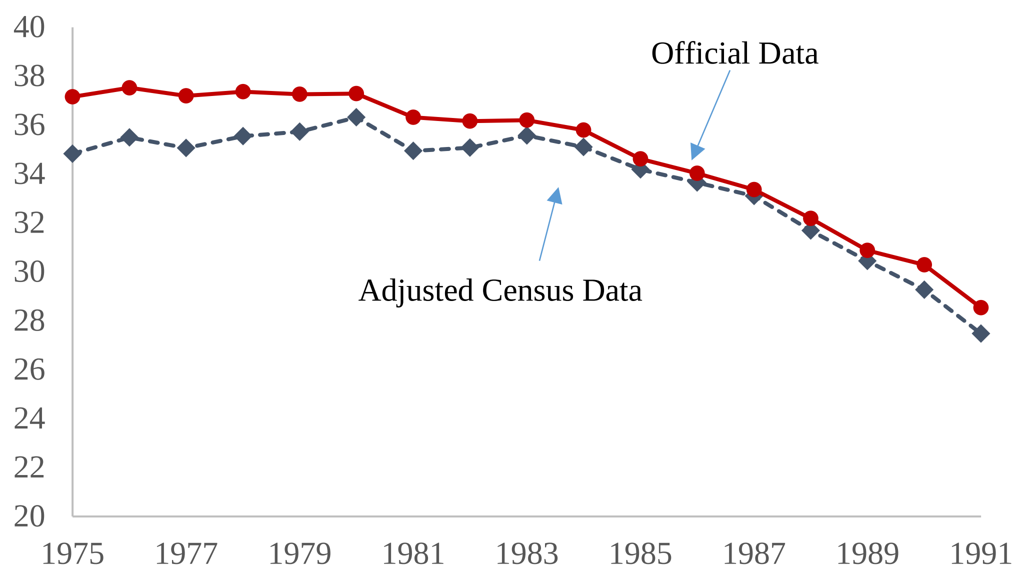
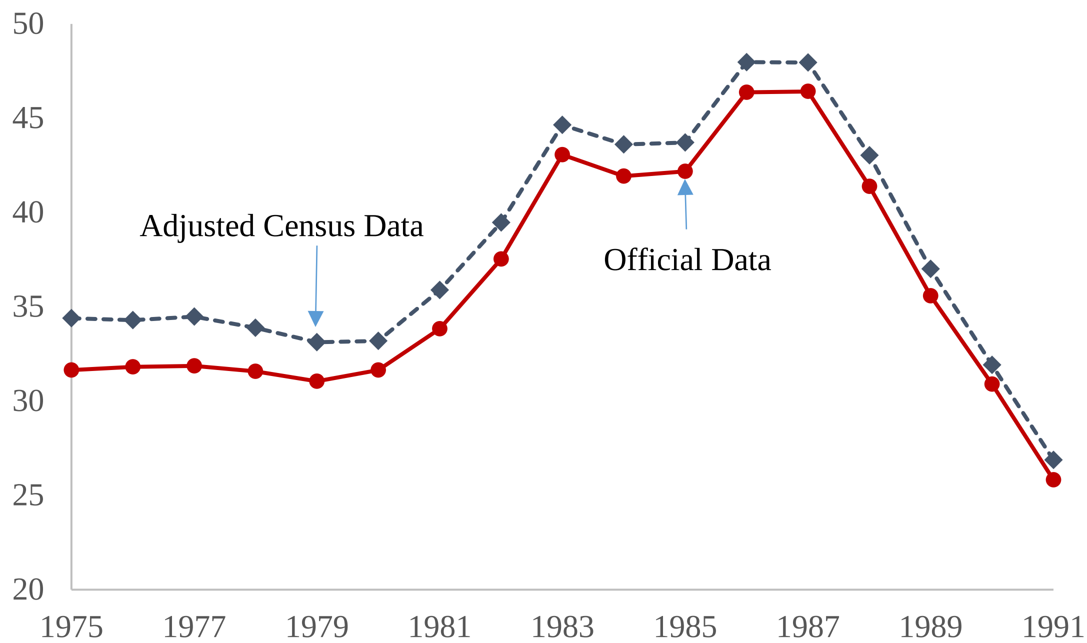


Figure C.2   Higher Parity Fertility Rate Using Official and Census Data



APPENDIX E

Data Description

Data Source	Type	Description
1989 Russian Census	count data	counts of all persons living in Russia in 1989 by age, sex, and oblast of residence
1994 Russian Microcensus	count data	counts of a sample of persons living in Russia in 1994 by birth year, sex, oblast at birth, and year of birth of every child (only reported for women). The microcensus was a 5% sample of the population, but I had access to 5% of it resulting in a 0.25% sample of the population consisting of 397,242 individuals. Due to the large amount of combinations of variables in these data, the count equals to one for every observation, making it similar to individual-level data. However, it is impossible to link individuals in the same household.
2002 Russian Census	count data	counts of all persons living in Russia in 2002 by birth year, birth month and oblast at birth
2010 Russian Census	count data	counts of all persons living in Russia in 2010 by birth year, birth month and oblast at birth (also by educational attainment, employment, gender, public assistance receipt, disability receipt, age of first birth, number of children, marital status); counts of all women present in Russia in 2010 by birth year and birth month of their first child, and by oblast at birth
1979 Russian Census	count data	counts of all persons living in Russia in January, 1979 by age, sex, oblast of residence, and by urban/rural status of the oblast; counts of persons living in Russia in January, 1979 who are older than 10 by education categories (only elementary, incomplete high school, complete high school, incomplete college, complete college)
1975-1994 "Narodnoe Hozyaystvo" Yearbooks	counts and averages data	characteristics of each oblast and in each year, where this analysis uses the production of bricks, concrete, timber, canned goods, meat, and the value of trade

APPENDIX F

Creation of the Replacement Rate

I calculate the replacement rate as: total monthly maternity benefits divided by the average female monthly wage. Total maternity benefits consist of paid parental leave and a one-time birth transfer. The formula for the replacement rate is: $\frac{B}{w}$, where B is the average monthly benefit, and w is the average female monthly wage. I calculate B as: $b_p + \frac{p_1 b_1 + (1-p_1) b_2}{12}$, where b_p is the monthly paid leave, b_1 is the one-time birth transfer for the first birth, b_2 is the one-time birth transfer for a higher parity birth, p_1 is the share of first births, and p_2 is the share of higher parity births.

First, I calculate the numerator, B, in the replacement rate formula. For this calculation, I use that, the one-time birth transfer was 50 rubles for first births and 100 rubles for higher parity births, where roughly half of all births are first births. In early beneficiary oblasts, where the paid leave was 35 rubles per month, the total monthly benefits are, $35 + \frac{0.5*50+0.5*100}{12}$; in late beneficiary oblasts, where the paid leave was 50 rubles per month, the total benefits are, $50 + \frac{0.5*50+0.5*100}{12}$.

Second, I calculate the denominator, w, in the replacement rate formula. I scale the average monthly wages of the whole population to estimate the average female monthly wages, because female wages were not published. For this purpose, I use the fact that on average women earned about 0.7 of what men earned. In doing this, I assume that the ratio of female to male earnings is the same in every oblast.

I use the average wage in 1980 for 81 oblasts in this analysis, which I manually enter from the "Russian Statistical Yearbook" from 1994. I scale the average monthly wages of the whole population to estimate the average female monthly wages, because female wages were not published. For this purpose, I use the fact that on average women earned about 0.7 of what men earned. In doing this, I assume that the ratio of female to male earnings is the same in every oblast.

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APPENDIX G

Creation of Childbearing Elasticities with Respect to Cost of a Child across Studies

I use a parametric bootstrap procedure to generate confidence intervals for the elasticity estimates in all studies (Johnston and DiNardo 1997). I generate 10,000 bootstrap draws of the reduced-form coefficients from normal distributions with means and standard errors equal to the point estimates reported in the paper. I calculate the percent change in childbearing, $dln(n)$, by dividing my bootstrap draws by the appropriate pre-treatment mean. I obtain an estimate of the cost of having a child until the child is 18 years old for a country and period relevant to the study, and generate 10,000 draws of average costs from normal distributions with means equal to the average cost estimate and standard errors equal to 10 percent of the cost for Russia, and 5 percent of the cost for all other studies. I calculate the percent change in costs, $dln(c)$, by dividing the change in monetary cost of a child induced by a policy by the bootstrap draws of average costs. Finally, I obtain 10,000 realizations of elasticities as: $\frac{dln(n)}{dln(c)}$. The values of the 2.5th and the 97.5th percentiles of the distribution of my generated elasticities constitute the 95-percent confidence interval for my estimated elasticity.

Johnston, Jack and John DiNardo. 1997. *Econometric Methods*. 4th ed. New York: McGraw-Hill.

Russia

The percent change in the cost of a child is calculated as follows. The per-month cost estimate of a child is 90 rubles, which is provided by a Soviet demographer (Valentei 1987). I calculate the cost of a child over 18 years, which equals to 90*12*18. The cost after the program subtracts parental leave payments (assuming full take-up), 35*10, and a cash transfer at the birth of a child, 75 (this is the average of the payment of 50 for a first birth and a payment of 100 for a second and third birth). Thus, the cost changed from 90*12*18 to 90*12*18-35*10-75, which represents a 2.2 percent decrease.

Austria

Guger (2003) uses the Austrian Consumer Survey from 2001 to estimate the monthly cost of a child in Austria as 500 euros, which is 389 euros in 1990 euros. The cost of raising a child before was: 388*12*18, while after the expansion of paid leave the cost became: 388*12*18-340*12 (the monthly paid leave was a fixed amount of 340 euros; I am assuming full-take up in this calculation). The cost of raising a child decreased by 4.8 percent. Childbearing went up by 21 percent (the coefficient scaled by the pre-treatment mean is, 0.068/0.32, and the standard error of the coefficient equals to 0.12; these estimates come from table 7 in Lalive and Zweimüller (2009)). Thus, the elasticity equals to: -4.4.

Spain

The average total cost of a child is estimated to be 150,000 euros. This estimate comes from surveys conducted by the consumer organization CEACCU in 42 Spanish provinces (as of 2008). The cost of a child after the benefit became: 150,000-2,500, where parents received a cash transfer of 2,500 euros at the birth of a child, which is a reduction in the cost of raising a child of 1.7

percent. The effect of the program on fertility rates is estimated at 0.063 percent (estimate in table A1 (Gonzalez 2012), with a standard error of 0.0115). This results in an elasticity of -3.8.

<u>Canada</u>

I calculate the change in cost of a child by taking a weighted average of changes in costs for first, second and third and higher parity births based on numbers reported in the paper. The benefit was 500 dollars for the first birth, 1000 dollars for second births, and 8000 dollars for third and higher parity births. The annual costs of a child as reported in the paper were: 7,935, 6,348, and 5,324 for first, second, and third births respectively. I weight these costs of a child by the share of births in each category. The resulting change in costs equals to: (500/(7935*18))*0.45+(1000/(6348*18))*0.35+(8000/(5324*18))*0.2. Thus, costs decreased by 2.1 percent. The fertility rate increased by 0.087 percent (table 6 (Milligan 2005); model c). Thus, the elasticity equals to: -4.1.

<u>Israel</u>

The elasticity, 0.54, and the standard error, 0.077, presented in this paper were derived in Cohen et al. (2013).

<u>Calculation of the Cost of the Maternity Benefits Program</u>

I obtain estimates of the number of induced births by multiplying the population of women age 15 to 44 in Russia in 1980 (32,696,400) by the event-study estimates from equation (4) and summing over event-years 1 to 11. I estimate that the program cost was about 14 billion rubles, where I assume that women took the entire leave (thus giving an upper bound of the cost). I calculate the cost from parental leave outlays by multiplying the fixed payments by 10 months (maximum time of leave) for each birth; I calculate the cost from the cash transfers by multiplying the fixed transfer by the number of births; I calculate the additional cost in terms of extra maternity benefits for births that were induced by multiplying the average national monthly salary by 4 months for the estimated induced 5 million births.