Online Appendix to: Family Planning and Development: Aggregate Effects of Contraceptive Use*

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This document is a companion (online) appendix to our paper "*Family Planning and Development: Aggregate Effects of Contraceptive Use*". Here, we describe the dataset and variables used in our paper and provide some robustness exercises to the reduced form evidence discussed in Section 3 of the paper.

We also present sensitivity analysis to the model parameters calibrated and estimated in Section 5 of the paper and robustness exercises to our quantitative analysis.

A Data Appendix

The definitions and source for the variables used in Section 3 of the paper are described below.

A.1 Cross-Country Data

Human capital attainment: Data from the Demographic and Health Surveys (DHS), available at http://www.measuredhs.com/, using the STATCompile. We construct the variable human capital attainment as follows: Get from the DHS the female and male percent distribution of the household populations age six and over by highest level of schooling attended or completed and median grade completed, according to background characteristics. There are four categories: No education, primary education, secondary education and higher education. Human capital attainment is the percent of each category times the

* The opinions expressed in this Online Appendix are those of the authors and do not necessarily reflect the views of the Bank of Portugal and the Deutsche Bundesbank.

corresponding years of schooling for each category: 0 for no education 6 for primary education, 12 for secondary education and 16 for higher education. These data are available for selected countries and years (1985–2013) with a total of 85 developing countries. The panel is unbalanced with some countries having only one observation and others having up to 9. The years are not necessarily the same across countries. We have also used the Barro and Lee (2013) measure with some interpolation. See Table A3 below and results are pretty much similar to those reported in Table 2 of the paper. The correlation between our measure with the one developed by Barro and Lee (2013) is 0.9.

Real GDP per capita: Real GDP per capita. Heston, Summers, and Aten (2012); Penn World Table Version 9.1; Center for International Comparisons of Production, Income, and Prices at the University of Pennsylvania. Variable used: PPP Converted GDP Per Capita (Chain Series), at 2011 constant prices.

Total fertility rate: Data from the Demographic and Health Surveys (DHS), available at http://www.measuredhs.com/, using the STATCompile. Total fertility rate for the three years preceding the survey for age group 15-49 expressed per woman. Selected countries and years (1985–2013). Total of 85 developing countries. The panel is unbalanced with some countries having only one observation and others having up to 6. The years are not necessarily the same across countries.

Wanted fertility rate: Data from the Demographic and Health Surveys (DHS), available at http://www.measuredhs.com/, using the STATCompile. Total wanted fertility rate for the three years preceding the survey for age group 15-49 expressed per woman. Total wanted fertility rate is calculated in the same way as the total fertility rate, but only including wanted births. A birth is considered wanted if the number of living children plus this birth is less than or equal to the ideal number of children. Selected countries and years (1985–2013). Total of 85 developing countries. The panel is unbalanced with some countries having only one observation and others having up to 6. The years are not necessarily the same across countries.

Percent of women using modern contraceptive methods: Data from the Demographic and Health Surveys (DHS), available at http://www.measuredhs.com/, using the STATCompile. Percent of women using modern contraceptive method for the three years preceding the survey. Selected countries and years (1985–2013). Total of 85 developing countries. The panel is unbalanced with some countries having only one observation and others having up to 6. The years are not necessarily the same across countries.

Countries in the DHS surveys: Albania, Armenia, Azerbaijan, Bangladesh, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Colombia, Comoros, Congo (Brazzaville), Congo Democratic Republic, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Ethiopia, Gabon, Georgia, Ghana, Guatemala, Guinea, Guyana, Haiti, Honduras, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lesotho, Liberia, Madagascar,

Malawi, Maldives, Mali, Mauritania, Mexico, Moldova, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Paraguay, Peru, Philippines, Romania, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, South Africa, Sri Lanka, Sudan, Swaziland, Tanzania, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uzbekistan, Vietnam, Yemen, Zambia, and Zimbabwe.

Table A1 contains summary statistics of these variables, and Table A2 reports correlations for them. Table A3 provides the regression results for the variable human capital attainment, using the measured developed by Barro and Lee (2013), on the same set of control variables considered in Table 2 of the paper. We can observe that the results reported in Table A3 are similar to those reported in Table 2 of the paper.

Table A1: Summary statistics.

	Number of Observations	Mean	Standard Deviation	5% Percentile	95% Percentile
Real GDP per capita	254	2675.40	2317.74	465.33	7414.97
Human capital attainment (DHS measure)	203	6.44	2.51	2.36	10.72
Human capital attainment (Barro and Lee measure)	216	2.03	0.45	1.27	2.81
Total fertility rate	251	4.36	1.46	2.3	6.7
Wanted fertility rate	251	3.52	1.41	1.7	6
Difference in actual and wanted fertility	251	0.85	0.45	0.20	1.7
% of women using modern contraceptive methods	204	41.29	21.80	9	73.9

In the model fit (Section 5.1), we also use **abortion rates** by level of education. The **total abortion rate** is calculated using Equation (7) of Westoff (2008). The equation is the following:

$$TAR = 4.09 - 0.037(MOD) - 0.386(TFR),$$

where TAR is the total abortion rate; MOD denotes the fraction of women using modern contraception; and TFR is the total fertility rate. Then we use data on TFR and MOD by education in Kenya to find the TAR.

A.2 Individual Level Data

We use individual level data from five DHS surveys (1989, 1993, 1998, 2003, 2008-09) for Kenya. There is also a 2014 DHS Survey for Kenya, but observations on the variable ever

Table A2: Simple correlations.

	Real GDP per capita	(DHS) Human capital attainment	Realized fertility	Wanted fertility	Fertility gap	% of women using modern contr. methods
Real GDP per capita	1					
Human capital attainment (DHS)	0.6629	1				
Realised fertility	-0.6916	-0.7501	1			
Wanted fertility	-0.6850	-0.7260	0.9507	1		
Fertility gap	-0.0911	-0.1150	0.2558	-0.0567	1	
% of women using modern contr. methods	0.5770	0.6967	-0.7625	-0.7607	-0.0891	1

use of modern contraceptives are missing. Since this is one of the main variables in Table 3 of the paper, then this wave was not used in the regressions presented in Table 3 of the paper.

Unwanted fertility: Total number of children ever born (v201) minus ideal number of children (v613) for women 40 year and older. As in the model, we drop any observation in which unwanted fertility is negative.

Wanted fertility: Ideal number of children (v613) for women 40 year and older.

Ever used modern contraceptive methods: Indicator variable which takes value one if women 40 year and older have ever used modern contraceptive methods (when variable v302 is equal to 20).

Dummy for human capital attainment: Highest education level attended (v106). This is a standardised variable providing level of education in the following categories: No education (left out in the regressions in Table 3 of the paper), Primary, Secondary and Higher.

DHS phase dummies: Indicator variable for each survey.

Wealth indicators: Household wealth index in quintile (v190). Dummy for each quintile.

Religion indicators: Religion (v130). Indicators for Catholics, Protestants, No Religion and other religions.

Indicator for knowledge of modern contraceptive methods: Knowledge of any method is classified into modern, traditional and folkloric methods (v301). We generate a dummy variable for knowldge of modern contraceptives.

Table A3: Relationship between human capital attainment (Barro and Lee measure) and fertility (unwanted and wanted).

	Dependent variable: Human capital attainment					
	(1)	(2)	(3)	(4)	(5)	(6)
Unwanted fertility	-0.1442	−0.1081	−0.2389***	−0.1180***	−0.0906***	−0.1137***
	(0.1449)	(0.0984)	(0.0455)	(0.0325)	(0.0362)	(0.0329)
Wanted fertility		−0.2151***	−0.2094***	−0.0821***		−0.0813***
		(0.0296)	(0.0282)	(0.0239)		(0.0241)
Log of per capita GDP					0.0473	0.0386
					(0.0456)	(0.0406)
Country fixed effects	No	No	Yes	Yes	Yes	Yes
Decade fixed effects	No	No	No	Yes	Yes	Yes
Number of observations	213	213	213	213	213	213
Number of countries	65	65	65	65	65	65
R-squared	0.0189	0.4469	0.9729	0.9865	0.9842	0.9867

Notes: Standard errors clustered by country are in parentheses. The symbols *, **, and *** imply that coefficients are statistically different from zero at 90, 95, and 99 percent confidence levels, respectively.

Rural dummy: Indicator variable if household lives in the rural area (v025).

Table A4 contains the summary statistics of the main variables used in the regression of Table 3 of the paper. Table A5 displays correlations for total fertility, wanted fertility, unwanted fertility and the indicator variable for the ever use of modern contraceptive methods.

In this Online Appendix we also explored the relationship between women's unwanted fertility and the use of modern contraceptive taking into account the partner's fertility preferences.[1] As emphasised by Doepke and Kindermann (2019) and others, the fertility decision is a joint partners' decision. They also show that in low-fertility countries women are much more likely than men to be opposed to having another child. Our emphasis is on high-fertility countries. The variable which identifies fertility preferences of the husband is the variable v621 and it has several missing observations. Table A6 report coefficients for the regression of unwanted fertility on similar regressors of those presented in Table 3 of the paper, but considering only women whose husband wanted less children or the same number of children as them. Notice that qualitatively results are similar to those pre-

[1] Field, Molitor, Schoonbroodt, and Tertilt (2016) studies the male fertility behaviour using several waves of the Demographic and Health Surveys (DHS) in eight Sub-Saharan African countries. They find that on average men have more children than women of the same cohort but this difference falls with the level of income. They also show that differences in the desire to have children can be explained to a large extent by differences in realised fertility.

Table A4: Summary statistics.

	Number of Observations	Mean	Standard Deviation	5% Percentile	95% Percentile
Total children ever born	4,205	7.08	2.66	3	12
Wanted fertility	4,205	4.23	1.77	2	8
Unwanted fertility	4,205	2.84	2.48	0	7
Ever used modern contrac methods	4,205	0.56	0.50	0	1
Completed primary education	4,203	0.48	0.50	0	1
Completed secondary education	4,203	0.15	0.36	0	1
Completed higher education	4,203	0.04	0.19	0	0

sented in Table 3 of the paper. Quantitatively, we can observe that, in all regressions, the estimated coefficient for the variable "ever used modern contraceptive methods" is larger in absolute value for the case considered in Table A6 below than in the case of Table 3 in the paper. Analogously, Table A7 below reports results for similar regressions of those displayed in Table A6 but in which we consider only women whose husband wanted more children than them. Notice that for the full specification (i.e. Column (5)) the coefficient for the variable "ever used modern contraceptive methods" is larger in absolute value than the one for the case of Table A6 (for those women whose husband wanted a lower or the same number of children) and the case of Table 3 in the paper (all women).

In Table A8 we consider the issue of whether the last child born in the last five years

Table A5: Simple correlations.

	Total Children ever born	Wanted fertility	Unwanted fertility	Ever used modern contraceptive methods
Total children ever born	1			
Wanted fertility	0.4305	1		
Unwanted fertility	0.7660	-0.2505	1	
Ever used modern contraceptive methods	-0.2246	-0.2025	-0.0967	1

Table A6: Relationship between unwanted fertility and the use of modern contraceptive methods conditional on the husband wanting less or the same number of children than the woman.

	Dependent variable: Unwanted fertility (fertility gap) (husband wanted less or the same number of children)				
	(1)	(2)	(3)	(4)	(5)
Ever used modern contrac methods	−0.8045*** (0.1807)	−0.4854** (0.1731)	−0.7707*** (0.1706)	−0.4222** (0.1684)	−0.3043* (0.1670)
Wanted fertility			−0.4010*** (0.0445)	−0.5174*** (0.0386)	−0.5690*** (0.0360)
Completed primary education				−0.4979** (0.1944)	−0.2854 (0.1836)
Completed secondary education				−2.0319*** (0.2426)	−1.3137*** (0.2408)
Completed higher education				−3.1212*** (0.3645)	−1.7651*** (0.3519)
DHS phase dummies	No	Yes	Yes	Yes	Yes
Other controls	No	No	No	No	Yes
Number of observations	1,415	1,415	1,415	1,415	1,415
R-squared	0.0242	0.1139	0.1847	0.2890	0.3540

Notes: Other controls include: Indicator for household wealth index in quintiles; Religion indicators, rural dummy and indicators for knowledge of contraceptive methods. Standard errors clustered by region of residence are in parentheses. The symbols *, **, and *** imply that coefficients are statistically different from zero at 90, 95, and 99 percent confidence levels, respectively.

Table A7: Relationship between unwanted fertility and the use of modern contraceptive methods conditional on the husband wanting more children than the woman.

	Dependent variable: Unwanted fertility (fertility gap) (husband wanted more children)				
	(1)	(2)	(3)	(4)	(5)
Ever used modern contrac methods	-0.6628^{**}	-0.4634^{*}	-0.8467^{***}	-0.7141^{**}	-0.7428^{**}
	(0.2924)	(0.2779)	(0.2977)	(0.2935)	(0.3015)
Wanted fertility			-0.4383^{***}	-0.5161^{***}	-0.5166^{***}
			(0.0747)	(0.0809)	(0.0832)
Completed primary education				-0.0404	-0.1611
				(0.3070)	(0.3179)
Completed secondary education				-1.6140^{***}	-1.534^{***}
				(0.4014)	(0.4283)
Completed higher education				-2.6610^{***}	-2.4274^{***}
				(0.6882)	(0.7393)
DHS phase dummies	No	Yes	Yes	Yes	Yes
Other controls	No	No	No	No	Yes
Number of observations	455	455	455	455	455
R-squared	0.0155	0.0978	0.1828	0.2274	0.2662

Notes: Other controls include: Indicator for household wealth index in quintiles; Religion indicators, rural dummy and indicators for knowledge of contraceptive methods. Standard errors clustered by region of residence are in parentheses. The symbols *, **, and *** imply that coefficients are statistically different from zero at 90, 95, and 99 percent confidence levels, respectively.

Table A8: Relationship between whether the last child born in the last five years was wanted and the use of modern contraceptive methods.

	Dependent variable: whether or not the last child born in the last five years was wanted				
	(1)	(2)	(3)	(4)	(5)
Ever used modern contrac methods	0.1221***	0.1084***	0.0977***	0.0984***	0.0502
	(0.0356)	(0.0362)	(0.0364)	(0.0350)	(0.0398)
Wanted fertility			-0.0160	−0.0203**	-0.0107
			(0.0098)	(0 .0096)	(0.0110)
Completed primary education				0.0689	0.0043
				(0.0420)	(0.0488)
Completed secondary education				−0.1209*	−0.1731**
				(0.0662)	(0.0745)
Completed higher education				−0.4393***	−0.4071***
				(0.0944)	(0.1282)
DHS phase dummies	No	Yes	Yes	Yes	Yes
Other controls	No	No	No	No	Yes
Number of observations	1,149	1,149	1,149	1,149	849
R-squared	0.0148	0.0204	0.0237	0.0470	0.0715

Notes: Other controls include: Indicator for household wealth index in quintiles; Religion indicators, rural dummy and indicators for knowledge of contraceptive methods. Standard errors clustered by region of residence are in parentheses. The symbols *, **, and *** imply that coefficients are statistically different from zero at 90, 95, and 99 percent confidence levels, respectively.

was wanted at that time, later or not at all. We create an indicator variable unwanted child based on variable v367 of the DHS questionnaires, which takes the value 1 if the last child born in the last five years was unwanted; and it takes the value 0 if the child was wanted at that time or wanted later. We run a linear probability model of this unwanted child on similar regressors of the regressions presented in Table 3 of the paper. Notice that in this case there is a positive relationship between unwanted child and the variable "ever used modern contraceptive methods". However, this relationship is not statistically different from zero at usual confidence levels for the full specification - Column (5). In addition, it can be driven by the fact that an unwanted child can lead to the use of modern contraceptives.

B Decomposition of the supply and demand experiments presented in Table 8 of the paper

This section contains two additional tables. They are supplementary material to Subsection 6.2 and Subsection 6.3 of the paper. Table A9 provides the decomposition of the two supply policies (free modern contraceptives and free abortion) presented in Table 8 of the paper; while Table A10 contains the decomposition of the two demand policies (no disutility from contraceptives use and no disutility from abortion) presented also in Table 8 of the paper. They are not reported in the paper to save in space.

Table A9: Decomposition: Supply policies, Kenya 2008

Statistics	Baseline	**Supply Policies**							
		Free contraceptives				*Free abortion*			
		Full exp.	Partial equil	Exog. fert.	Exog. educ.	Full exp.	Partial equil.	Exog. fert.	Exog. educ.
Output, input, and prices									
$Y_{pc}^{i}/Y_{pc}^{basel}$	1	1.13	1.12	1.31	1.13	1.09	1.07	1.13	1
K^{i}/K^{basel}	1	1.21	1.18	1.68	1.21	1.15	1.11	1.24	1.01
Schooling (years)	7.68	8.78	8.75	9.07	8.78	8.46	8.46	8.58	7.65
w^{i}/w^{basel}	1	1.04	1	1.15	1.04	1.03	1	1.05	1
r^{i}/r^{basel}	1	0.93	1	0.78	0.93	0.95	1	0.91	0.99
Fertility and family planning									
Av. fertility	5.54	5.16	5.08	4.50	5.16	5.25	5.24	5.11	5.57
Av. unw. fert.	0.92	0	0	0	0	0.42	0.37	0.57	0.62
Contrac. use (% HHs)	33	100	100	100	100	12	17	17	15
Pregn. aborted (%)	12	0	0	0	0	22	22	20	19
Av. contrac. exp./wh (%)	0.28	0	0	0	0	0.08	0.10	0.12	0.09
Inequality and welfare									
Gini index	0.48	0.47	0.47	0.47	0.47	0.48	0.47	0.47	0.48
Labour inc. 90/50	3.83	3.89	3.88	4.05	3.89	4	4	4.19	3.96
Labour inc. 90/10	12.57	10.89	10.88	10.63	10.89	10.29	10.30	10.96	12.05
Welfare	3.86	4.11	4.07	4.25	4.11	4.02	3.99	4.06	3.89
Cost of the policy									
$Cost/Y_{pc}$ (current Y), (%)	0	2.43	2.45	2.08	2.43	0.43	0.44	0.36	0.40
$Cost/Y_{pc}$ (original Y), (%)	0	2.74	2.74	2.71	2.74	0.47	0.48	0.40	0.41

C Sensitivity Analysis

This Section of the appendix provides sensitivity analysis regarding the 18 parameters estimated in Section 5 of our paper. These 18 parameters of the model were estimated to match 22 data moments for the economy of Kenya and the normalisation of the output per capita to one. These parameters are listed in the first column of Tables A11 and A12.

In these two tables we increase each of the 18 parameters by 1 percent (Table A11) and by 10 percent (Table A12) and assess the robustness of two counterfactual exercises.

Table A10: Decomposition: Demand policies, Kenya 2008

Statistics	Baseline	Demand Policies							
		No disut. of contr.				*No disut. of abortion*			
		Full exp.	Partial equil	Exog. fert.	Exog. educ.	Full exp.	Partial equil.	Exog. fert.	Exog. educ.
Output, input, and prices									
$Y_{pc}^{i}/Y_{pc}^{basel}$	1	0.99	1	1	1	1.05	1.05	1.10	1
K^{i}/K^{basel}	1	1.21	0.98	1	1	1.09	1.07	1.18	1.01
Schooling (years)	7.68	7.65	7.68	7.68	7.65	8.09	8.06	8.26	7.75
w^{i}/w^{basel}	1	1	1	1	0.99	1.01	1	1.04	1
r^{i}/r^{basel}	1	1	1	1	1.01	0.97	1	0.93	0.99
Fertility and family planning									
Av. fertility	5.54	5.58	5.56	5.54	5.58	5.35	5.32	5.16	5.53
Av. unw. fert.	0.92	0.91	0.91	0.92	0.91	0.51	0.52	0.59	0.66
Contrac. use (% HHs)	33	34	34	33	34	0	0	0	0
Pregn. aborted (%)	12	12	11	12	12	23	23	23	21
Av. contrac. exp./wh (%)	0.28	0.28	0.29	0.28	0.28	0	0	0	0
Inequality and welfare									
Gini index	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.48
Labour inc. 90/50	3.83	3.83	3.83	3.83	3.83	3.95	3.95	4.19	3.85
Labour inc. 90/10	12.57	12.57	12.57	12.57	12.48	12.16	12.16	11.48	12.18
Welfare	3.86	3.85	3.86	3.86	3.85	3.96	3.94	4.01	3.89
Cost of the policy									

The two counterfactual exercises considered here are the free contraception and the free abortion exercises. For comparison, we also report the results of these two counterfactual exercises (first row of these two tables) when all parameters are at their benchmark calibrated values reported in Section 5 of the paper. We concentrate our analysis in four statistics: the GDP per capita, the average years of schooling, the average fertility rate and the average unwanted fertility rate.

The tables are divided into three sections. The first section (baseline) contains these four statistics at the main benchmark calibration and when we adjust the value of one of the 18 parameters. The second section provides the value for these four statistics in the free contraception exercise and the third section corresponds to the case of free abortion.

Clearly, the benchmark calibration is quite robust when the parameters are changed by 1 percent. There are two exceptions. They are the utility weight on human capital (parameter ξ) and the curvature of the human capital accumulation equation (parameter ζ). The results of the two extreme counterfactual exercises are also quite robust for a 1 percent deviation of each of the parameters relative to the benchmark calibration. The changes in output per capita in the case of free contraception and free abortion are about 13 percent and 9 percent, respectively. The only parameter which affects the results significantly is the parameter governing the utility weight on human capital (parameter ξ). When ξ is higher by 1%, then the free contraception (abortion) exercises increases output per capita by 4.45 (1.31) percent relative to the baseline instead of roughly 13 (9) percent when the

benchmark calibration is used.

In Table A12 we can observe that the benchmark values for the four statistics reported are for most parameters robust to a rise in 10 percent in their value. The exceptions are once more the utility weight on human capital (parameter ξ) and the curvature of the human capital accumulation equation (parameter ζ). For the counterfactual exercises, only the utility weight on human capital (parameter ξ) affects substantially the results. We do not have much information about what should be the value of this parameter. In our benchmark calibration the utility weight on the quality of children is higher than the utility weight on the quantity of children.

This analysis here suggests that the value of the parameters calibrated to target the 22 moments of the Kenyan economy and the normalisation of the output to one should be relatively close to the values we found in our estimation procedure. The only exceptions are the utility weight on human capital (parameter ξ) and the curvature of the human capital accumulation equation (parameter ζ). These parameters help the model to match the average fertility rate and the average years of schooling. In addition, the average returns to one additional year of schooling in our benchmark calibration is quite close to what is observed in the data and this is not a targeted moment in our estimation procedure. Consequently our model is consistent on how human capital maps onto income, which is one of our key mechanisms of how family planning interventions might affect individual outcomes.

Table A11: Sensitivity analysis - 1%

	Baseline				**Free Contraception**				**Free Abortion**			
	GDP	School.	Av. fert.	Av. unw. fertility	GDP	School.	Av. fert.	Av. unw. fertility	GDP	School.	Av. fert.	Av. unw. fertility
Benchmark calibration	1.051	7.6781	5.542	0.91857	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
λ_0	1.051	7.6781	5.542	0.91857	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
λ_1	1.061	7.6898	5.4943	0.92046	1.1866	8.7859	5.1511	0	1.1489	8.4672	5.2396	0.41657
λ_2	1.0247	7.5467	5.6471	0.99449	1.1852	8.7804	5.1555	0	1.1467	8.4524	5.2454	0.42573
λ_3	1.0407	7.6517	5.5877	0.91417	1.1843	8.7838	5.1589	0	1.1352	8.4788	5.3056	0.36828
ψ_q	1.051	7.6781	5.542	0.91857	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
ϕ_a	1.0478	7.6517	5.5531	0.92592	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
ψ_a	1.0479	7.6516	5.5528	0.92554	1.1854	8.7843	5.1591	0	1.1464	8.46	5.2514	0.42369
κ	1.0603	7.7121	5.5036	0.93703	1.1854	8.7843	5.1591	0	1.1457	8.4575	5.2544	0.42651
θ	1.0512	7.6779	5.5407	0.91724	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2514	0.42372
h_0	1.049	7.6438	5.5818	0.91764	1.1929	8.7849	5.1592	0	1.1413	8.4858	5.3139	0.37
h_1	1.0674	7.7308	5.5003	0.90869	1.1918	8.7862	5.1597	0	1.1516	8.4756	5.2553	0.41779
ζ	1.1812	8.1087	5.1654	0.90917	1.3654	9.2575	4.7257	0	1.3203	9.0766	4.8273	0.32667
σ	1.0584	7.6821	5.5323	0.93432	1.1926	8.7944	5.1545	0	1.1507	8.4836	5.2571	0.4202
γ	1.0155	7.5481	5.699	0.99279	1.1803	8.7821	5.179	0	1.1303	8.4918	5.3308	0.37049
ξ	1.1338	7.9925	5.2173	0.95875	1.1853	8.7842	5.1591	0	1.1487	8.4699	5.2437	0.41491
β	1.0696	7.7362	5.4851	0.90894	1.1903	8.7842	5.1591	0	1.1528	8.467	5.2464	0.41787
χ	1.0666	7.7383	5.4661	0.90789	1.1859	8.7843	5.1463	0	1.1516	8.4801	5.2212	0.41382
TFP	1.0759	7.7484	5.5285	0.90657	1.2001	8.7896	5.1888	0	1.1646	8.4872	5.267	0.41621

Table A12: Sensitivity analysis - 10%

	Baseline				Free Contraception				Free Abortion			
	GDP	School.	Av. fert.	Av. unw. fertility	GDP	School.	Av. fert.	Av. unw. fertility	GDP	School.	Av. fert.	Av. unw. fertility
Benchmark calibration	1.051	7.6781	5.542	0.91857	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
λ_0	1.051	7.6781	5.542	0.91857	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
λ_1	1.1175	7.7823	5.232	0.92515	1.3253	9.2547	4.7112	0	1.2528	8.773	4.8702	0.39458
λ_2	1.0288	7.4182	5.5611	1.0578	1.1984	8.6292	5.035	0	1.1305	8.2786	5.2487	0.4405
λ_3	1.0171	7.6378	5.7044	0.9181	1.1543	8.786	5.2792	0	1.1083	8.4939	5.4218	0.35142
ψ_q	1.051	7.678	5.542	0.91857	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.42371
ϕ_a	1.0526	7.637	5.5275	0.95968	1.1854	8.7843	5.1591	0	1.1465	8.4602	5.2513	0.4237
ψ_a	1.052	7.635	5.531	0.95931	1.1854	8.7843	5.1591	0	1.1471	8.4519	5.242	0.42935
κ	1.0471	7.6196	5.5515	1.0172	1.1854	8.7843	5.1591	0	1.1433	8.4428	5.2593	0.45641
θ	1.0425	7.651	5.5809	0.90478	1.1854	8.7843	5.1591	0	1.1359	8.4769	5.3012	0.36803
h_0	1.071	7.6018	5.7772	0.98924	1.1293	8.0328	5.6106	0	1.096	7.8404	5.7226	0.39399
h_1	1.3513	9.0672	4.8131	0.77248	1.5536	10.174	4.4367	0	1.4896	9.8902	4.5496	0.29798
ζ	4.7178	15.793	3.1207	0.091391	4.8383	15.99	3.0975	0	4.8055	15.924	3.0926	0.030033
σ	1.081	7.4583	5.5899	0.95159	1.1972	8.2876	5.241	0	1.1516	8.1118	5.3934	0.41843
γ	0.81004	6.473	6.8033	1.0802	0.91116	7.4798	6.3129	0	0.86529	7.0951	6.5422	0.42729
ξ	1.4839	9.5039	4.2317	0.76514	1.5419	10.174	4.199	0	1.6302	10.407	4.0165	0.31616
β	1.1971	8.0928	5.1603	0.91541	1.2471	8.8104	5.1059	0	1.3211	9.0409	4.8677	0.37017
χ	1.3213	9.0614	4.5791	0.74251	1.5228	10.203	4.2022	0	1.4223	9.7968	4.3957	0.28915
TFP	1.4561	9.1057	5.0344	0.77884	1.6752	10.208	4.6213	0	1.5939	9.8737	4.7677	0.29891

D Robustness exercises

D.1 More Expensive Abortion

One main conclusion from our simulations in the paper is that subsidising the price of abortion is a more cost-effective policy for improving long-run living standards than policies that either subsidise the price of modern contraceptives or subsidise basic education. See Subsection 6.4 in the paper. This is a strong result which should be interpreted with caution. As highlighted in the paper, in our benchmark economy, we internally estimate the relative price of abortion, ϕ_a, such that features of the data, as the number of abortions, were matched. This approach is valid in order to estimate the parameters of the model and implement policy simulations which either subsidise the use of modern contraceptives or subsidise basic education. It might be a limited strategy, however, once our goal is to investigate the effects of a government policy that subsidises abortions. The reason is that the relative price of abortion in our model, ϕ_a, corresponds to its "market" price in which abortions are mainly illegal and performed under unsafe methods and unqualified providers.[2] Therefore, if the government were to implement public policies to subsidise abortion, then we would expect such abortions to take place in safe providers, charging higher prices (cf., Fisher, 2016). Consequently, if the price of official abortion providers were in the top range of the reported abortion price (say US$200 instead of US$59 as in our benchmark), then the cost of abortion policies in Table 9 would have being approximately 1.59% of GDP in the universal policy and 1.28% of GDP in the targeted experiment instead of 0.47% and 0.38% of GDP, respectively.[3] Therefore, the long-run multiplier of government expenditures on output per capita in the abortion policies would have been 5.7 (6.8) in the universal (targeted) policy. Before they were 19.4 in the universal policy and 22.9 in the targeted policy. The long-run multipliers of the abortion polices are still higher than the case of the universal contraception policy (multiplier of 5.3) and the targeted education policy (multiplier of 6.3).

In order to investigate further the issue on abortion, we consider the case in which abortions take place only through official providers at the price of US$200, which is 3.4 times the baseline price and is the price reported in official providers in Kenya. We keep all the other parameters at the baseline. This new economy is reported in Column (1) - New baseline (US$200) - of Table A13. This is a completely different economy relative to the baseline and we run similar policy experiments to those reported in Table 9 of the paper but keep the relative price of abortion at US$200 instead of US$59. Note that at this high price there is almost no abortion in equilibrium. The universal abortion subsidy in which the total amount of this subsidy corresponds to 0.50% of GDP increases output per capita by 3.6% relative to the new baseline output, which is below the increase in the

[2] According to some anecdotal evidence the price of abortion in Kenya ranges from US$30-65 in illegal clinics and international charity Marie Stopes clinics (cf., Fisher, 2016; Hussain, 2012; Robbins, 2013), to about US$200 in a safe abortion clinic.

[3] In the universal policy all abortions would now take in official providers. In the targeted policy, subsidised abortions would take place in official providers, while the non-subsidised abortions would be at the baseline providers.

Table A13: Counterfactual experiments with a higher price of abortion (US$200). Universal Policies: Subsidy on the price of modern contraceptives; subsidy on the price of abortion; and subsidy on basic education (0-4 years) for all families. Targeted Policies: Subsidy on the price of modern contraceptives for women with up to 8 years of schooling; subsidy on the price of abortion for women with up to 8 years of schooling; and subsidy on basic education for children with parents with up to 8 years of schooling.

		Universal Policies, abortion price: US$200			**Targeted Policies**, abortion price: US$200 *Parents with up to 8 yrs of sch.*		
Statistics	New baseline (US$200)	Subsid. contrac.	Subsid. abortion	Subsid. education (0-4 yrs)	Subsid. contrac.	Subsid. abortion	Subsid. education (0-4 yrs)
Output, input, and prices							
Ypc relat. to the baseline	1	1.028	1.036	0.93	1.025	1.044	0.94
K relat. to the baseline	1	1.05	1.06	0.89	1.04	1.07	0.89
Av. years of schooling	7.11	7.56	7.64	7.01	7.51	7.76	7.01
w relat. to the baseline	1	1.01	1.01	0.97	1.01	1.02	0.97
r relat. to the baseline	1	0.98	0.98	1.05	0.99	0.98	1.05
Fertility and family planning							
Av. fertility	5.61	5.54	5.53	6.01	5.55	5.51	6
Av. unwanted fert.	1.26	0.68	0.96	1.23	0.72	0.86	1.25
% of HHs who use contrac.	55	83	33	57	79	39	56
% of pregn. aborted	1.1	0.5	11	1.3	0.5	11	1.4
Av. contrac. exp./wh (%)	0.84	1.4	0.28	0.91	2.24	0.43	0.89
Inequality and welfare							
Gini index	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Labour income 90/50	3.73	3.86	3.83	3.21	3.86	3.84	3.20
Labour income 90/10	11.69	12.57	12.49	10.27	12.57	12.14	10.31
Welfare	3.77	3.85	3.86	3.74	3.84	3.87	3.74
Cost of the policy							
$Cost/Y_{pc}$ (current Y), (%)	0	0.50	0.50	0.50	0.50	0.51	0.50
$Cost/Y_{pc}$ (original Y), (%)	0	0.51	0.51	0.47	0.51	0.53	0.47

universal abortion policy when the price was US$ 59. This rise is, however, larger than the increase in output per capita in the alternative universal policies (universal contraceptives subsidy and universal education policy) reported both in Table 9 of the paper and in Table A13. In the last set of experiments we implement various targeted policies when the price of abortion is US$200. When abortion subsidies are given to women with up to 8 years of schooling then output per capita increases by 4.4% relative to the new baseline, which is above the rise in output of the targeted contraceptive policy and targeted education policy reported in Table 9 of the paper and in Table A13.

We are aware that there are many health complications associated with abortion, which vary significantly with the stage at which the pregnancy is stopped and these might not be fully captured in our model. In addition, official providers in developing countries such as Kenya might not have the facilities, medical specialists and medicines needed in order to scale the level of abortions generated in our experiments. Therefore, the main conclusion from these experiments is that countries should think about their legal law on abortion

and whether or not to provide them in official providers. This is particularly important since in many countries abortion is not permitted by law but still several women undergo unsafe abortions each year. Our experiments also show that contraceptive polices seem to be an effective strategy to not only increase living standard in Kenya but to also decrease abortions.

D.2 Different target group

Table A14 reports statistics for the experiments in which the targeted group corresponds to all parents with up to 4 years of schooling. In the paper the targeted group corresponds to parents with up to 8 years of schooling. We implement similar policies to those presented in Table 9 of the paper. The effectiveness of family planning policy to impact living standards relative to education subsidies is also stronger here.

D.3 Ghana

Now we estimate the parameters such that the model matches key micro and macro moments of Ghana for 2008. We apply a similar strategy and consider the same moments used to estimate the model for Kenya but we now consider the economy of Ghana, which is roughly 40 percent richer than Kenya in per capital income. The reason of choosing Ghana is to understand the robustness of our results of family planning interventions in Kenya for a richer economy with a more educated population. There are of course other important differences between the economy of Ghana and the economy of Kenya. For instance, abortion rate is higher in Ghana than what is observed in Kenya. While abortion in Kenya is prohibited by its Constitution unless the life and health of an expectant mother is in danger, abortion in Ghana is legally permissible.[4]

Table A15 reports the calibrated and estimated parameter values that result from the baseline estimation procedure applied to Ghana - the strategy and moments targeted are fully described in Subsection 5.1 of our paper and therefore we do not repeat them here. Table A16 displays the fit of the model relative to the data in Ghana. The model fit is also displayed in Figures A1 and A2. Figure A1 displays the fraction of the adult population per education category. Regarding unwanted fertility, the model does a good job in reproducing the fertility gap by education (see Figure A2(d)) - in fact, the model does a better job in matching the fertility gap in Ghana than the fertility gap in Kenya. Here the fertility gap is not overestimated in any education category. The model underestimates the level of abortion for households with the highest level of education but matches well the distribution of abortion for the other three education levels - see Figure A2(b).

Table 10 in Subsection 6.5 of the paper reports key statistics relative to the Ghana baseline for a couple of counterfactual experiments. We show that qualitatively results are very similar to the case of Kenya.

[4]Countries Where Abortion Is Illegal Population. (2019-08-27). Retrieved 2019-09-09, from http://worldpopulationreview.com/countries/countries-where-abortion-is-illegal/

Table A14: Counterfactual experiments: Targeted policies, Kenya 2008. Targeted Policies: Subsidy on the price of modern contraceptives for women with up to 4 years of schooling; subsidy on the price of abortion for women with up to 4 years of schooling; and subsidy on basic education for children with parents with up to 4 years of schooling.

Statistics	Baseline	**Targeted Policies** *Parents with up to 4 yrs. of sch.* Subsid. contrac.	Subsid. abortion	Subsid. education (0–4 yrs)
Output, input, and prices				
Ypc relat. to the baseline	1	1.02	1.01	0.98
K relat. to the baseline	1	1.03	1.02	0.95
Av. years of schooling	7.68	7.90	7.84	7.94
w relat. to the baseline	1	1.01	1.01	0.98
r relat. to the baseline	1	0.99	0.99	1.03
Fertility and family planning				
Av. fertility	5.54	5.48	5.50	5.74
Av. unwanted fert.	0.92	0.73	0.80	0.98
% of HHs who use contrac.	33	46	31	26
% of pregn. aborted	12	10	14	11
Av. contrac. exp./wh (%)	0.28	0.26	0.27	0.22
Inequality and welfare				
Gini index	0.48	0.48	0.48	0.48
Labour income 90/50	3.83	3.85	3.85	3.82
Labour income 90/10	12.57	12.10	12.10	12.56
Welfare	3.86	3.91	3.89	3.89
Cost of the policy				
$Cost/Y_{pc}$ (current Y), (%)	0	0.38	0.08	0.49
$Cost/Y_{pc}$ (original Y), (%)	0	0.40	0.08	0.47

D.4 Cross-Country Analysis

Instead of calibrating and estimating the parameters of the model to different economies, which is computationally demanding and time consuming, we create the following counterfactual economies. We change two key parameters of the model in the following manner: (i) we adjust the total factor productivity parameter (TFP) - parameter A of Equation (1) of the model economy presented in Section 4 of the paper - such that the counterfactual economy has a relative (to Kenya) per capita income similar to what is observed in the data for some reference economies - see these economies below; and (ii) in the spirit of de la Croix and Doepke (2003), we also adjust proportionally the cost of education $\lambda(e)$, such that the cost of education relative to income per capita is similar to what we estimate for the Kenyan economy. The main idea here is that teachers' salary should be positively

Table A15: Calibrated and estimated parameters for Ghana

Parameter	Description	Value	Comment
Calibrated parameters (3 parameters)			
α	Capital share in income	0.36	Feenstra et al (2015)
N	Max. number of unwanted pregnancies	10	Normalised
ϕ_q	Price of modern contraceptives	1	Normalised
Estimated parameters (18 parameters)			
A	TFP parameter	0.5352	Moments (i)-(v)
β	Discount factor	0.5901	Moments (i)-(v)
γ	Utility weight on fertility	0.7311	Moments (i)-(v)
ξ	Utility weight on human capital	3.0308	Moments (i)-(v)
Ψ_q	Utility cost of contraception	0.0016	Moments (i)-(v)
Ψ_a	Utility cost of abortion	0.0422	Moments (i)-(v)
h_0	Human capital - fixed	4.9923	Moments (i)-(v)
h_1	Human capital - marginal	0.0351	Moments (i)-(v)
ζ	Human capital - curvature	1.8541	Moments (i)-(v)
χ	Time cost per child	0.0401	Moments (i)-(v)
σ_ϵ	Std of ability shock	0.8244	Moments (i)-(v)
κ	Fertility uncertainty	0.3288	Moments (i)-(v)
θ	Efficiency of contraception	446.8273	Moments (i)-(v)
ϕ_a	Abortion cost	0.0013	Moments (i)-(v)
λ_1	Education cost: 4 years of schooling	0.0026	Moments (i)-(v)
λ_2	Education cost: 8 years of schooling	0.0124	Moments (i)-(v)
λ_3	Education cost: 12 years of schooling	0.0639	Moments (i)-(v)
λ_4	Education cost: 16 years of schooling	0.3402	Moments (i)-(v)

related to per capita income. The values of the other parameters are kept at the level estimated for the Kenyan economy and described in Subsection 5.1 of the paper. There are 9 counterfactual economies based on income per capita data from Congo, Ghana, Egypt, Liberia, Sao Tome and Principe, Sierra Leone, Tanzania, Uganda and Zambia. The poorest economy in this sample is Liberia. Its per capita income is 38 percent of the income per capita in Kenya. The richest economy in this sample is Egypt, which is approximately 4 times richer than Kenya.

It is important to highlight that we are not claiming that these counterfactual economies mimic key statistics observed in these 9 economies. Quite the opposite, those are counterfactual economies relative to Kenya. But this might be a useful exercise to understand how family planning interventions affect the economy when income levels are different from the level observed in Kenya.

Figures A3(a)-A3(d) below display selected statistics for these counterfactual economies. GDP per capita relative to Kenya by construction should be similar to what is observed in the data, which is confirmed in Figure A3(a). The other three measures are not targeted.

Table A16: Facts, Data versus Model

	Ghana, 2008	
Statistics	Data	Model
Targeted moments		
Adults with no primary education (%)	0.2680	0.3011
Adults with 8 years of schooling (%)	0.3020	0.3207
Adults with 12 years of schooling (%)	0.3875	0.3439
Adults with 16 years of schooling (%)	0.0415	0.0342
Fertility, parents with no primary education	6	4.1504
Fertility, parents with 8 years of schooling	4.9	3.7408
Fertility, parents with 12 years of schooling	3.5	3.2381
Fertility, parents with 16 years of schooling	2.1	2.8756
Unwanted fertility, parents with no primary education	0.7	0.6762
Unwanted fertility, parents with 8 years of schooling	0.7	0.5993
Unwanted fertility, parents with 12 years of schooling	0.6	0.4278
Unwanted fertility, parents with 16 years of schooling	0.3	0.3157
Abortions, parents with no primary education	1.3744	1.577
Abortions, parents with 8 years of schooling	1.5326	1.5266
Abortions, parents with 12 years of schooling	2.0138	1.6507
Abortions, parents with 16 years of schooling	2.5949	1.7068
Modern contraceptive prevalence, parents with no primary education	0.108	0.1016
Modern contraceptive prevalence, parents with 8 years of schooling	0.18	0.18337
Modern contraceptive prevalence, parents with 12 years of schooling	0.196	0.18337
Modern contraceptive prevalence, parents with 16 years of schooling	0.185	0.21296
Income Gini	0.4280	0.50981
Capital-to-output ratio, K/Y	1.57	1.3079
Consumption-to-output ratio, C/Y	0.7118	0.6644
Normalisation of output per capita to one	1	1.051

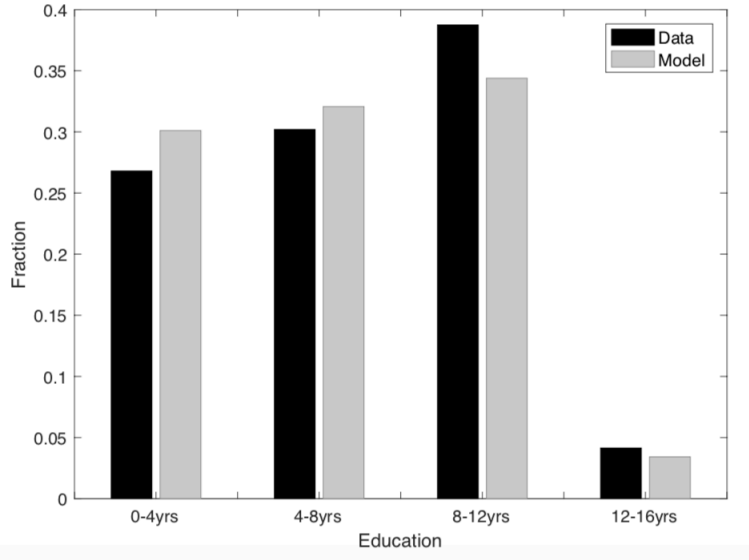
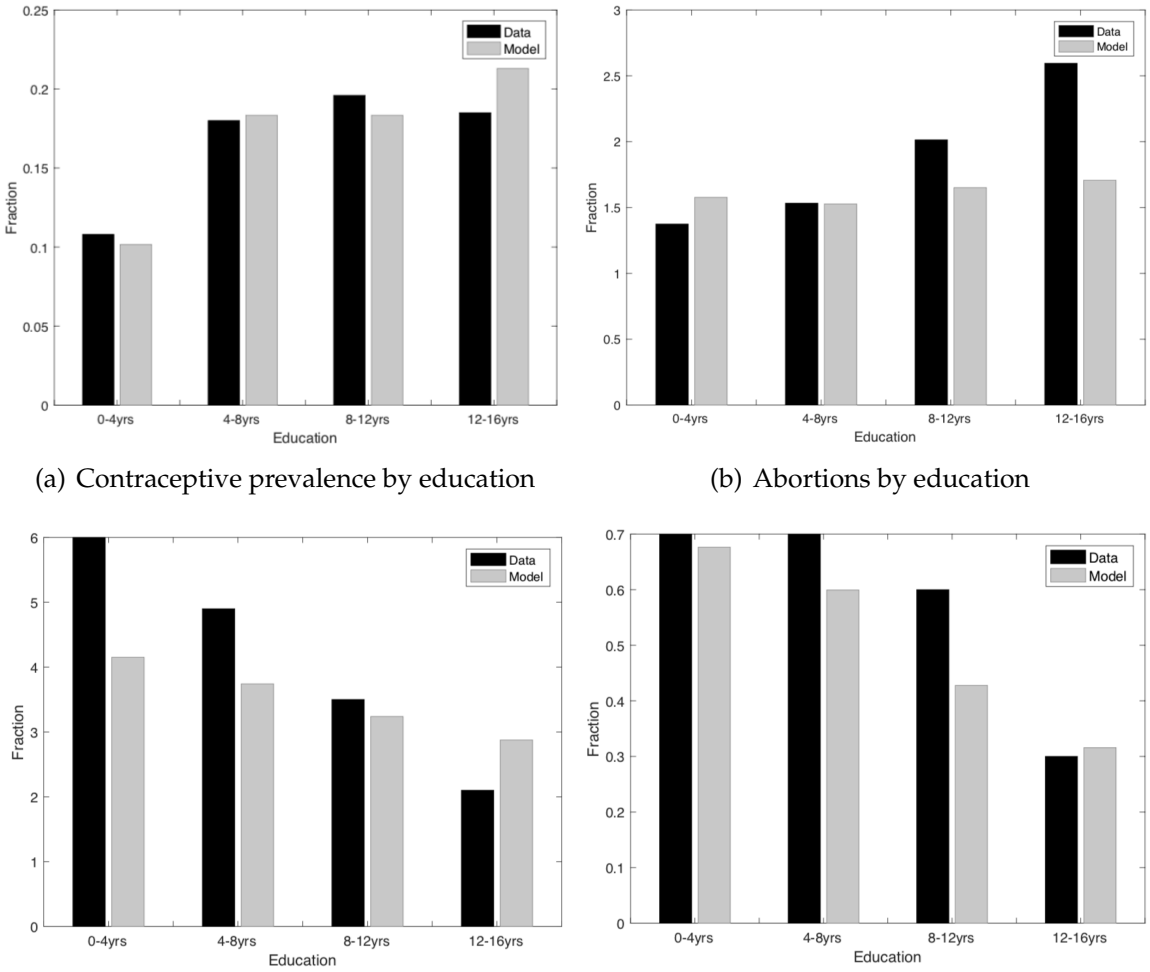


Figure A1: Data versus model - Fraction of adults by education. Source: 2008 Ghana DHS.

We can see that the counterfactual economies in general overestimate the average years of schooling of the reference economies, Figure A3(b) - it might be that returns to schooling are different when income levels are different. Notice that the correlation between contraceptive prevalence in the model and in the data is positive, as well as the correlation of the fertility gap observed in these reference economies and in the counterfactual economies. Therefore, the counterfactual economies have very different levels of income, human capital attainment, contraceptive prevalence and unwanted fertility. We then explore how family planning interventions impact these very different counterfactual economies.

Figure A4 provides the effects of two family planning interventions on three aggregate variables: income per capita, the average years of schooling and the average fertility rate - the effects on all other variables presented in the paper (see Table 8 of the paper) are available upon request. The two family planning interventions are: (a) households can access modern contraceptives without any monetary cost ($\phi_q = 0$); and (b) there is no monetary cost of abortion ($\phi_a = 0$). There are still utility costs associated with both birth control methods. The horizontal axis in each figure corresponds to the relative (to Kenya) income per capita of each of the reference economies. The black squares are the results when contraceptives are offered without any monetary cost, while the red circles are the case of free abortion.

From these three graphs, we can conclude that the effects of supply-side family planning interventions on aggregate variables such as income per capita, average years of schooling and the average fertility rate are decreasing with the level of income. This is expected since for these counterfactual economies we are keeping the cost of modern contraceptives and abortion at the level observed in Kenya. Therefore, for economies with higher TFP, modern contraceptives and abortion are relatively more affordable. For instance, free modern contraceptives (abortion) increase(s) income per capita approximately



(a) Contraceptive prevalence by education

(b) Abortions by education

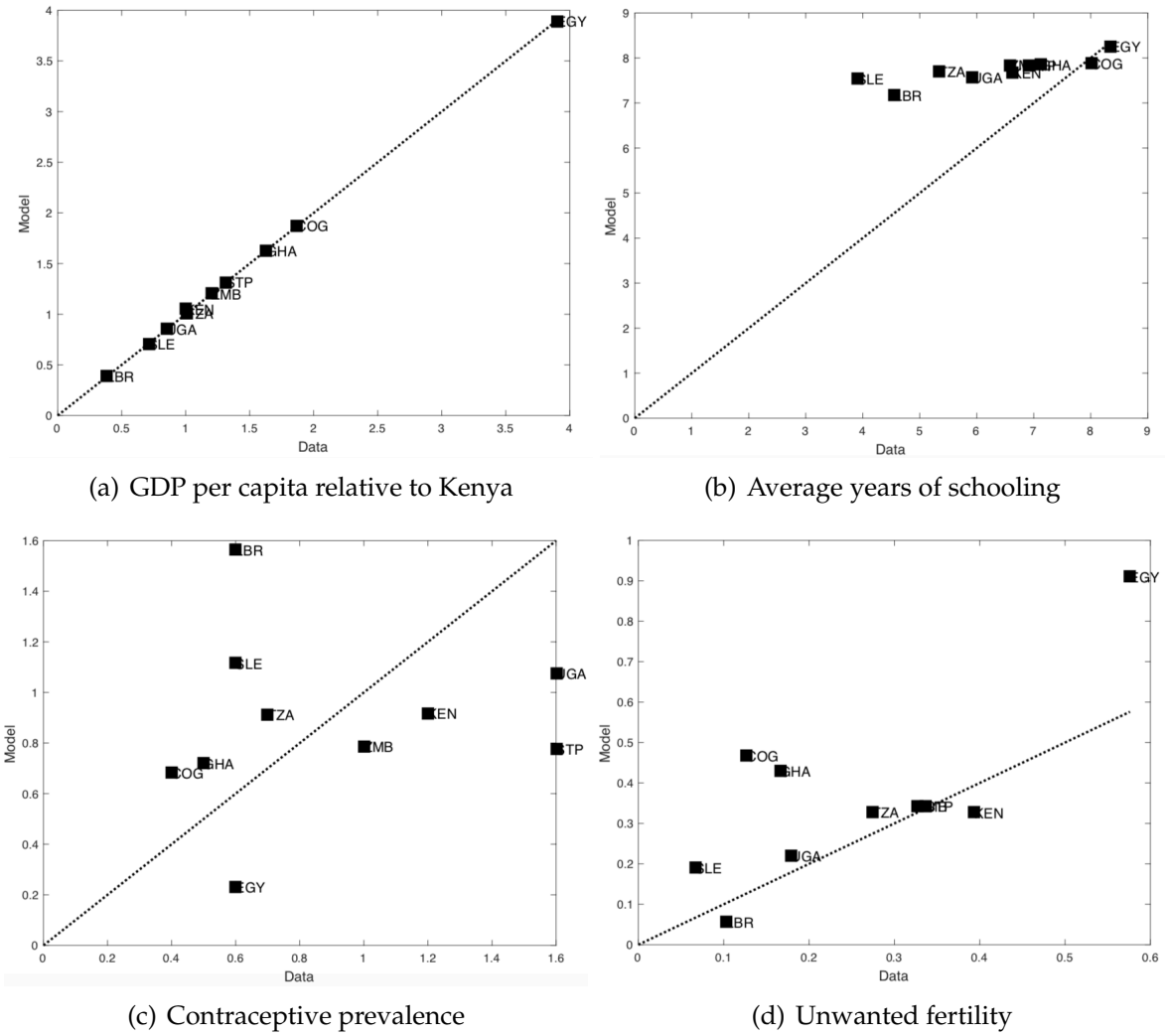
(c) Fertility by education

(d) Unwanted fertility by education

Figure A2: Data versus model - Selected statistics. Source: 2008 Ghana DHS.

in 17% (24%) in the counterfactual economy with GDP per capita similar to the one observed in Liberia and 4% (3%) in the counterfactual economy with GDP per capita similar to the one observed in Egypt. Recall that even when the aggregate effects are small, family planning interventions can have important impact on fertility and on human capital formation of the the families in which the fertility gap is significative.

We can also infer that the aggregate effects of free provision of modern contraceptives are, in general, stronger than the case for free abortion. This is not true for the case of the economy with GDP per capita similar to the one observed in Liberia. However, the costs associated with each of these two policies are also different, therefore we cannot directly conclude that the free provision of modern contraceptives is more cost-effective than free abortion.



(a) GDP per capita relative to Kenya

(b) Average years of schooling

(c) Contraceptive prevalence

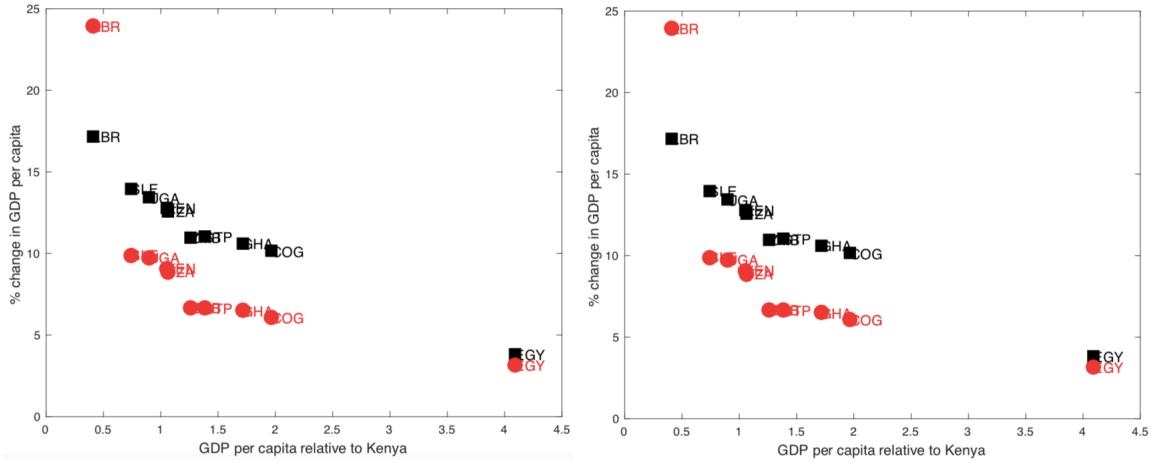
(d) Unwanted fertility

Figure A3: Data versus model. Black squares: Selected counterfactual economies and statistics. Source: See Subsection A.1.

D.5 Heterogenous Modern Contraceptives Costs

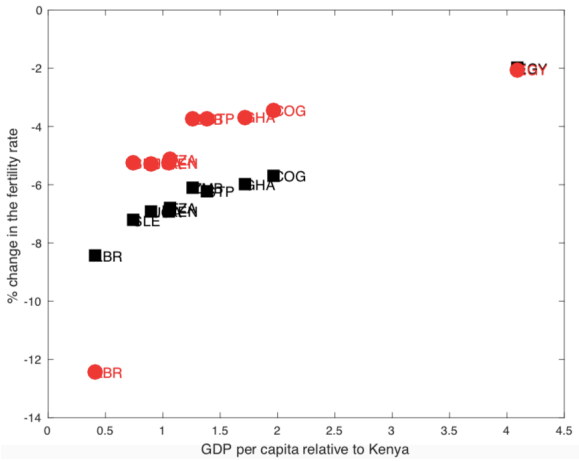
In this subsection we consider the case in which the price of modern contraceptives (ϕ_q) is heterogenous among the adult population in Kenya. Relative to the benchmark in the calibration of our model to Kenya (Subsection 5.1 of the paper), we assume that instead of $\phi_q = 1$ being the same for all households, we let $\phi_q = 1.10$ for households with at most 8 years of schooling and $\phi_q = 0.9$ for households with more than 8 years of schooling.[5] The idea behind this heterogeneity is that more educated households could not only use modern contraceptives more effectively than less educated households, but they could

[5]We also implement similar exercises with $\phi_q = 1.20$ (or $\phi_q = 1.30$) for households with at most 8 years of schooling and $\phi_q = 0.8$ (or $\phi_q = 0.7$) for households with more than 8 years of schooling. Results are available upon request.



(a) % change in income

(b) % change in schooling.



(c) % change in the fert. rate

Figure A4: Counterfactual experiments. Supply-Side Policies: (a) Black squares: Free contraceptives provision ($\phi_q = 0$). (b) Red circles: Free abortion ($\phi_a = 0$). Selected counterfactual economies.

also have easier access to them - closeness to hospitals, doctors and clinics. We keep the value of all other parameters at their baseline calibration. The goal here is not to have a better fit of the model to the Kenyan data, but instead to understand the robustness of some of our counterfactual exercises to the presence of heterogenous costs on modern contraceptives.

With such values for ϕ_q, we have a new baseline economy. We first compare this baseline economy with an economy with no fertility shocks and in which households can choose their family size without any uncertainty. We can see that output relative to this new baseline is 15 percent higher and it was 13 percent higher relative to the calibration presented in the paper - see the first and second columns of Table A17.

As in the paper, we also implement policies which either subsidise access to modern contraceptives, or abortion, or subsidise education. The level of this subsidy is such that

Table A17: Counterfactual experiments: Heterogeneous modern contraceptive cost, Kenya 2008.

Statistics	Baseline	No fertility shocks	Universal Policies: Subsidy contrac.	Subsidy abortion	Subsidy educ. (0-4 yrs)
Output, input, and prices					
Ypc relat. to the baseline	1	1.15	1.02	1.11	0.99
K relat. to the baseline	1	1.25	1.02	1.18	0.97
Av. years of schooling	7.61	8.78	7.72	8.46	7.83
w relat. to the baseline	1	1.05	1.00	1.04	0.99
r relat. to the baseline	1	0.92	0.99	0.94	1.02
Fertility and family planning					
Av. fertility	5.62	5.16	5.51	5.25	5.73
Av. unwanted fert.	0.95	0	0.66	0.42	0.92
% of HHs who use contrac.	27	0	79	14	27
% of pregn. aborted	12	0	4	22	12
Av. contrac. exp./wh (%)	0.30	0	0.53	0.16	0.32
Inequality and welfare					
Gini index	0.48	0.47	0.48	0.47	0.48
Labour income 90/50	3.82	3.89	3.90	4.01	3.87
Labour income 90/10	12.50	10.89	12.32	10.29	12.03
Welfare	3.84	4.11	3.87	4.02	3.88
Cost of the policy					
$Cost/Y_{pc}$ (current Y), (%)	0	0	0.50	0.43	0.50
$Cost/Y_{pc}$ (original Y), (%)	0	0	0.51	0.48	0.50

expenditure on this policy corresponds to 0.5 percent of income. Some statistics of this policy relative to the baseline economy are shown in Table A17. The third column of Table A17 presents the case in which modern contraceptives are subsidised. Once more, the policy is effective in expanding the use of modern contraceptives since the fraction of women using such methods increases from 27 percent to 79 percent - in the case in which $\phi_q = 1$ for all households this fraction increases from 33 to 84 percent. Average fertility decreases by just 0.11 of a child and unwanted pregnancy decreases by 0.29 of a child.[6] Subsidies for abortion can generate a strong effect on output since it increases by 11 percent. This per capita output response is about 5 times larger than the effect on output per capita of a subsidy on the price of modern contraceptives.

As when ϕ_q is homogenous to all households, if the government funds education so that all children have access to the first four years of primary education without any direct private cost, then fertility (due to an income effect) rises. Although schooling also rises and inequality decreases, the net effect on output per capita of this policy is negative

[6]The wanted fertility margin adjusts after the introduction of this policy.

but small. Therefore, we can conclude that universal subsidies in early education are less effective than public investment in modern contraceptives or abortion to raise per capita income and to control fertility. The largest reduction in inequality, measured by the ratio of the 90th percentile to the 10th percentile of income, also occurs when abortion is subsidised. Similar patterns are found when $\phi_q = 1.20$ or $\phi_q = 1.30$ for households with at most 8 years of schooling and $\phi_q = 0.8$ or $\phi_q = 0.7$ for households with more than 8 years of schooling. The experiments with some targeted groups are omitted but results are qualitatively similar to what we observed in Table 9 of the paper.

D.6 Heterogenous Abortion Costs

Now we let the utility cost of abortion (Ψ_a) to be heterogenous among the adult population in Kenya. The main idea is that the type of abortion might be very different for low educated women when compared to highly educated women. Health and other risks might be higher for low educated women than for high educated women. Therefore, relative to the benchmark in the calibration of our model to Kenya (Subsection 5.1 of the paper), we assume that instead of $\Psi_a = 0.0804$ being the same for all households, we let $\Psi_a = 1.30 \times 0.0804 = 0.10452$ for households with at most 8 years of schooling and $\Psi_a = 0.7 \times 0.0804 = 0.05628$ for households with more than 8 years of schooling.[7] Once more, the main point here is to consider the robustness of our results to the case in which the utility cost of abortion is larger for poor households than for rich households. We keep the value of all other parameters at their baseline calibration based on the economy of Kenya. The results of our policy experiments are shown in Table A18.

Clearly, policies which subsidise the cost of abortion become less effective in changing fertility and on improving income levels when compared to the case in which the utility cost of abortion is homogenous among all individuals - Table 8 in the paper. However, relative to the other two policies subsidising abortion still has the stronger effect on aggregate output. It is roughly three times the effects on output of the policy which subsidise the price of modern contraceptives.

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[7] We also implement similar exercises with $\Psi_a = 1.10 \times 0.0804 = 0.08844$ or $\Psi_a = 1.20 \times 0.0804 = 0.09648$ for households with at most 8 years of schooling and $\Psi_a = 0.9 \times 0.0804 = 0.07236$ or $\Psi_a = 0.8 \times 0.0804 = 0.06432$ for households with more than 8 years of schooling, respectively. Results are available upon request.

Table A18: Counterfactual experiments: Heterogeneous abortion cost, Kenya 2008.

Statistics	Baseline	No fertility shocks	Universal Policies: Subsidy contrac.	Subsidy abortion	Subsidy educ. (0-4 yrs)
Output, input, and prices					
Ypc relat. to the baseline	1	1.13	1.02	1.07	0.96
K relat. to the baseline	1	1.21	1.04	1.12	0.93
Av. years of schooling	7.66	8.78	7.72	8.44	7.66
w relat. to the baseline	1	1.04	1.01	1.02	0.98
r relat. to the baseline	1	0.93	0.98	0.96	1.04
Fertility and family planning					
Av. fertility	5.54	5.16	5.44	5.33	5.79
Av. unwanted fert.	0.94	0	0.57	0.41	0.97
% of HHs who use contrac.	31	0	84	21	26
% of pregn. aborted	11	0	4	21	11
Av. contrac. exp./wh (%)	0.32	0	0.56	0.16	0.33
Inequality and welfare					
Gini index	0.48	0.47	0.48	0.47	0.48
Labour income 90/50	3.83	3.89	3.92	4.00	3.58
Labour income 90/10	12.57	10.89	12.21	10.28	11.77
Welfare	3.86	4.11	3.90	4.01	3.86
Cost of the policy					
$Cost/Y_{pc}$ (current Y), (%)	0	0	0.50	0.41	0.50
$Cost/Y_{pc}$ (original Y), (%)	0	0	0.51	0.44	0.48

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