

Bargaining over Babies: Theory, Evidence, and Policy Implications

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I. Evidence from the Generations and Gender Programme

TABLE 1—SUMMARY STATISTICS OF THE WAVE 1 SAMPLE

| Variable | Mean |
|--|-------|
| Age of female partner | 33.81 |
| Age of male partner | 36.62 |
| Respondent female (in percent) | 49.85 |
| Married couple (in percent) | 68.74 |
| Cohabiting (in percent) | 87.62 |
| Number of existing children | 1.45 |
| Women wanting a baby (in percent) | 22.27 |
| Men wanting a baby (in percent) | 22.99 |
| Couples where at least one partner wants a baby (in percent) | 27.50 |
| Couples where both partners want a baby (in percent) | 16.76 |

Notes: 33,479 observations. Included countries are Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Lithuania, Norway, Poland, Romania, and Russia.

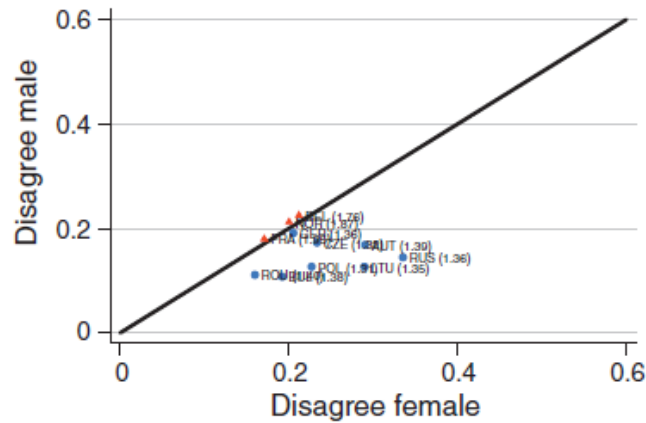
A. Many Couples Disagree on Whether to Have a Baby

We now compute the following disagreement shares:

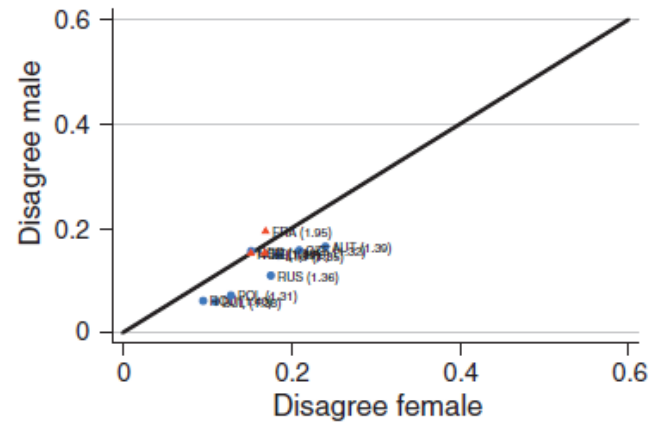
$$\textit{disagree male} = \frac{\nu(\textit{she yes/he no})}{\nu(\textit{agree}) + \nu(\textit{she yes/he no}) + \nu(\textit{she no/he yes})},$$

$$\textit{disagree female} = \frac{\nu(\textit{she no/he yes})}{\nu(\textit{agree}) + \nu(\textit{she yes/he no}) + \nu(\textit{she no/he yes})}.$$

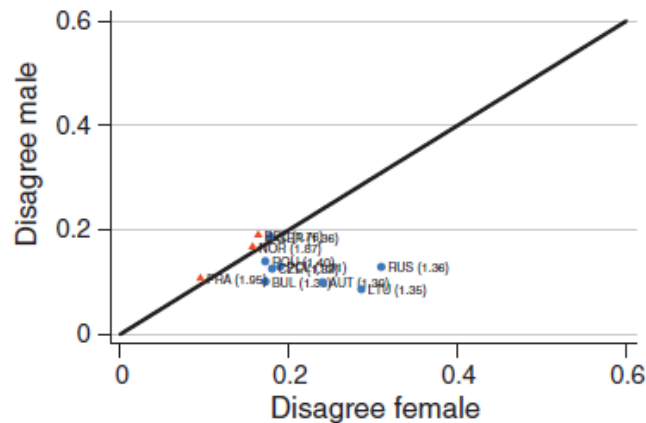
Panel A. All couples



Panel B. Couples without children



Panel C. Couples with one child



Panel D. Couples with two or more children

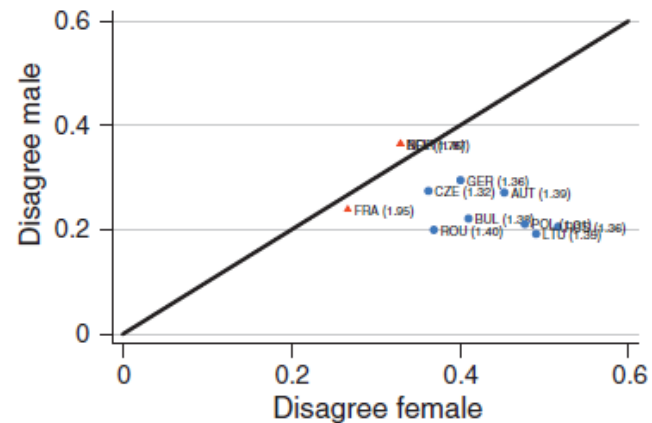


FIGURE 1. DISAGREEMENT OVER HAVING A BABY ACROSS COUNTRIES

Notes: Data from Generations and Gender Programme. Each dot is a country, total fertility rate displayed in parentheses. *Disagree female* is the number of couples where the woman does not want a child but the man does, as a fraction of all couples where at least one partner wants a child. *Disagree male* is the analogous fraction of couples where the man does not want a child but the woman does.

B. Without Agreement, Few Births Take Place

The basic facts can be established through simple regressions of fertility outcomes on intentions of the following form:

$$\begin{aligned} birth_i = & \beta_0 + \beta_f \cdot she\ yes/he\ no_i + \beta_m \cdot she\ no/he\ yes_i \\ & + \beta_a \cdot agree_i + \epsilon_i. \end{aligned}$$

TABLE 2—IMPACT OF FERTILITY INTENTIONS ON PROBABILITY OF BIRTH

| | Whole sample | By number of children | | |
|-----------------|------------------|-----------------------|-------------------|------------------|
| | | $n = 0$ | $n = 1$ | $n \geq 2$ |
| She yes/he no | 0.100 (0.020) | 0.019 (0.038) | 0.130 (0.040) | 0.062 (0.024) |
| She no/he yes | 0.044 (0.013) | 0.052 (0.034) | -0.035 (0.019) | 0.034 (0.018) |
| Agree | 0.319 (0.013) | 0.239 (0.024) | 0.276 (0.020) | 0.299 (0.031) |
| Constant | 0.077 (0.003) | 0.173 (0.013) | 0.124 (0.009) | 0.039 (0.003) |
| Number of cases | 10,974 | 2,122 | 3,024 | 5,828 |
| R^2 | 0.123 | 0.063 | 0.100 | 0.079 |

Notes: Each column is a linear regression of a binary variable indicating whether a child was born between Wave 1 and Wave 2 (i.e., within three years after Wave 1) on stated fertility intentions in Wave 1. Countries included (i.e., all countries where data from both waves are available) are Austria, Bulgaria, Czech Republic, France, Germany, Lithuania, and Russia. Sample restricted to couples where the woman is between 20 and 45 years old (i.e., of childbearing age) and the man is between 20 and 55 years old during the Wave 1 interview (when intentions are recorded).

*C. When Men Do Little Child Care Work,
Women Are More Likely to Be Opposed to Having More Children*

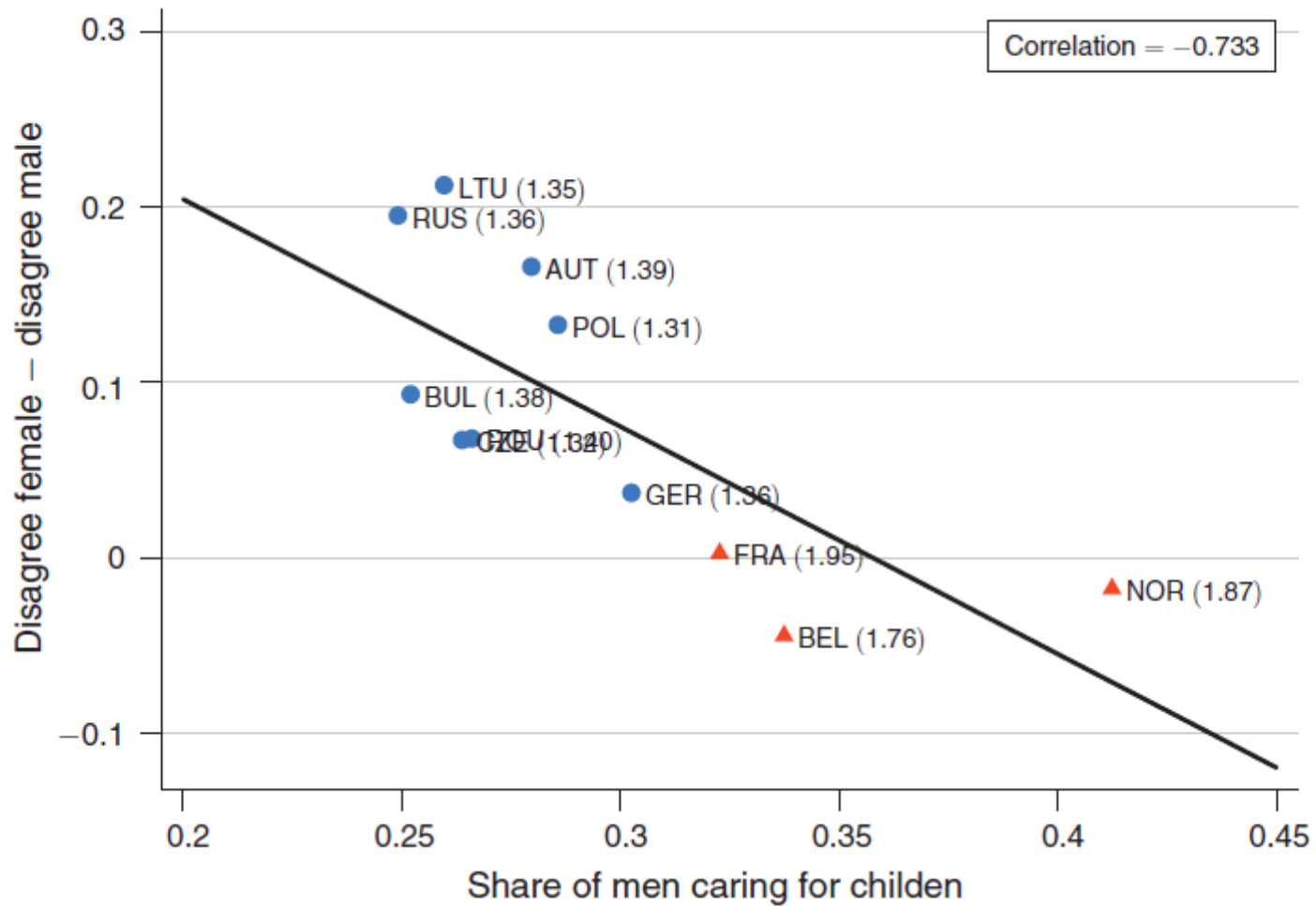
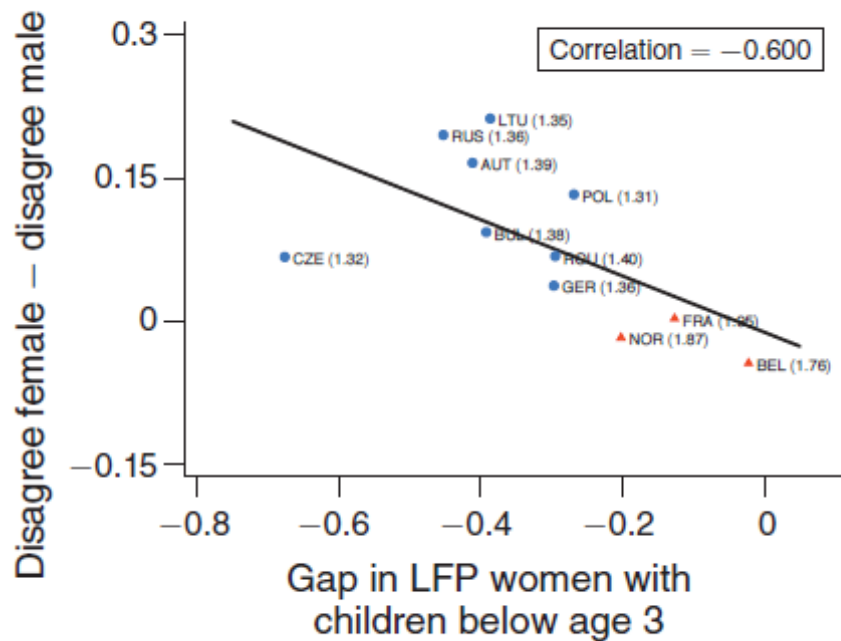


FIGURE 2. DISAGREEMENT OVER FERTILITY AND MEN'S SHARE IN CARING FOR CHILDREN

Notes: Data from Generations and Gender Programme. Each dot is a country, total fertility rate displayed in parentheses. Sample restricted to couples who have at least one child under age 15.

Panel A



Panel B

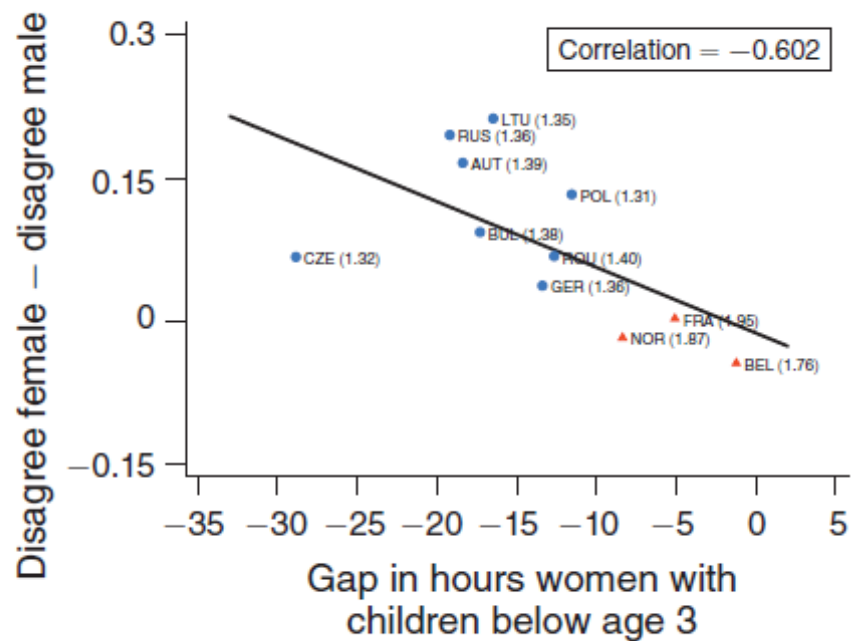


FIGURE 3. DISAGREEMENT OVER FERTILITY AND MOTHER'S LABOR MARKET BEHAVIOR

Notes: Data from Generations and Gender Programme. Each dot is a country, total fertility rate displayed in parentheses. Horizontal axis of panel A displays gap in labor force participation rate between mothers with a child up to age 3 and all other women in the sample (which is restricted to women of ages 20 to 45). Horizontal axis of panel B displays gap in weekly hours of labor supply between the same groups.

II. A Bargaining Model of Fertility

A. Setup and Solution under Commitment

Utility $u_g(c_g, b)$ of partner $g \in \{f, m\}$ is given by

$$(1) \quad u_g(c_g, b) = c_g + bv_g,$$

where $c_g \geq 0$ is consumption, $b \in \{0, 1\}$ indicates whether a child is born, and v_g is the additional utility partner g receives from having a child compared to the childless status quo.

For a cooperating couple, the budget constraint is then given by

$$(2) \quad c_f + c_m = (1 + \alpha)(w_f + w_m - \phi b).$$

Utilities $\bar{u}_g(0)$ in the outside option are therefore given by

$$(3) \quad \bar{u}_f(0) = w_f \quad \text{and} \quad \bar{u}_m(0) = w_m.$$

PROPOSITION 1 (Fertility Choice under Commitment): *Under commitment, the couple decides to have a child if the condition*

$$(4) \quad v_f + v_m \geq \phi(1 + \alpha)$$

is met. Moreover, when (4) holds, we also have

$$u_f(1) \geq u_f(0) \quad \text{and} \quad u_m(1) \geq u_m(0).$$

That is, each partner is individually better off when the child is born. Conversely,

$$v_f + v_m < \phi(1 + \alpha)$$

implies

$$u_f(1) < u_f(0) \quad \text{and} \quad u_m(1) < u_m(0),$$

that is, if the couple decides not to have a child, each partner individually is better off without the child. Taking together, the conditions imply that under commitment the couple always agrees about the fertility choice, and this choice is efficient.

B. Setup and Solution under Lack of Commitment

The new outside options therefore are

$$(5) \quad \bar{u}_f(1) = w_f + v_f - \chi_f \phi,$$

$$(6) \quad \bar{u}_m(1) = w_m + v_m - \chi_m \phi.$$

PROPOSITION 2 (Fertility Choice under Lack of Commitment): *Under lack of commitment, we have $u_f(1) \geq u_f(0)$ (the woman would like to have a child) if and only if the condition*

$$(7) \quad v_f \geq \left(\chi_f + \frac{\alpha}{2} \right) \phi$$

is satisfied. We have $u_m(1) \geq u_m(0)$ (the man would like to have a child) if and only if the condition

$$(8) \quad v_m \geq \left(\chi_m + \frac{\alpha}{2} \right) \phi$$

is satisfied. The right-hand sides of (7) and (8) are constants. Hence, depending on v_f and v_m , it is possible that neither condition, both conditions, or just one condition is satisfied. Since child birth requires agreement, a child is born only if (7) and (8) are both met simultaneously.

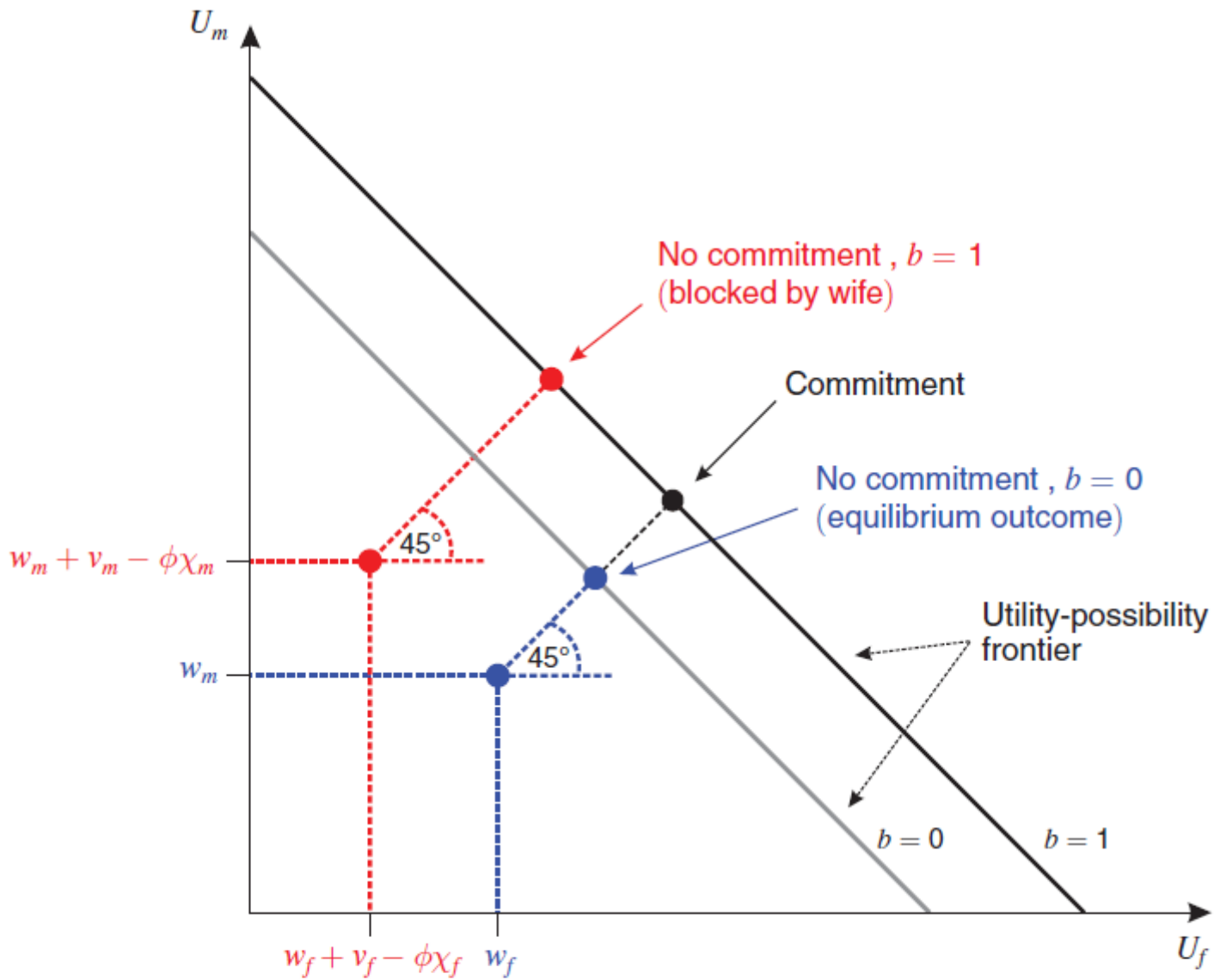


FIGURE 4. BARGAINING UNDER COMMITMENT VERSUS LACK OF COMMITMENT

C. Toward a Quantitative Model

III. A Quantitative Model of Bargaining over Fertility under Partial Commitment

The individual utility of a household member of gender $g \in \{m, f\}$ at age t is given by the value function,

$$(9) \quad V_g^t(e, w_f, a_1, a_2, a_3, v_f, v_m) = E\left[u(c_g, d_g, v_g, b) + \beta V_g^{t+1}(e, w_f, a'_1, a'_2, a'_3, v'_f, v'_m)\right].$$

The a_i evolve according to

$$\begin{pmatrix} a'_1 \\ a'_2 \\ a'_3 \end{pmatrix} = \begin{pmatrix} I(a_1 > 0)(a_1 + 1) + I(a_1 = 0)b \\ I(a_2 > 0)(a_2 + 1) + I(a_1 > 0)I(a_2 = 0)b \\ I(a_3 > 0)(a_3 + 1) + I(a_2 > 0)I(a_3 = 0)b \end{pmatrix},$$

where $I(\cdot)$ is the indicator function.

Instantaneous utility is given by

$$u(c_g, d_g, v_g, b) = c_g - d_g + v_g \cdot b.$$

Given the age distribution of children a_i , we can calculate the total number of children living in the household as

$$n_h = \sum_i \mathbf{1}(0 < a_i < H) + b,$$

where H is the duration of childhood.

The within-period outside option for the wife, analogous to (5), is then given by

$$(10) \quad \bar{u}_f(w_f, v_f, h, n_h, b) = (1 - bh)w_f - \frac{1}{2}(\phi_c n_h + (1 - h)w_y b) - \chi_f \phi_u n_h + v_f \cdot b,$$

and for the husband we have, analogous to (6),

$$(11) \quad \bar{u}_m(w_m, v_m, h, n_h, b) = w_m - \frac{1}{2}(\phi_c n_h + (1 - h)w_y b) - \chi_m \phi_u n_h + v_m \cdot b.$$

- Given these outside options, the couple negotiates how to divide consumption given the budget constraint.
- The couple's budget constraint in the case of cooperation reads

$$(12) \quad c_f + c_m = (1 + \alpha) \left[(1 - bh) w_f + w_m - \phi_c n_h - (1 - h) w_y b \right],$$

that is, total consumption is equal to total income minus the goods cost of raising children, scaled up by the increasing returns from cooperation α .

With equal bargaining weights, the Nash bargaining outcome is the solution of the maximization problem

$$\max_{c_f, c_m} \left[c_f - \left((1 - bh) w_f - \frac{1}{2} (\phi_c n_h + (1 - h) w_y b) \right) \right]^{0.5} \\ \times \left[c_m - \left(w_m - \frac{1}{2} (\phi_c n_h + (1 - h) w_y b) \right) \right]^{0.5},$$

subject to the budget constraint above.

Formally, i_g is determined as follows:

$$(13) \quad i_g = I\left\{u(c_g, d_g, v_g, 1) + \beta E\left[V_g^{t+1}(e, w_f, a'_1, a'_2, a'_3, v'_f, v'_m) \mid b = 1\right]\right. \\ \left. \geq u(c_g, d_g, v_g, 0) + \beta E\left[V_g^{t+1}(e, w_f, a'_1, a'_2, a'_3, v'_f, v'_m) \mid b = 0\right]\right\},$$

where $I(\cdot)$ is the indicator function and it is understood that consumption and child care costs depend on b .

IV. Matching the Model to Data from the Generations and Gender Programme

A. Preset and Individually Estimated Parameters

TABLE 3—FERTILITY RATES IN GGP DATA BY FERTILITY INTENTION

| Existing children | High school | | | | | |
|-------------------|-------------|--------|---------|--------|---------|--------|
| | $n = 0$ | | $n = 1$ | | $n = 2$ | |
| | He no | He yes | He no | He yes | He no | He yes |
| She no | 17.89 | 17.89 | 13.06 | 13.06 | 4.28 | 4.28 |
| She yes | 17.89 | 40.21 | 23.60 | 39.84 | 12.21 | 36.15 |
| Existing children | College | | | | | |
| | $n = 0$ | | $n = 1$ | | $n = 2$ | |
| | He no | He yes | He no | He yes | He no | He yes |
| She no | 17.03 | 17.03 | 11.42 | 11.42 | 2.48 | 2.48 |
| She yes | 17.03 | 43.78 | 26.67 | 42.48 | 2.48 | 30.91 |

Notes: Percent of couples with each combination of female intent, male intent, and existing number of children that will have a baby within three years.

B. Jointly Estimated Parameters

TABLE 4—DISTRIBUTION OF FERTILITY INTENTIONS IN GGP DATA AND MODEL

| | $n = 0$ | | $n = 1$ | | $n = 2$ | |
|--------------------|---------|--------|---------|--------|---------|--------|
| | He no | He yes | He no | He yes | He no | He yes |
| <i>High school</i> | | | | | | |
| Data | | | | | | |
| She no | 56.36 | 6.92 | 66.05 | 7.55 | 90.25 | 4.39 |
| She yes | 5.55 | 31.16 | 4.29 | 22.10 | 2.31 | 3.05 |
| Model | | | | | | |
| She no | 55.67 | 5.51 | 68.37 | 7.25 | 85.62 | 6.35 |
| She yes | 4.74 | 34.08 | 3.14 | 21.23 | 3.40 | 4.64 |
| <i>College</i> | | | | | | |
| Data | | | | | | |
| She no | 49.09 | 7.04 | 56.56 | 9.92 | 86.34 | 5.78 |
| She yes | 6.37 | 37.50 | 5.08 | 28.45 | 3.29 | 4.58 |
| Model | | | | | | |
| She no | 50.20 | 5.55 | 59.76 | 8.66 | 84.84 | 6.92 |
| She yes | 4.84 | 39.40 | 2.41 | 29.18 | 3.23 | 5.01 |

TABLE 5—SHARE OF COUPLES WITH SAME FERTILITY INTENTIONS IN BOTH WAVES

| | Data | | Model | |
|---------|-------|--------|-------|--------|
| | He no | He yes | He no | He yes |
| She no | 79.89 | 25.42 | 69.17 | 32.77 |
| She yes | 22.63 | 65.24 | 29.91 | 52.63 |

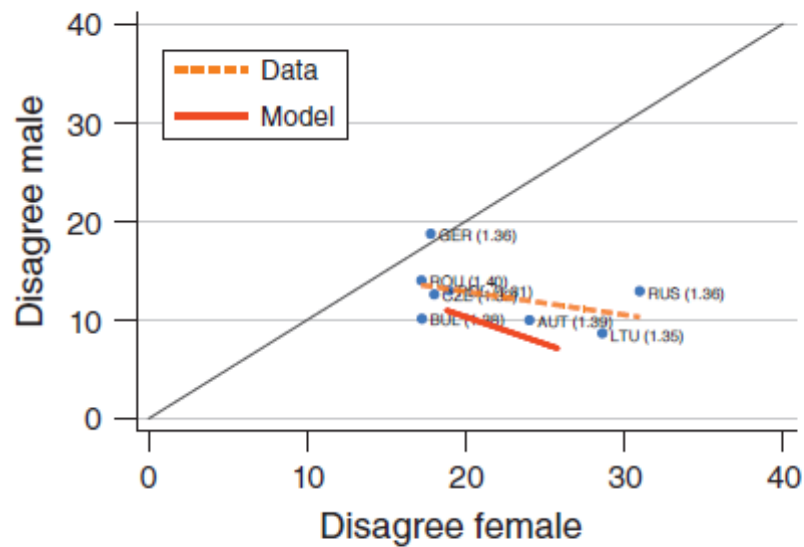
Notes: Comparison of GGP data (population 35 and under) and model output.

TABLE 6—WOMEN’S LABOR FORCE PARTICIPATION IN GGP DATA AND MODEL

| | Data | | Model | |
|-------------|---------------|-------|---------------|-------|
| | Child under 3 | | Child under 3 | |
| | No | Yes | No | Yes |
| High school | 62.60 | 22.14 | 62.60 | 21.98 |
| College | 80.50 | 43.17 | 80.50 | 43.19 |

C. Parameter Choices and Model Fit

Panel A. Couples with one child



Panel B. Couples with two or more children

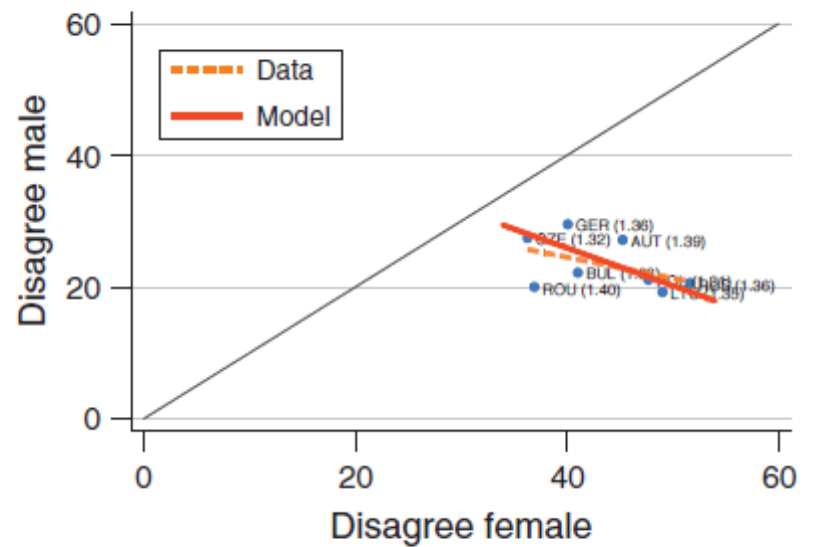


FIGURE 5. FERTILITY INTENTIONS ACROSS COUNTRIES, GGP DATA AND MODEL

TABLE 7—JOINTLY CALIBRATED PARAMETERS

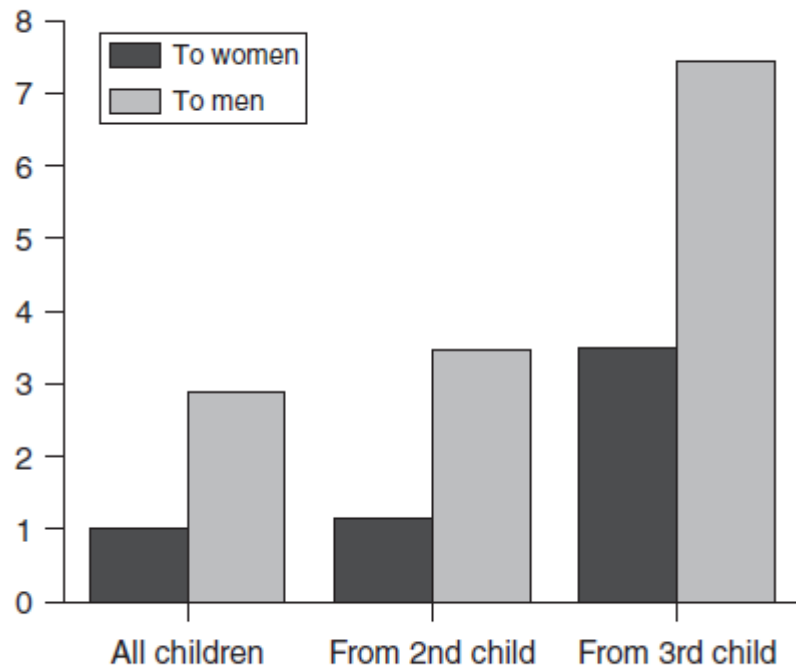
| Description | Parameter | Value | |
|---|----------------|-------------|---------|
| | | High school | College |
| <i>Child preference parameters</i> | | | |
| Mean women first child | $\mu_{f,e,1}$ | 5.07 | 5.78 |
| Mean women second child | $\mu_{f,e,2}$ | 1.79 | 3.06 |
| Mean women third child | $\mu_{f,e,3}$ | -0.15 | 0.05 |
| SD women | σ_f | | 3.07 |
| Mean men first child | $\mu_{m,e,1}$ | 3.64 | 4.85 |
| Mean men second child | $\mu_{m,e,2}$ | -6.44 | 0.00 |
| Mean men third child | $\mu_{m,e,3}$ | -15.54 | -14.63 |
| SD men | σ_m | | 12.72 |
| Correlation | ρ | | 0.93 |
| Persistence | π | | 0.29 |
| <i>Child care and labor market parameters</i> | | | |
| Child care cost | w_y | | 0.58 |
| Participation cost | p_c | | 0.36 |
| SD female wages | $\sigma_{w,e}$ | 0.89 | 0.94 |

TABLE 8—DEMOGRAPHIC STATISTICS GENERATED BY ESTIMATED MODEL

| | |
|---|------|
| Total fertility rate | 1.56 |
| Fraction of couples without children | 0.12 |
| Fraction of couples with one child | 0.39 |
| Fraction of couples with two children | 0.43 |
| Fraction of couples with more than two children | 0.06 |

V. Policy Experiments: The Effectiveness of Targeted Child Subsidies

Panel A. Subsidy per child per year



Panel B. Total cost per couple

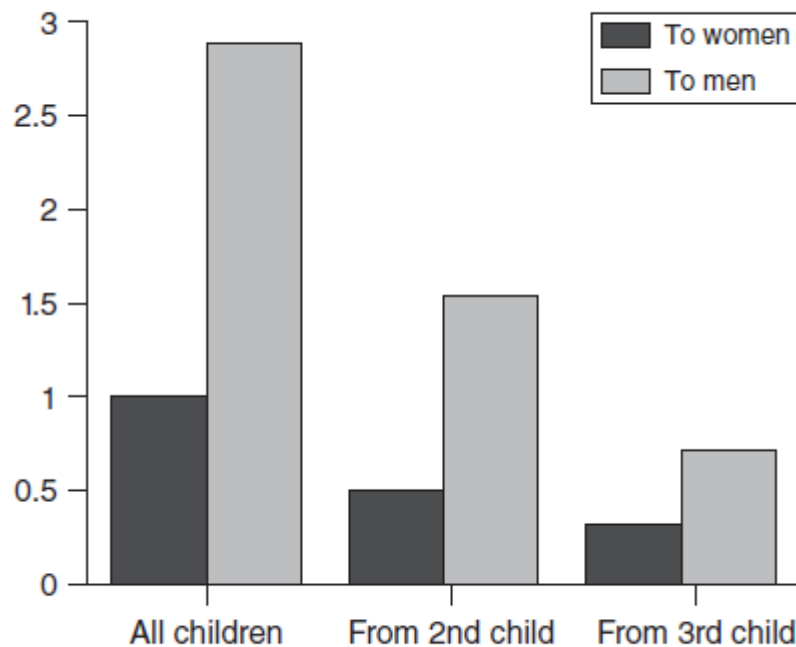


FIGURE 6. RELATIVE COST OF TARGETED SUBSIDIES NEEDED TO RAISE THE TOTAL FERTILITY RATE BY 0.1

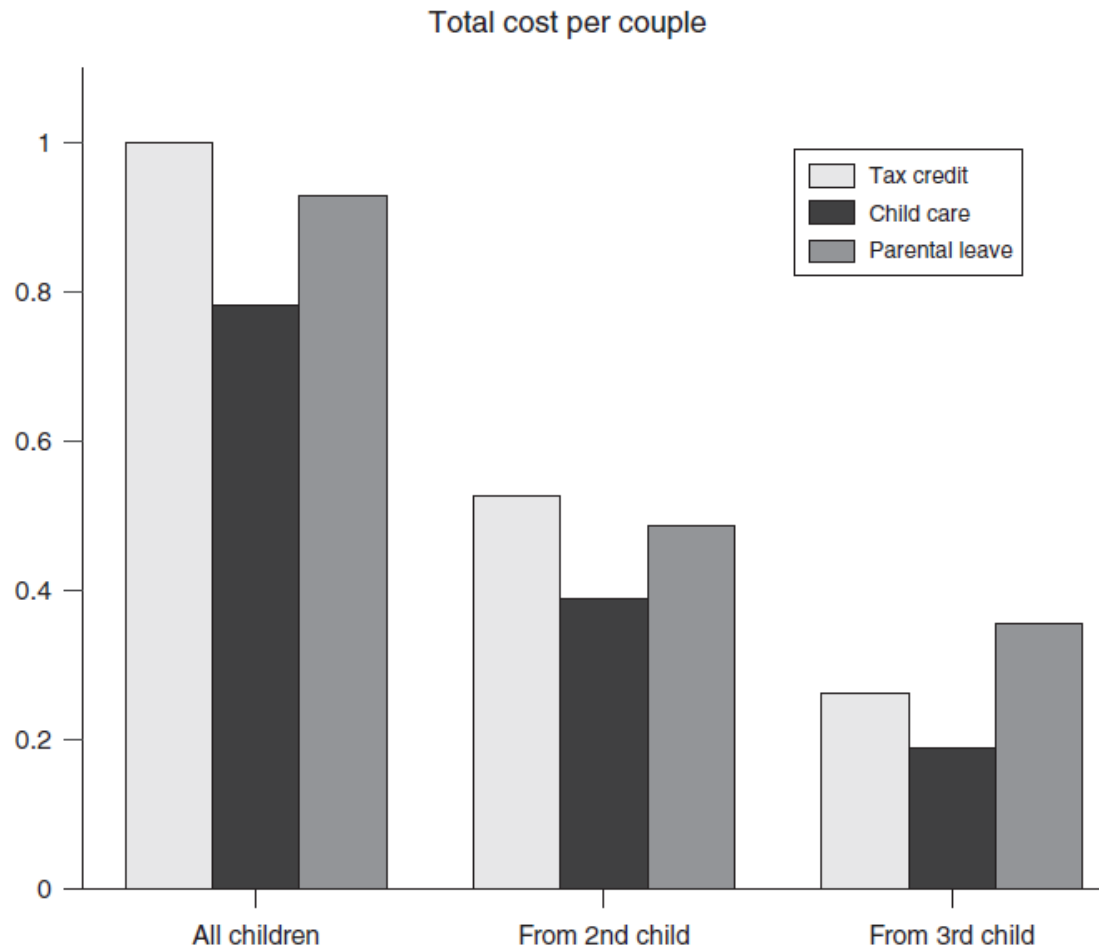


FIGURE 7. RELATIVE COST OF REAL-LIFE POLICIES RAISING THE TOTAL FERTILITY RATE BY 0.1

Notes: *Tax credit* is a per-child subsidy that is proportional to each partner's labor income. *Child care* is a subsidy to the cost of market-based child care. *Parental leave* is a subsidy paid to mothers who take care of a young child at home. Cost is displayed relative to a tax credit for all children.

VI. Conclusions