Bargaining over Babies
Theory, Evidence, and Policy Implications

Matthias Doepke and Fabian Kindermann
How Babies are Made
How Babies are Made
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How Babies are Made
The Question

- It takes two people to make a baby
- Agreement should be essential for fertility
- Mother and father have to prefer baby over status quo
- Question:
  Is agreement important for understanding fertility choice?
The Plan

- Document importance of agreement using new data on
  - fertility preferences and
  - fertility outcomes
- Build a model that is consistent with the data
- Match the model to the data
- Derive stark policy implications for low-fertility countries
The Western World’s Fertility Crisis

Total fertility rate by country

FRA NOR DEU AUT BEL ESP CZE POL JPN USA
Relationship to Literature

- Large differences in desired fertility between men and women in developing countries (e.g. Westoff 2010)
- Experimental evidence suggests important role for household bargaining (e.g. Ashraf, Field, and Lee 2014)
- Limited theoretical literature on bargaining over fertility; Rasul (2008) is closest
The Data
Generations and Gender Programme (GGP)

- Longitudinal Survey of 18-79 year olds in 19 countries
  - *Do You Yourself Want Another Baby Now?*
  - *Does Your Partner Want Another Baby Now?*
- Wave II (2007-ongoing): *Fertility Outcomes*
GGP Data on Fertility Intentions

- Four possible states for a couple:
  - Neither wants a baby
  - Both want a baby (AGREE)
  - She wants a baby, he does not (SHE YES/HE NO)
  - He wants a baby, she does not (SHE NO/HE YES)
GGP Data on Fertility Intentions

Four possible states for a couple:

- Neither wants a baby
- Both want a baby (AGREE)
- She wants a baby, he does not (SHE YES/HE NO)
- He wants a baby, she does not (SHE NO/HE YES)

AGREE + SHE YES/HE NO + SHE NO/HE YES → POTENTIALS
Fact 1: 
There is a lot of disagreement within couples
GGP Data on Fertility Intentions: No Children

Couples Without Children

Disagree Male

Disagree Female

0.2

0.4

0.6

Couples Without Children

FRA (1.95)

AUT (1.39)

RUS (1.36)

GER (1.36)

ROU (1.40)

LTU (1.35)

POL (1.31)

CZE (1.32)

FRA (1.95)

NOR (1.87)

BEL (1.76)
GGP Data on Fertility Intentions: One Child

Couples With One Child

Disagree Male

Disagree Female

BUL (1.38)
RUS (1.36)
GER (1.36)
ROU (1.40)
AUT (1.39)
LTU (1.35)
POL (1.31)
CZE (1.32)
FRA (1.95)
NOR (1.87)
BEL (1.76)
GGP Data on Fertility Intentions: Two Children

Couples With Two or More Children

Disagree Male

Disagree Female

Couples With Two or More Children
Fact 2: Agreement matters for fertility
GGP Data on Fertility Intentions and Outcomes

- Fertility outcomes available for Austria, Bulgaria, Czech Republic, France, Germany, Lithuania, and Russia

- Regress birth outcome on constant, SHE YES/HE NO, SHE NO/HE YES, and AGREE

- Result for couples with no children:

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHE YES/HE NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHE NO/HE YES</td>
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<tr>
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GGP Data on Fertility Intentions and Outcomes

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- Regress birth outcome on constant, SHE YES/HE NO, SHE NO/HE YES, and AGREE
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<tr>
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<td>(0.04)</td>
</tr>
<tr>
<td>SHE NO/HE YES</td>
<td>0.05</td>
<td>(0.03)</td>
</tr>
<tr>
<td>AGREE</td>
<td>0.24***</td>
<td>(0.02)</td>
</tr>
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</table>
GGP Data on Fertility Intentions and Outcomes

- Fertility outcomes available for Austria, Bulgaria, Czech Republic, France, Germany, Lithuania, and Russia

- Regress birth outcome on constant, SHE YES/HE NO, SHE NO/HE YES, and AGREE

- Result for couples with one child:

<table>
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<tr>
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<th>Coefficient</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
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<td>0.13***</td>
<td>(0.04)</td>
</tr>
<tr>
<td>SHE NO/HE YES</td>
<td>−0.04*</td>
<td>(0.02)</td>
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<tr>
<td>AGREE</td>
<td>0.27***</td>
<td>(0.02)</td>
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GGP Data on Fertility Intentions and Outcomes

- Fertility outcomes available for Austria, Bulgaria, Czech Republic, France, Germany, Lithuania, and Russia

- Regress birth outcome on constant, SHE YES/HE NO, SHE NO/HE YES, and AGREE

- Result for couples with two children:

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<td>0.06***</td>
<td>(0.02)</td>
</tr>
<tr>
<td>SHE NO/HE YES</td>
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</tr>
<tr>
<td>AGREE</td>
<td>0.30***</td>
<td>(0.03)</td>
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Fact 3:
The extent of disagreement is related to the distribution of child care
GGP Data on Fertility Intentions and Childcare

Correlation = $-0.733$

Disagree Female − Disagree Male

Share of men caring for children

BUL (1.38)  
RUS (1.36)  
GER (1.36)  
ROU (1.40)  
AUT (1.39)  
LTU (1.35)  
POL (1.31)  
CZE (1.32)  
FRA (1.95)  
NOR (1.87)  
BEL (1.76)
GGP Data on Fertility Intentions and Labor Supply

Disagree Female − Disagree Male

Gap in LFP Women with Children Below Age 3

Correlation = −0.600
GGP Data on Fertility Intentions and Hours

Disagree Female − Disagree Male

Gap in Hours Women with Children Below Age 3

Correlation = −0.602
A Bargaining Model of Fertility Choice
Family Setup

- Couple consists of wife $f$ and husband $m$
- Both spouses earn wages $w_f$ and $w_m$
- Decide about
  - consumption allocation $c_f$ and $c_m$ and
  - whether to have a child, $b \in \{0, 1\}$
- Child creates costs $\phi$
Family Setup

- Preferences of spouse $g \in \{f, m\}$ are:
  \[
  u_g(c_g, b) = c_g + b \cdot v_g,
  \]

- Cooperative family budget constraint:
  \[
  c_f + c_m = (1 + \alpha) \cdot (w_f + w_m - b \cdot \phi)
  \]

- Nash bargaining with equal weights
Mechanics of Nash-Bargaining with Equal Weights

- Total amount of available utility:

\[ U = u_f(c_f, b) + u_m(c_m, b) \]
Mechanics of Nash-Bargaining with Equal Weights

- Total amount of available utility:

\[ U = u_f(c_f, b) + u_m(c_m, b) \]

\[ = (1 + \alpha) \cdot (w_f + w_m - b \cdot \phi) + b \cdot (v_f + v_m) \]
Mechanics of Nash-Bargaining with Equal Weights

- **Total amount of available utility:**

  \[
  U = u_f(c_f, b) + u_m(c_m, b)
  \]

  \[
  = (1 + \alpha) \cdot (w_f + w_m - b \cdot \phi) + b \cdot (v_f + v_m)
  \]

- **Outside Options:** \( \bar{u}_f \) and \( \bar{u}_m \)

  \[\rightarrow\] non-cooperation (Lundberg/Pollak 1993)

- **Bargaining outcome:**

  \[
  U_g = \bar{u}_g + \frac{1}{2} \cdot [U - \bar{u}_f - \bar{u}_m]
  \]
Case 1: Commitment

- **General time line:** first the kid, then consumption
- **Simultaneous** decision about fertility and consumption
- Can fully commit to consumption plan after kid was born
- **Outside options:** Work and have no kid

\[ \bar{u}_f = w_f \quad \text{and} \quad \bar{u}_m = w_m \]
The bargaining solution is:

\[
\begin{align*}
U_f &= w_f + \frac{\alpha}{2} (w_f + w_m - \phi b) + \frac{b}{2} (v_f + v_m - \phi) \\
U_m &= w_m + \frac{\alpha}{2} (w_f + w_m - \phi b) + \frac{b}{2} (v_f + v_m - \phi)
\end{align*}
\]

Surplus from Consumption \quad \text{Surplus from Fertility}
The bargaining solution is:

\[
U_f = w_f + \frac{\alpha}{2} (w_f + w_m - \phi b) + \frac{b}{2} (v_f + v_m - \phi)
\]

\[
U_m = w_m + \frac{\alpha}{2} (w_f + w_m - \phi b) + \frac{b}{2} (v_f + v_m - \phi)
\]

Surplus from Consumption

Surplus from Fertility
Outcome Under Commitment

- The bargaining solution is:

\[ U_f = w_f + \frac{\alpha}{2} (w_f + w_m - \phi b) + \frac{b}{2} (v_f + v_m - \phi) \]

\[ U_m = w_m + \frac{\alpha}{2} (w_f + w_m - \phi b) + \frac{b}{2} (v_f + v_m - \phi) \]

Surplus from Consumption

Surplus from Fertility

- Couple will have a child if:

\[ v_f + v_m \geq \phi (1 + \alpha) \]

- Couple agrees on fertility and choice is efficient
Case 2: No Commitment

- Two-stage decision **without commitment**:
  1. Decide on fertility
  2. Ex-post bargaining over consumption given fertility choice

- Solve backwards

- Outside options in **second stage** (as function of $b$):
  \[
  \bar{u}_f(b) = w_f + b \left[ v_f - \chi_f \phi \right],
  \]
  \[
  \bar{u}_m(b) = w_m + b \left[ v_m - \chi_m \phi \right]
  \]

with fixed cost shares $\chi_f + \chi_m = 1$
Outcome Without Commitment

▶ Ex-post utilities **without child**:

\[ U_f(0) = w_f + \frac{\alpha}{2} (w_f + w_m) \]
\[ U_m(0) = w_m + \frac{\alpha}{2} (w_f + w_m) \]

▶ Ex-post utilities **with child**:

\[ U_f(1) = w_f + v_f - \chi_f \phi + \frac{\alpha}{2} (w_f + w_m - \phi) , \]
\[ U_m(1) = w_m + v_m - \chi_m \phi + \frac{\alpha}{2} (w_f + w_m - \phi) \]

▶ Spouses still share consumption surplus equally, but partners are not compensated for reduction in outside option
Outcome Without Commitment

- Ex-post utilities without child:

\[ U_f(0) = w_f + \frac{\alpha}{2} (w_f + w_m) \]
\[ U_m(0) = w_m + \frac{\alpha}{2} (w_f + w_m) \]

- Ex-post utilities with child:

\[ U_f(1) = w_f + v_f - \chi_f \phi + \frac{\alpha}{2} (w_f + w_m - \phi) \]
\[ U_m(1) = w_m + v_m - \chi_m \phi + \frac{\alpha}{2} (w_f + w_m - \phi) \]

- Spouses still share consumption surplus equally, but partners are not compensated for reduction in outside option
Fertility Choice Without Commitment

- Spouses have to agree for child to be born:
  \[ b = \begin{cases} 
  1 & \text{if } U_f(1) \geq U_f(0) \text{ and } U_m(1) \geq U_m(0) \\
  0 & \text{otherwise} 
\end{cases} \]

- Wife agrees to birth if:
  \[ v_f \geq \left( \chi_f + \frac{\alpha}{2} \right) \phi \]

- Husband agrees to birth if:
  \[ v_m \geq \left( \chi_m + \frac{\alpha}{2} \right) \phi \]

- Disagreement is possible and outcome may be inefficient
Graphical Representation
Child Bearing Decisions With and Without Commitment

\[ U_m \]

\[ w_m \]

\[ w_f + v_f - \chi \phi \]

\[ w_f \]
Child Bearing Decisions With and Without Commitment

\[ U_m \]

\[ U_f \]

\[ w_m \]

\[ w_f + v_f - \chi \phi \]

utility-possibility frontier

\[ n = 0 \]
Child Bearing Decisions With and Without Commitment
Child Bearing Decisions With and Without Commitment

\[ U_m \]

utility-possibility frontier

\[ n = 0 \]

\[ w_f + v_f - \chi f \phi \]

utility-possibility frontier

\[ n = 0 \]
Child Bearing Decisions With and Without Commitment
Child Bearing Decisions With and Without Commitment

\[ U_f \]

Utility-possibility frontier

\[ n = 0 \quad n = 1 \]

With commitment

\[ w + v - m \]

\[ w + v - f \]

\[ U_f \]

\[ U_m \]

\[ w_m \]

\[ w_f + v_f - \chi \phi \]

\[ w_f \]
Child Bearing Decisions With and Without Commitment

\[ U_f \\

\text{utility-possibility frontier}

n = 0 \quad n = 1

\text{with commitment}

\[ w_m + v_m - \chi_m \phi \]

\[ w_m \]

\[ w_f + v_f - \chi_f \phi \quad w_f \]

\[ U_f \]
Child Bearing Decisions With and Without Commitment

\[ n = 0 \]
\[ n = 1 \]

Utility-possibility frontier

\[ w_m + v_m - \chi_m \phi \]

\[ w_m \]

\[ w_f + v_f - \chi_f \phi \]

\[ w_f \]
Child Bearing Decisions With and Without Commitment

\[ U_m \]

\[ U_f \]

without commitment

with commitment

utility-possibility frontier

\[ w_m + v_m - \chi_m \phi \]

\[ w_f + v_f - \chi_f \phi \]

\[ w_m \]

\[ w_f \]

\[ n = 0 \]

\[ n = 1 \]
Towards a Quantitative Model

- Consider impact of targeted subsidy on fertility when there are many couples with a distribution of preferences
  - Impact depends on density of preference distribution
  - Impact depends on which partner is pivotal for decision

- Consider impact of child subsidy on timing of births versus total number of births
  - Impact depends on persistence of disagreement

- Additional features of quantitative model
  - Female labor supply decision
  - Partial commitment
A Quantitative Model
The Quantitative Model

- Model period is three years
- Couples fertile until age 43
- Utility from children is stochastic and evolves over time
- Probability of birth conditional on intentions, but exogenous
- Two types of female education $e \in \{hs, co\}$
- Additional wage heterogeneity $w_f \sim \log N(\mu_{w,e}, \sigma_{w}^2)$
Cost of Having Children

- Cost of children linear in the number of kids $n$

- Three types of costs:
  
  1. **Utility cost**: $\phi_u \rightarrow$ split according to $\chi_f$ and $\chi_m$

- Child care cost only for children age 3 and below

- Total material cost of having children $k(h) = \phi_c + h \cdot w_f + (1 - h) \cdot w_y$
Cost of Having Children

- Cost of children linear in the number of kids $n$

- Three types of costs:
  1. Utility cost: $\phi_u \rightarrow$ split according to $\chi_f$ and $\chi_m$
  2. Monetary cost: $\phi_c \rightarrow$ split equally between partners

Total material cost of having children $k(h) = \phi_c + h \cdot w_f + (1-h) \cdot w_y$
Cost of Having Children

- Cost of children linear in the number of kids \( n \)

- Three types of costs:
  
  1. Utility cost: \( \phi_u \rightarrow \) split according to \( \chi_f \) and \( \chi_m \)
  
  2. Monetary cost: \( \phi_c \rightarrow \) split equally between partners
  
  3. Child care cost: \( \phi_y \rightarrow \) depends on female labor supply \( 1 - h \)
Cost of Having Children

- Cost of children linear in the number of kids $n$

- Three types of costs:
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  2. Monetary cost: $\phi_c \rightarrow$ split equally between partners
  3. Child care cost: $\phi_y \rightarrow$ depends on female labor supply $1 - h$

- Child care cost only for children age 3 and below

- Total material cost of having children

$$k(h) = \phi_c + h \cdot w_f + (1 - h) \cdot w_y = \phi_y$$
Preferences

- $n \leq 3$ is total number of existing children
- Raise children for $H = 6$ periods (18 years)
- **State vector** of a couple:
  \[ S = (w_f, w_m, v_f, v_m, a_1, a_2, a_3), \]
- Utility of spouse $g$:
  \[ V^t_g(S) = E \left[ u(c_g, v_g, b) + \beta V^{t+1}_g(S') \right] \]
  with
  \[ u(c_g, v_g, b) = c_g + b \cdot (v_g - \chi_g \cdot \phi_u) \]
The Within Period Game

Stage 1
Partners negotiate about labor force participation
\( h \)

Stage 2
Partners express intentions under choice \( h \)
\( i_f \) and \( i_m \)

Stage 3
Bargaining over consumption allocation
\( c_f \) and \( c_m \)
Stage 3: Bargaining Game

- Nash bargaining as in static model

- Outside options:

\[
\bar{u}_f = (1 - bh)w_f + b \cdot [v_f - \chi_f \phi_u - 0.5 (\phi_c + (1 - h)w_y)]
\]

\[
\bar{u}_m = w_m + b \cdot [v_m - \chi_m \phi_u - 0.5 (\phi_c + (1 - h)w_y)]
\]
Stage 2: Fertility Intentions

- Fertility intentions:

\[ i_g = I \left\{ E \left[ u(c_g, v_g, 1) + \beta V_{g}^{t+1}(S') \, \bigg| b = 1 \right] - E \left[ u(c_g, v_g, 0) + \beta V_{g}^{t+1}(S') \, \bigg| b = 0 \right] \geq 0 \right\}, \]

- Probability of having a child given by function:

\[ \kappa_e(i_f, i_m, n) \]

taken directly from GGP data
Stage 1: Female Labor Force Participation

Efficient choice:

\[ h_{\text{eff}} = \begin{cases} 
1 & \text{if } w_f < w_y \\
0 & \text{otherwise}
\end{cases} \]

- If under \( h_{\text{eff}} \) one partner is in favor of child, other not:
  - Partner who is in favor can offer a different \( h \in [0, 1] \)
  - Make other partner indifferent between having baby or not
  - Not always possible to make such an offer
Dynamic Model Component

- Fertility preferences drawn from uniform distribution
  - gender and education specific means
  - gender specific densities/variances
  - correlation $\rho$ between spouses
- Wages drawn from log-normal distribution with
  - education specific means
  - common variance
- If $b = 0$, retain preferences with probability $\pi$
- If $b = 1$, draw new preferences
Parameter Choice
## Matching the Model to the Data: Exogenous Parameters

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<tr>
<th>Description</th>
<th>Parameter</th>
<th>Value</th>
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<td>Time preference rate</td>
<td>$\beta$</td>
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<tr>
<td>Economies of scale</td>
<td>$\alpha$</td>
<td>0.40</td>
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<td>Distribution of utility cost</td>
<td>$\chi_m$</td>
<td>0.31</td>
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<tr>
<td>Monetary cost of children</td>
<td>$\phi_c$</td>
<td>€ 5000 p.a.</td>
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<td>Wage of female partner</td>
<td>$\mu_{w,e}$</td>
<td>1.00 1.50</td>
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<td>Fraction going to college</td>
<td></td>
<td>0.25</td>
</tr>
<tr>
<td>Birth probabilities</td>
<td>$\kappa_e(i_f, i_m, n)$</td>
<td>from GGP</td>
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</table>
Matching the Model to the Data: Endogenous Parameters

1. Means and correlation of fertility preferences + utility cost:
   Match agreement shares by number of existing children

2. Persistence of fertility preferences over time:
   Match repeated observation of intentions for people who
   don’t have a child birth between waves 1 and 2

3. Cost of external child care + variance of wages:
   Labor force participation of women with and without children
   under age 3
Matching the Model to the Data: Endogenous Parameters

4. Key parameter: Gender-specific densities $d_f$ and $d_m$
   - Determine how strongly intentions react to $\chi_g$
   - Exploit variation across low-fertility countries
   - Vary $\chi_m$ from 0.28 to 0.34; adjust $w_y$ to match predicted LFP of mothers; and match regression of male on female intentions across countries
   - Implies higher density for women
## Estimated Parameters

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<tr>
<th>Description</th>
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<td>High school</td>
<td>College</td>
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<tr>
<td>Mean women first child</td>
<td>$\mu_{f,e,1}$</td>
<td>5.07</td>
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<td>Mean women second child</td>
<td>$\mu_{f,e,2}$</td>
<td>1.79</td>
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<td>Mean women third child</td>
<td>$\mu_{f,e,3}$</td>
<td>$-0.15$</td>
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<tr>
<td>Std. dev. women</td>
<td>$\sigma_f$</td>
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<tr>
<td>Mean men first child</td>
<td>$\mu_{m,e,1}$</td>
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<td>Mean men third child</td>
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<td>Std. dev. men</td>
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<td>$\rho$</td>
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<td>Participation cost</td>
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<tr>
<td>Std. dev. female wages</td>
<td>$\sigma_{w,e}$</td>
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Model Fit
1. Fit for Fertility Intentions

### High school

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<tr>
<td></td>
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<td>He yes</td>
<td>He no</td>
<td>He yes</td>
<td>He no</td>
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<td><strong>Data</strong></td>
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<td>6.92</td>
<td>66.05</td>
<td>7.55</td>
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<td>5.55</td>
<td>31.16</td>
<td>4.29</td>
<td>22.10</td>
</tr>
<tr>
<td><strong>Model</strong></td>
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<td>55.67</td>
<td>5.51</td>
<td>68.37</td>
<td>7.25</td>
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<tr>
<td></td>
<td>She yes</td>
<td>4.74</td>
<td>34.08</td>
<td>3.14</td>
<td>21.23</td>
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### College

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<th>$n = 2$</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>He no</td>
<td>He yes</td>
<td>He no</td>
<td>He yes</td>
<td>He no</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>She no</td>
<td>49.09</td>
<td>7.04</td>
<td>56.56</td>
<td>9.92</td>
</tr>
<tr>
<td></td>
<td>She yes</td>
<td>6.37</td>
<td>37.50</td>
<td>5.08</td>
<td>28.45</td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td>She no</td>
<td>50.20</td>
<td>5.55</td>
<td>59.76</td>
<td>8.66</td>
</tr>
<tr>
<td></td>
<td>She yes</td>
<td>4.84</td>
<td>39.40</td>
<td>2.41</td>
<td>29.18</td>
</tr>
</tbody>
</table>
2. Fit for Persistence over Time

<table>
<thead>
<tr>
<th></th>
<th>Data</th>
<th></th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>He no</td>
<td>He yes</td>
<td>He no</td>
</tr>
<tr>
<td>She no</td>
<td>79.89</td>
<td>25.42</td>
<td>69.17</td>
</tr>
<tr>
<td>She yes</td>
<td>22.63</td>
<td>65.24</td>
<td>29.91</td>
</tr>
</tbody>
</table>
3. Fit for Labor Force Participation

<table>
<thead>
<tr>
<th></th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Child under 3:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>High school</td>
<td>62.60</td>
<td>22.14</td>
</tr>
<tr>
<td>College</td>
<td>80.50</td>
<td>43.17</td>
</tr>
</tbody>
</table>
4. Fit for Variation in Agreement Shares: One Child

![Graph showing data and model fit for variation in agreement shares for one child. The x-axis represents agreement shares ranging from 0 to 40, and the y-axis also ranges from 0 to 40. The graph includes data points for different countries labeled BUL, RUS, GER, ROU, AUT, LTU, CZE, and data trend lines for both data and model predictions.](image-url)
4. Fit for Variation in Agreement Shares: Two Children
## Predictions for Demographic Variables

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fertility rate</td>
<td>1.56</td>
</tr>
<tr>
<td>Fraction of couples without children</td>
<td>0.12</td>
</tr>
<tr>
<td>Fraction of couples with one child</td>
<td>0.39</td>
</tr>
<tr>
<td>Fraction of couples with two children</td>
<td>0.43</td>
</tr>
<tr>
<td>Fraction of couples with more than two children</td>
<td>0.06</td>
</tr>
</tbody>
</table>
Policy Experiments
Policy Experiment (Set 1)

- Increase fertility by either:
  - Giving subsidies directly to mothers
  - Giving subsidies directly to fathers
- Consider subsidy for all children or higher-order children
- Compare cost of raising total fertility rate by 0.1
Total Cost of Subsidy

Total Cost per Couple

- **all children**:
  - Women: 1 unit
  - Men: 3 units

- **from 2nd child**
  - Women: 0.5 unit
  - Men: 1.5 units

- **from 3rd child**
  - Women: 0.3 unit
  - Men: 1.2 units
Why Does Targeting Matter?

▶ Targeting towards higher order children:
  ▶ Only small fraction of population actually childless
  ▶ Targeting higher order children
    → concentrates subsidy on marginal births

▶ Targeting towards women:
  ▶ Women have more power over fertility decision
  ▶ Women tend to be blockers of fertility decision
  ▶ Women more responsive to changes in cost of children
Policy Experiment (Set 2)

- Real life policies:
  - Tax credits
  - Child care subsidies
  - Parental leave benefits

- Compare cost of raising total fertility rate by 0.1
Total Cost of Real Life Policies

Total Cost per Couple

- Tax Credit
- Child Care
- Parental Leave

Bar chart showing the total cost per couple for different types of policies, categorized by the number of children (all children, from 2nd child, from 3rd child).
Summing Up
Conclusions

- Agreement, and lack thereof, is crucial determinant of fertility
- Bargaining model with limited commitment matches data well
- Appropriate targeting of pro-fertility policies hugely important
The couple solves:

$$\max_{b,c_f,c_m} \left\{ \left( u_f(c_f,b) - \bar{u}_f \right)^{\frac{1}{2}} \left( u_m(c_m,b) - \bar{u}_m \right)^{\frac{1}{2}} \right\}$$

subject to:

$$c_f + c_m = (1 + \alpha) (w_f + \omega_m - \phi_ub)$$