Polygyny, Women's Rights and Development

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Motivation

- Many Sub-Saharan African countries are extremely poor.
- This paper: polygyny is one reason for lack of development.

Why?

- Polygyny requires a positive brideprice to ration women.
  $\rightarrow$ Makes children a good investment.
  $\rightarrow$ Men want many women and many children.
- Investment in women crowds out investment in physical capital.
  $\rightarrow$ Low $\frac{K}{Y}$ and high population growth.
  $\rightarrow$ Low GDP per capita.

Outline of the Talk

1. Data
2. The model (polygyny & monogamy)
3. Calibration & numerical results:

   If countries in SSA banned polygyny, then

   - Brideprices would change from positive to negative.
   - Fertility would fall by 70%.
   - Savings rate would increase by 35%.
   - GDP p.c. would increase by 170%.

4. Extension: More Rights for Women

Some Facts about Polygyny

- 28 countries in Sub-Saharan Africa with more than 10% married men in polygynous union.
  Range: 10.2%-55.6%. Average: 24%.
- Average number of wives per married man > 1, as high as 1.7.
- Almost all men get married: 95%+, average: 97.3%.
- Possible because of high age gap and growing population size.
  Example: 10 year age gap, annual population growth 3%
  $\Rightarrow$ makes average of 1.34 wives per man possible.

In this talk:

Abstract from heterogeneity

Polygynous vs. Monogamous Countries ($|\text{latitude}| < 20$)

	Polygyny	Monogamy
TFR 1980	6.78	4.62
Surviving 5 yrs. 1980	5.01	3.57
Male age at first marriage	26.2	27.8
Female age at first marriage	19.9	25.0
Age gap	6.4	2.8
$\frac{I}{Y}$ 1960-85	0.09	0.16
$\frac{s}{GNP}$ 1960-85	0.128	0.194
$\frac{K}{Y}$ 1985	1.1	1.9
GDP per capita, 1985	975	2,798

Sub-Saharan Africa

	High Polygyny	Low Polygyny
TFR 1980	6.78	5.97**
Surviving 5 yrs. 1980	5.01	4.57*
IMR 1980	12.2	11.5
CMR 1980	19.4	18.3
Male age at first marriage	26.2	26.6
Female age at first marriage	19.9	22.7***
Age gap	6.4	3.9***
$\frac{I}{Y}$ 1960-85	8.7	14.3**
$\frac{K}{Y}$ 1980	1.1	1.6*
GDP per capita, 1980	975	1,574*

Brideprice and Polygyny

Hartung 1982

	Brideprice ≤ 0		Brideprice > 0	
No polygyny	70	(62.5%)	42	(37.5%)
limited polygyny ($< 20\%$)	137	(47.2%)	153	(52.8%)
general ($> 20\%$)	41	(9.2%)	407	(90.8%)

The Environment

- Overlapping generations GE model
- Agents differ by sex
- Agents live for 3 periods: child, young adult, old adult
- Children don't make choices
- Child Production
  - Inputs: fertile women & consumption good
  - Women are fertile only as young adults
- Market for wives: fathers sell daughters
- Cobb-Douglas production function
- Young adults supply one unit of labor inelastically

Utility of a Man

$$U = \ln c^y + \beta \ln c^o + \gamma \ln(f^y + f^o)$$

Subscripts: y, o specify age of a man

“Child Production”

- Only young adult women are fecund.
- Men can have children in both adult periods,
  if they have a fecund wife.
- Husband and wife share cost of child-rearing equally.
- If a woman has f children, the total cost is $2\epsilon f^2$ during the period in which she gives birth.
- Suppose an age i man has f^i children and n^i fecund wives
  $\rightarrow \frac{f^i}{n^i}$ children per (fecund) wife
  $\rightarrow$ total cost: $\epsilon \left(\frac{f^i}{n^i}\right)^2 n^i$.

Marriage

- Competitive market for brides (= young adult women)
- Brideprice: p
- Young and old men buy wives
- Fathers sell daughters

Brideprices

- There is a cost, a, per daughter who remains unmarried after the father's death, to capture the following:
  - Unmarried daughters cannot bear grand-children
  - Cost of protecting her virginity
  - She would be without protector after father dies and therefore not have access to land and property
- This assures that fathers are willing to marry their daughters even if $p < 0$.
- Note: a utility cost leads to similar results.

Man's Problem

$$\max_{c,s,n,f,d} \ln(c^y) + \beta \ln(c^o) + \gamma \ln(f^y + f^o)$$

$$\begin{aligned}
s.t. \quad & c^y + s^y + pn^y + \epsilon \frac{(f^y)^2}{n^y} \leq w \\
& c^o + s^o + pn^o + \epsilon \frac{(f^o)^2}{n^o} \leq Rs^y + pd^y \\
& a(\frac{f^y + f^o}{2} - d^y - d^o) \leq Rs^o + pd^o \\
& d^y \leq \frac{f^y}{2}, \quad d^o \leq \frac{f^o}{2} \\
& \text{non-negativity constraints}
\end{aligned}$$

Monogamy

Additional constraint on man's problem:

$$n^y + n^o \leq 1$$

Woman's Problem

- Women obey their husband's fertility decisions.
- Problem of a married woman whose husband wants $\bar{f}$ children:

$$\max_{c^y, c^o, s} \ln(c^y) + \beta \ln(c^o) + \gamma \ln(\bar{f})$$

$$\begin{aligned} s.t. \quad & c^y + s + \epsilon \bar{f}^2 \leq w \\ & c^o \leq Rs \end{aligned}$$

- Unmarried women: $\bar{f} = 0$.

Production

$Y_t = AK_t^{\alpha} L_t^{1-\alpha}$

Let M_t be # young adult men at time t.

$L_t = 2M_t$

$K_t = (s_y^m + s_y^f)M_t + s_o^m M_{t-1}$

Optimization: w =MPL and r =MPK

Equilibrium

- Men and women maximize their utility
- Profit maximization
- Markets for capital and labor clear
- Bride market clears:
  $d^y M_{t-1} + d^o M_{t-2} = n^y M_t + n^o M_{t-1}$
- Population dynamics:
  $M_{t+1} = \frac{1}{2}[M_t f^y + M_{t-1} f^o]$

$$\implies \frac{M_t}{M_{t+1}} n^o + n^y \leq 1$$

Comparative Statics in Marriage System: 2 Propositions

Proposition 1 (Polygyny):
When polygyny is allowed, then any BGP has the following characteristics:

1. $p > 0$

2. Men marry and have children when old $(n^o > 0, f^o > 0)$.

3. There is an age gap between husband and wife.

4. All daughters marry $(d^y = 0, d^o = \frac{f^o}{2})$.

5. Net interest rates are positive $r - \delta > 0$.

Fertility and Savings

- Effective marginal cost of an extra child low under polygyny because $p > 0$ acts like child-rearing subsidy.
- Savings low under polygyny:
  Brides are an alternative asset.
  $\rightarrow$ crowds out investment in physical capital.

Proposition 2 (Monogamy):

1. If there is a BGP with positive population growth in which all women marry, then there is no spousal age gap $(f^y > 0, n^y = 1, f^o = n^o = 0)$ and $p \geq -a$.

2. If there is a BGP with positive population growth in which some women remain unmarried, then there is a spousal age gap $(f^o > 0, n^o = 1, f^y = n^y = 0)$, the fraction of unmarried women is $\frac{\eta-1}{\eta}$, and $p = -a$.

Calibrating the Polygynous Economy

Model period = 15 years

normalize GDP p.c. to 975

Parameter	Value	calibrated s.t.
β	0.46	annual discount factor = 0.95
α	0.4	income share of capital = 40%
γ	0.58	surviving # kids = 5.01
ϵ	44	$\frac{S}{Y} = 13\%$
δ	0.66	annual depreciation rate = 7%

Note: a is irrelevant for the polygynous BGP and hence cannot be calibrated. I therefore assume it is large enough to not be binding.

$\rightarrow$ rules out case 2 under monogamy.

Model's Predictions

	Polygyny Model & Data	Monogamy Model	Monogamy Data
Surviving fertility	5.01	2.91	3.57
Savings rate	0.13	0.22	0.19
GDP per capita	975	2,648	2,798

Equilibrium Demographics

	Polygyny		Monogamy	
	Model	Data	Model	Data
Wives per man	2.5	1.34	1	1
Age gap	15	6.4	0	2.8
Annual population growth	6.3%	2.7%	2.5%	2.2%

Alternative Policy?

- So far: Banning polygyny increases GDP.
- Monogamy is hard to enforce (many countries have tried)
- Alternative policy?
- Extension: More Rights for Women/Daughters
  $\rightarrow$ Analyze a model where daughters choose their own husband.
- Main finding: GDP p.c. $\uparrow$, but less.

Polygyny Laws in Countries with high Polygyny

Law	Countries	Rate
Legal	Cameroon, Republic of the Congo, Ghana, Kenya Kuwait, Malawi, Mauritania Niger, Nigeria, Sierra Leone South Africa, Sudan, Swaziland, Uganda	22%
Restr.	Bangladesh, Benin, Botswana, Burkina Faso, Central African Republic, Chad Gabon, Libya, Mali, Mozambique Senegal, Somalia, Tanzania, Zambia	26%
Illegal	Angola, Burundi, Democratic Republic of the Congo Cote d'Ivoire, Equatorial, Guinea, Ethiopia, Gambia Guinea, Liberia, Madagascar, Mayotte, Togo	27%

Measure of Women's Rights	High Polygyny	Monogamous $\lvert\text{Latitude}\rvert < 20$
abortion policy, 2005	1.4	1.7
Year of complete women's suffrage	1960	1952
Year first women in parliament	1970	1965
Female seats in parliament, 2004	12.6%	14.1%
female/male literacy, 2000	0.66	0.95
% female in secondary educ., 2000	40	49
adult female/male mortality, 2000	0.83	0.68
% of HIV infected who is female	57%	36%
Mean marriage age (women), 2000	19.9	24.4
GDI, 2003	0.42	0.70
GEM, 2003	0.22	0.50

New Marriage Market

- Market for brides
- **Modification:** daughters sell themselves.
- Young (y) and old (o) men buy young women.
- Brideprice: $p^i, i = y, o$
- Contrast results to model where fathers sell daughters.

Analytical Results

Proposition 1 *Any BGP when polygyny is allowed has the following properties:*

1. $p^y, p^o > 0$

2. $n^y = 0, n^o > 0$ *and* $I^y = 0, I^o = 1$.

3. $n^o = \frac{M_t}{M_{t-1}} = \sqrt{\frac{f^o}{2}}$

Notes:

1. Monogamy: $p < 0$

2. Monogamy: men marry and have children young.

3. Overall, this policy does not affect family structure as much as banning polygyny.

Women's Rights – Numerical Results

	Fathers "own" daughters		Daughters choose
Marriage System	Polygyny	Monogamy	Polygyny
Children per woman	5.01	2.91	4.44
Number of wives per man	2.51	1	2.22
Savings rate as % of GDP	13%	22%	21%
GDP per capita	975	2,648	1,570

Summary

- Polygyny $\rightarrow$ Brideprice > 0
  $\rightarrow$ affects incentives to save and have children
- Enforcing monogamy would
  - decrease fertility by 40%
  - increase savings rate by 60%
  - increase GDP p.c. by 170%
- These numbers seem reasonable, given the empirical differences between polygynous and monogamous countries.
- More Rights for Women might also help development.
- Open question: Why do some countries ban polygyny and others don't?

Why Does Small Differences in $\frac{S}{Y}$ Translate into Large GDP p.c. Differences?

	Pol.	Mon.	$\frac{\text{Mon}}{\text{Pol}}$
$\frac{S}{Y}$	0.14	0.19	1.36
$\eta = \frac{M_{t+1}}{M_t}$	2.5	1.45	0.57
$\frac{K}{Y} = \frac{S}{Y}\frac{1}{\eta+\delta-1}$	0.064	0.172	2.69
$\frac{Y}{L} = A^{\frac{1}{1-\alpha}}\left(\frac{K}{Y}\right)^{\frac{\alpha}{1-\alpha}}$	4,030	7,780	1.9
$\frac{Population}{L}$	3.9	3.1	0.8
$Y_{pc} = \frac{\frac{Y}{L}}{\frac{Population}{L}}$	1,029	2,458	2.4