

The Mystery of Monogamy

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Why is Monogamy a Mystery?

Most societies today are polygynous. 850 out of 1170 societies in Murdock's Ethnographic Atlas are polygynous. In many parts of Africa 25% to 55% of women live in polygynous households (Lesthaege 1986).

Many of today's monogamous societies were polygynous until a few centuries ago.

It is easy to explain polygyny:

Male inequality produces polygyny – the rich men attract more wives (Becker 1973).

- Yet, polygyny is seen (almost) only in primitive economies.

- With all the inequality we see in developed countries, why aren't they polygynous?

Importance:

Family structure can have an important impact on economic performance.

Explanation:

The key element of our explanation is the rise in the importance of human capital, generating a tradeoff between quantity of wives and children and child quality.

Anthropological Mystery? (and the historical perspective)

“Men in the Middle Ages did not mate monogamously: neither was the rise of monogamy in modern societies brought on by Christian ideology.”

“But if we are at least becoming more monogamous, why? Now that is the real question!”

Laura Betzig “Medieval Monogamy”, *Journal of Family History*, 20(2) 1995.

“That leaves me with my favorite question. When, and why did polygyny and despotism end, and monogamy and democracy begin? ...It seems to me that one event changed all that: the switch to an industrial economy in Europe in the past few centuries. Reproductive inequality...seem to have declined in the one space and time. Why is another matter.”

Laura Betzig “Roman Polygyny”, *Ethology and Sociobiology* 13, 1992.

Roman Polygyny:

“At no period in Roman history was the presence of a concubine in the house considered discreditable.”

“In the course of time the institution of concubinage became a sort of unofficial marriage.”

Pierre Grimal, “Love in Ancient Rome” University of Oklahoma Press, 1986.

Medieval Polygyny:

“Illegitimacy was a normal part of the structure of ordinary society – so normal that illegitimate children, especially males, were neither concealed nor rejected”

Georges Duby, “The Knight, the Lady, and the Priest, 1983, Pantheon, New York.

“In Christian Europe, however, concubinage was ‘illegal’ and its offspring were illegitimate. Yet ...the practice flourished among laity and clerics alike ...”

Jack Goody, “The Development of the Family and Marriage in Europe,” 1983, Cambridge University Press.

“In the early sixteenth century open maintenance of a mistress – usually of lower-class origins – was perfectly compatible with a respected social position and stable marriage . . . up to about 1560 they are often to be found leaving bequests to bastard children in their wills. In practice, if not in theory, the early-sixteenth century nobility was a polygamous society.”

Lawrence Stone (1977) *The Family, Sex, and Marriage in England, 1500-1800*. New York: Harper and Row.

Goals of the Paper

To offer an explanation to the emergence of monogamy as the equilibrium outcome in the marriage market despite large levels of male income inequality

Without relying on changes in preferences, cultural norms, civil rights of women, etc.

Without relying on laws banning polygyny

We follow Becker who argues that polygyny does not exist because people do not want to be polygynous, or else the ban would not hold (Thailand, Egypt, etc.)

To examine (theoretically) the relationship between the marriage market (polygamous vs. monogamous) and economic growth

(Not obvious that it would not be good for growth to have the successful men mate with several wives.)

To provide empirical support for our explanation

Preview of the Results

The sources of inequality are important in determining monogamy/polygyny, not just the level of inequality (as stressed in existing literature).

- When the role of human capital as a source of inequality is high monogamy will rise.
- While male inequality generates polygyny, female inequality reduces it.

Polygyny can be harmful for economic growth but it also can be beneficial.

Existing Literature

Very few models allow for polygyny (despite lots of polygyny in the real world):

Becker (1973, 1991), Grossbard (1976), Jacoby (1995), Guner (1999), Lagerlof (2002), and Edlund and Lagerlof (2002).

They focus on the agrarian (primitive) economies and other marriage institutions in these economies – “bride prices”, dowries, biases towards sons or daughters, support for elderly parents, etc.

Predictions of these models:

Male inequality generates inequality in the marriage market – polygyny.

Polygyny is associated with high bride prices and high female productivity.

→

These models cannot explain the decline in polygyny in advanced countries.

One exception is Lagerlof (2002) who develops a model in which polygyny is eliminated over time as an outcome of the elimination of inequality

Our model is the first:

To produce monogamy as an outcome of an economic equilibrium in the presence of persistent inequality among men.

To offer an explanation for the disappearance of polygyny with the process of development, without relaying on eliminating inequality.

To demonstrate that the price (bargaining power) of women, and thereby marriage patterns, are related to the quality-quantity trade-off in fertility

To show that female inequality reduces polygyny and to show how female inequality is generated.

The model shows that the source of male inequality and the return to education affect the equilibrium level of female's 'price' inequality by affecting the quantity/quality trade-off in fertility

The Model

The marriage market is organized by contracts that specify the allocation of resources within the household

Men are allowed to marry as many wives as they wish subject to their budget constraint.

A marriage contract consists of three components:

- (1) price — an income transfer from the husband to the wife for her personal consumption
- (2) offspring's human capital
- (3) offspring's bequest

Preferences are defined over consumption, the number of children, and their children's income (from physical and human capital).

Man's preferences are represented by the following utility function:

$$u^m = \ln c + \ln[n(x + b)]$$

c – his own consumption

n – the number of wives he marries which equivalently is half the number of his children since every woman has two children, a boy and a girl

$x = l, h$ – the quality level (human capital) of the children

Woman's son and daughter are either both skilled or unskilled

The levels of human capital and the type of human capital could differ between boys and girls and there are no restrictions regarding the distribution of bequests between a woman's two children.

Woman's preferences are represented by the following utility function:

$$u^f = \ln y + \ln(x + b)$$

y – the consumption transfer (the “price”) she receives from her husband – women do not have any other income.

To raise skilled children, parents have to invest resources in their children's human capital.

Skilled parents have a comparative advantage in the production of skilled children:

The cost of raising (two) skilled children
is:

\underline{e} – if both parents are skilled

\bar{e} – if one parents is skilled

$$\bar{e} > \underline{e}$$

prohibitively high – if both parents are unskilled

A proportion θ of men and women have high human capital – are skilled.

A man's income is composed of two components: labor income and non-labor income

Labor income is:

h – for skilled men

1 – for unskilled men

Non-labor income is:

L – for skilled men

λ – for unskilled men

Income inequality between the two types of men is represented by:

$$inequality = \frac{I^s - I^u}{I^u}$$

Where, $I^s = h + L$ $I^u = 1 + \lambda$

(λ is sufficiently small such that $inequality > 0$)

→

There are two sources of inequality.

Each man marries only one type of woman (skilled or unskilled), and offers identical contracts to all women within the same type.

A man's budget constraint:

$$I \geq c + n(y + \varepsilon e + b)$$

$\varepsilon = 0$ if they raise low quality children

$\varepsilon = 1$ if they raise high quality children

Analysis

An equilibrium is characterized by a set of marriage contracts which satisfy:

- Men and women maximize their utility subject to their budget constraints
- Contracts are efficient - There is no marriage contract that a man can offer to a woman that would make him better off without making the woman worse off
- The marriage market clears – all women get married

The optimal contract solves a maximization problem where resources transferred to children are a “public good” in the sense that both parents derive utility from their children's human capital and bequests.

Every man offers a marriage contract, consisting of y , ε and b , to maximize his utility subject to his budget constraint and subject to matching alternative marriage offers for any given type of woman:

$$\ln y + \ln(x + b) \geq U$$

Results

For each man:

$$c = n(y + \varepsilon e + b) = I / 2$$

Only three price levels exist in equilibrium:

1. The price for a skilled woman who raises skilled children is:

$$y = (h - \underline{e}) / 2$$

2. The price for an unskilled woman who raises skilled children is:

$$y = (h - \bar{e}) / 2$$

3. The price for any type of woman who raises unskilled children is:

$$y = 1 / 2$$



The value of women in the marriage market is directly linked to the quality of her children. It is equal to half the net value of her children's human capital.

If both parents are skilled, they raise skilled children if and only if:

$$h \geq \underline{h} \equiv 1 + \underline{e}$$

If one parent is skilled and the other is not, then they raise skilled children if and only if:

$$h \geq \bar{h} \equiv 1 + \bar{e}$$

If there is an unskilled woman/man that raises skilled children, then all skilled women/man raise skilled children.

If polygyny exists, only the rich (skilled) men are polygynous.

If parents invest in raising skilled children (h is sufficiently high) there will be assortative mating in the marriage market: skilled women only marry skilled men.

Patterns of Polygamy

For a given level of inequality, costs of human capital, and total income for each type of men, changes in the composition of inequality determine the rate of polygyny in the marriage market.

For $h < \underline{h}$

- Polygyny is independent of h .
 - Rich men are polygynous.
 - No one invests in child quality.
- When the value of human capital is very low women are valued only for the quantity of children they can produce: rich men use their wealth to acquire “quantity” rather than investing in child quality.

For $h \in (\underline{h}, \bar{h})$

- Polygyny declines with h
- Assortative mating increases with h
- Skilled men who marry skilled wives invest in child quality, while skilled men who marry unskilled wives do not invest in child quality.

→

Skilled women are valued for the quality and not just the quantity of children they produce.

→

The cost of unskilled women in equilibrium – the “full price” (the consumption transfer plus bequest level and human capital investment) – is lower for unskilled women because of the low human capital of their children.

→

The rate of polygyny depends on the composition of income and inequality, and not just the levels: as h increases, holding *inequality* constant, the average number of wives per rich man declines.

(The increasing value of child quality, and consequently, the increasing demand for quality in women, as the value of human capital increases, reduces the number of wives each rich man can afford)

→

Polygyny cannot be ruled out even when the value of human capital is sufficiently high to entice skilled men to raise quality children with skilled women.

Monogamy exists if and only if:

$$h \in (\underline{h}, \bar{h}) \quad \text{and} \quad \bar{e} - \underline{e} \geq \frac{I^s - I^u}{I^u}$$

→

A larger comparative advantage for skilled women generates higher inequality for women in their value on the marriage market, thus making polygyny less affordable for rich men who want quality wives.

Male inequality creates polygyny, but female inequality reduces it.

For a given level of income inequality, the number of wives per unskilled man increases with h , and marriages become more assortative.

(Fernandez, Guner, and Knowles (2001), show that the degree of assortative matching by education levels increases with the return to human capital in advanced countries)

For $h > \bar{h}$

- Polygyny increases with h .
- Skilled/Rich men are polygynous.
- All skilled men invest in child quality, regardless of the skill level of their wives.

For high values of h it is efficient for skilled men to have skilled children with either skilled or unskilled women.

The importance of female inequality declines and polygyny increases as the full price falls with h .

Figure 1a

Polygyny as a function of the value of human capital: Average number of wives of a high income men.

The figure is plotted for the case where the condition in Proposition 3 is satisfied and monogamy exists.

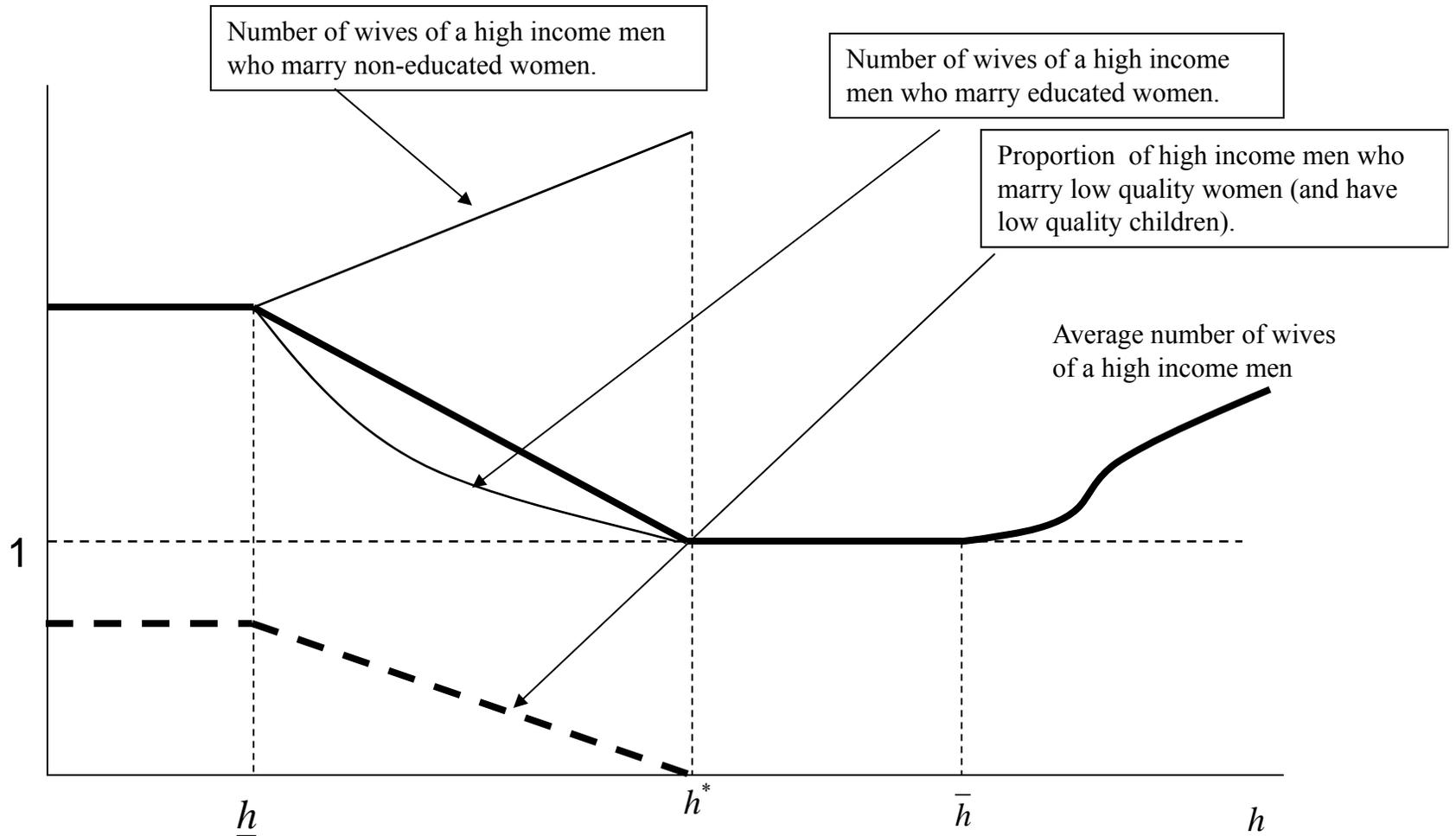


Figure 1b

Polygyny as a function of the value of human capital: Average number of wives of a high income men.

The figure is plotted for the case where the condition in Proposition 3 is not satisfied and monogamy does not exist.

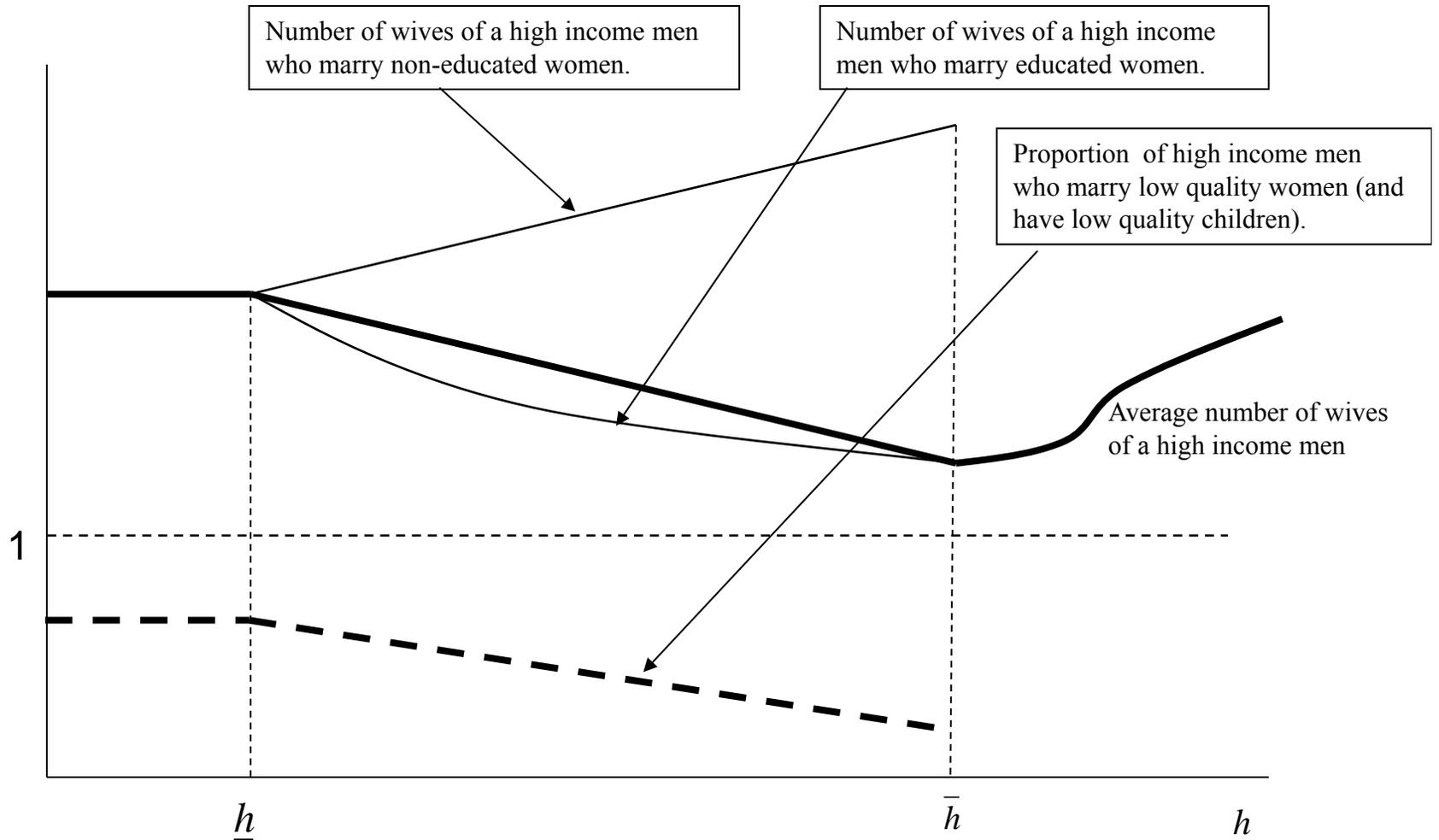
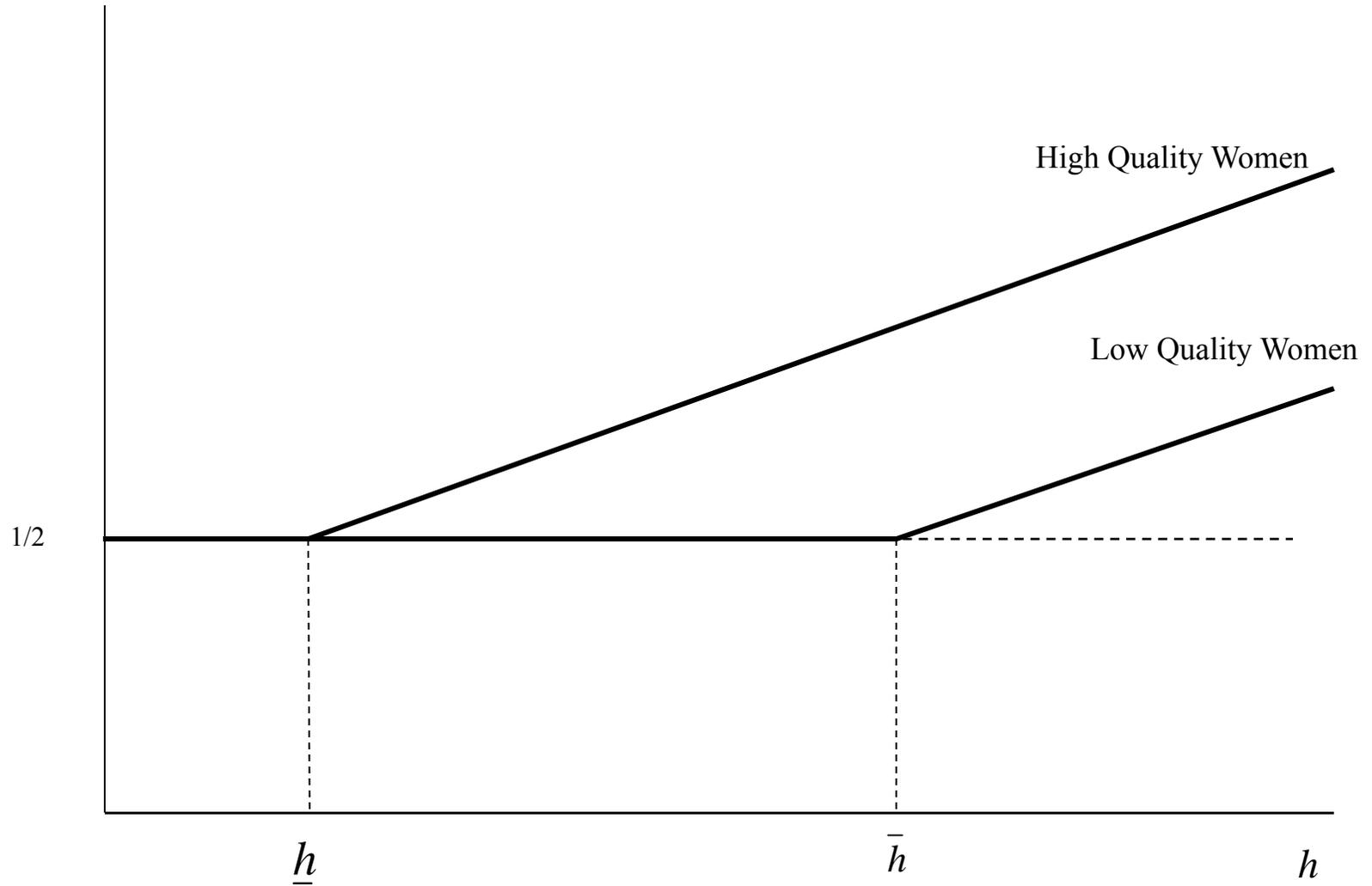


Figure 2

“Consumption Prices” for Both Types of Women as a function of the value of human capital.



The effect of inequality

Given h , the degree of polygyny increases with increasing inequality

Increases in inequality stemming from bigger disparities in the value of human capital will increase polygyny for low or high values of h , but polygyny may or may not increase for intermediate values.

Implications of the Model

Is polygyny bad for growth?

It is bad for growth if it reduces investment in children.

It is good for growth if it increases investment in children.

Why are developed countries more monogamous than less-developed countries?

A developed country has a high value of human capital, h , relative to the costs of producing human capital

(for instance since parents with higher levels of human capital are more effective in producing quality children)

For the sake of cross-country comparisons we focus at the intermediate range of h . This is easily justified by considering endogenous returns to skills – h decreases with θ – and restricting the analysis to steady states.

An alternative approach, generating similar results, would be to examine differences in the proportion of rich men who are rich because of their human capital versus rich men who are wealthy because of their non-labor income.

What about laws and norms against polygyny?

Higher rates of polygyny are likely to be associated with increasing social unrest stemming from a larger mass of frustrated poor men. Hence, the rich may support laws or norms in favor of monogamy if it is less costly for them i.e., if they want to have a small number of wives because of the importance of human capital.

Consider the ban on polygyny by the Christian Church. The ban on polygyny was one of many sexual reforms by the Church which took time to be effective (see Posner (1992) and Betzig (1992, 1995)), most likely due to the high demand for polygyny prior to the increase in the importance of human capital. However, economic growth likely triggered a positive feedback between investments in human capital, the natural growth of monogamy, and a more effective ban on polygyny. In this manner, social norms and rational incentives can interact with economic growth to reinforce each other and create an advanced, highly monogamous economy.

Empirical Evidence

Data from Cote d'Ivoire is used to show that the model is consistent with the mating and reproductive patterns of men and women within a society exhibiting large variation in polygynous behavior.

The analysis uses the CILSS data from Cote d'Ivoire in 1986. The data consists of a sample of households and contains information on each member of the household.

While polygyny is formally outlawed in Cote d'Ivoire, the practice of polygyny is widespread, which illustrates the ineffectiveness of banning polygyny when the demand for polygyny is high.

41% of all women between the ages of 18 and 40 are in a polygynous marriage, and this figure ranges from 24% for Catholic women to 62% for Muslim women.

The main inference of the model is that polygyny depends not only on the level of a man's income, but also on the sources of his income.

This result is examined. A probit is estimated for the probability that a man has more than one wife.

The analysis controls for:

Geographic location of residence

(dummy variables for living in the big city of Abidjan or “Other Cities”, and three regional dummy variables for living in the East Forest, West Forest, and Savannah)

Religion

(dummies for being either Muslim, Catholic, Protestant, Other Christian, Animist, or Other Religion)

Age

(dummy variables for each ten-year interval)

Probability of Being Polygynous, Male Heads of Households

	Probit: Dependent Variable =1 if man has more than one wife				
Total Personal Income	0.063 (0.010)	0.108 (0.013)	0.055 (0.009)	0.110 (0.013)	0.066 (0.009)
Education	-0.018 (0.004)			-0.009 (0.005)	-0.015 (0.005)
Personal Wage Income		-0.165 (0.026)		-0.148 (0.027)	
Percent of Income from Wages			-0.368 (0.087)		-0.302 (0.088)
Self-Employed	Yes	No	No	Yes	Yes
Observations	1357	1358	1358	1357	1357

Controlling for: geographic location, age, and religious.

Coefficient estimates are the marginal effects from the probit results.

Standard errors are in parentheses.

Explaining the Education Level of Wives

	OLS Regression Dependent Variable: Education Level of the Wife	
Dummy for being in a Polygynous Marriage	-0.646 (0.125)	-0.271 (0.103)
Education level of the Husband		0.427 (0.015)
R-square	0.31	0.54
Number of observations	1710	1709

Controlling for: geographic location, age, and religious.
Standard errors are in parentheses.

Explaining the Education Level of Children

	OLS Regression Dependent Variable: Education Level of the child			Probit Dependent Variable = 1 if child has any education		
Number of Wives in Household	-0.115 (0.031)	-0.042 (0.034)	-0.054 (0.032)	-0.050 (0.014)	-0.032 (0.016)	-0.030 (0.015)
Father's Total Income	0.105 (0.018)	0.039 (0.021)	0.044 (0.019)	0.053 (0.009)	0.040 (0.011)	0.035 (0.010)
Father's Education		0.050 (0.011)	0.049 (0.010)		0.023 (0.005)	0.025 (0.005)
Mother's Education		0.048 (0.015)			0.021 (0.008)	
Mean Education of all Wives in Household			0.046 (0.013)			0.020 (0.007)
Male	0.294 (0.054)	0.313 (0.058)	0.296 (0.054)	0.108 (0.024)	0.108 (0.027)	0.109 (0.025)
R-Squared	0.50	0.50	0.52			
Observations	2225	1909	2186	2225	1909	2186

Controlling for: geographic location, age, and religious.
Standard errors are in parentheses.

Conclusions

Developed countries are monogamous because polygyny is too expensive.

When women are valued only for the quantity of their children, the price of women is low and rich men acquire multiple wives.

When women are valued for the quality of children they can produce, the price of quality in women increases, making polygyny expensive.

Male inequality increases polygyny, female inequality reduces it.

The model predicts that monogamy is associated with a high cost of wives: consistent with the high bargaining power of women in modern marriages.

The model predicts that higher assortative mating is associated with higher values of human capital (and monogamy).

Polygyny has a causal effect on growth that can be positive or negative