



Lifestyles of the rich and polygynous in Cote d'Ivoire

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ABSTRACT

This paper investigates whether the sources of income, not just the levels, determine whether an individual is monogamous. Our results support the idea that polygyny stunts development by allowing wealthy men to acquire wives rather than investing in child quality.

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1. Introduction

An extensive literature focuses on the important relationship between fertility and growth, with particular emphasis on the role played by the child quantity–quality trade-off in the process of growth and development (see Becker and Lewis (1973) and many subsequent papers). However, decisions over child quantity versus quality are clearly influenced, if not jointly determined, by marriage customs such as monogamy and polygyny. For men, acquiring multiple wives is a means to increase child quantity, however, a higher quantity of wives and children may come at the expense of quality in wives and children. For women, monogamy may be a way to gain access to a larger percentage of her husband's time and financial inputs, thus increasing the quality of her children. However, polygyny may allow some women to become the second or third wife of a higher quality man rather than being the only wife of a poorer one. In this manner, polygyny could enable some women to increase the quality of their children.

These scenarios demonstrate how marriage practices interact with the decision over child quantity and quality, and are likely to

affect economic growth.¹ However, the strong correlation between economic development and monogamous marriage practices has received little attention in the literature.² In general, polygynous behavior is quite easy to understand theoretically—inequality in male wealth naturally leads wealthier men to acquire multiple wives in a standard model of the marriage market which is not restricted to be monogamous. Understanding how monogamy

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¹ This research is related to the recent research concerning marriage patterns, macro-economic conditions, and inequality (see Kremer (1997), Aiyagari et al. (2000), Fernandez and Rogerson (2001), Fernandez et al. (2005), and Doepke and Tertilt (2009)). However, these papers do not examine the role of polygyny versus monogamy in the process of development.

² Tertilt (2005) argues that the practice of polygyny reduces economic growth by crowding out investments in capital. In a subsequent paper, Tertilt (2006) estimates that transferring the rights to choose a husband from fathers to daughters lowers polygyny and increases output per capita by 60%. Edlund and Lagerlof (2002, 2006) argue that polygyny affects investments in sons relative to daughters and in wives versus physical assets. Lagerlof (2005) argues that lower inequality in the process of development leads to lower rates of polygyny, while Lagerlof (2010) argues that large wage gaps increase the returns to rebellion, thus leading to self-imposed monogamy by the elite in order to placate the lower classes. Becker (1991) argues that the marginal productivity of men versus women in the production of children rises with development, which reduces the incidence of polygyny in advanced societies. Becker's theory has been extended and tested by Grossbard (1976) and Jacoby (1995).

arises in developed societies is, therefore, somewhat of a puzzle. The goal of this paper is to use data from Cote d'Ivoire to test the implications of the theory proposed by Gould et al. (2008) (GMS hereafter), which shows how development causes the marriage market to be more monogamous in equilibrium, without relying on an explanation based on exogenously determined norms and laws.

The model in GMS is based on the assumption that higher quality men and women have a comparative advantage in raising higher quality children, since they are more efficient in educating their children (see Moav, 2005). Therefore, rich men in less-developed economies, who typically derive their wealth from non-labor income, do not produce quality children efficiently. As a result, rich men in less-developed economies have a low demand for high quality women who produce high quality children more efficiently. Hence, the value of women in the marriage market is determined by the quantity, rather than the quality of children that women can produce. Assuming that all women produce a similar expected number of children, all women are close substitutes for each other in the marriage market in less-developed economies, which keeps the bride price low enough so that rich men can afford more than one wife. Consequently, rich men in developing economies marry multiple wives and have many children with low levels of human capital.

In a developed economy, GMS argue that human capital plays a larger role in determining the wealth of richer men and, therefore, the cost of producing child quality is low relative to the return, which creates a high demand for child quality versus quantity. The increased demand for quality children increases the demand for quality in women in the marriage market, which stems from the increasing value of their input in producing child quality. As a result, the price of quality women increases in equilibrium, making polygyny less affordable for rich men who want high quality wives.

A key insight of GMS is that the increasing importance of human capital in developed societies generates increasing variation in the value of women in the marriage market, thus offsetting the effect of high male inequality on polygynous behavior. This paper tests the implications of this model using data from Cote d'Ivoire, a country where monogamy and polygyny are both prevalent. Specifically, we test the predictions that: (i) wealthier men are more polygynous and have more children; and (ii) conditional on total income, men with more human capital and more wealth obtained by labor income will marry fewer wives, their wives will be more educated, and they will produce fewer, but better educated, children.

2. The data

The analysis uses the CILSS data from Cote d'Ivoire in 1986. The data set 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 rampant, which illustrates the futility of banning polygyny when the demand for polygyny is high. Forty-six percent of all married women between the ages of 18 and 40 are in a polygynous marriage, and this figure ranges from twenty-nine percent for Catholic women to sixty-five percent for Muslim women. Table 1 presents summary statistics for male heads of households, and confirms that higher rates of polygyny are found within the Muslim community, but polygyny is still prevalent within the Christian community (27% of Catholic men) and within the large city of Abidjan (15% of all men). There is a considerable amount of religious heterogeneity, with most people being Muslim (34%), Animist (25%), or Catholic (27%). Also, the population is dispersed geographically, with 21% in the main city of Abidjan and 22% in other cities. Most of the household heads do not work for wages, with roughly half of them self-employed in the agricultural sector. Wage income is roughly one-third of the total personal income of household heads in our sample.

Table 1

Summary statistics for male heads of households in Cote d'Ivoire, 1986.

	Mean	Std. deviation
Polygyny dummy variable		
All men	0.30	0.46
Muslim men	0.42	0.49
Animist men	0.32	0.47
Catholic men	0.18	0.38
Protestant men	0.19	0.39
Other Christian men	0.23	0.42
Other religion men	0.16	0.37
Religion dummies		
Muslim	0.34	0.47
Animist	0.25	0.43
Catholic	0.27	0.44
Protestant	0.05	0.23
Other Christian	0.04	0.20
Other religion	0.03	0.18
Geographic dummies		
City of Abidjan	0.21	0.41
Other cities	0.22	0.41
East Forest region	0.23	0.42
West Forest region	0.15	0.36
Savannah region	0.19	0.39
Income and education variables		
Total personal income	1,388,546	1,591,037
Personal wage income	446,907	1,193,002
Years of education	3.16	4.86
Works for wages	0.24	0.43
Self-employed in agriculture	0.51	0.50
Self-employed in business	0.13	0.34
Sample size	1360	

The sample includes all male heads of households between the ages of 21 and 70.

3. Empirical evidence

Table 2 examines the prediction that rich men are more likely to be polygynous than poorer men. Each specification controls for the 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), and has a dummy variable for being self-employed. The first column in Table 2 shows that total personal income significantly increases the chances of being polygynous, which is consistent with the classic model of polygyny by Becker (1991).

More importantly, Table 2 shows that after controlling for total income, higher levels of education and/or wage income are associated with lower rates of polygyny. This result is true if education is entered by itself, with wage income, or with the percentage of total income represented by wage income. In addition, dummy variables for being self-employed in agriculture, self-employed in business, and being a wage earner are included in the specification. So, these findings are not simply picking up the effect of being a farmer versus a wage earner.

Overall, the results show that richer men have more wives, but controlling for total wealth, men who earn their money through education and labor income have fewer wives. This result confirms the main prediction of GMS that polygyny depends not only on the level of a man's income, but also on the sources of his income. GMS argue that a man who becomes wealthy because of his human capital will prefer one educated wife over multiple uneducated wives, with the reverse being true if his wealth was inherited or acquired through physical capital or land. This prediction is explored in Table 3 which examines what determines the education level of a wife.

The first column of Table 3 shows that women in polygynous marriages tend to have lower levels of education. The second

Table 2
Probability of being polygynous, male heads of households.

	Probit				
	Dependent variable = 1 if man has more than one wife				
Total personal income	0.063 (0.020)	0.107 (0.023)	0.055 (0.027)	0.110 (0.022)	0.066 (0.020)
Education	−0.018 (0.006)			−0.009 (0.006)	−0.015 (0.005)
Personal wage income		−0.164 (0.029)		−0.148 (0.035)	
Percent of total income from wages			−0.368 (0.070)		−0.302 (0.054)
Observations	1357	1358	1358	1357	1357

Coefficient estimates are the marginal effects from the probit results. Standard errors appear in parentheses, and are clustered at the geographic level described in Table 1. The income and wage variables have been normalized by dividing by one million, and were created by subtracting the estimated annual income of non-heads of the household from the “created” variables for total household income and total household wage income. Each regression includes dummies for age groups, geographic regions, religions, and for self-employment. Age dummies include the following categories: below 25, 25–34, 35–44, 45–54, 55–64, and greater than 64. The five geographic and six religion dummies are detailed in Table 1. The sample includes all male heads of households between the ages of 21 and 70.

Table 3
Explaining the education level of wives.

	OLS regression	
	Dependent variable: education level of the wife	
Dummy for being in a polygynous marriage	−0.646 (0.394)	−0.271 (0.200)
Education level of the husband		0.427 (0.077)
Number of observations	1710	1709

Standard errors appear in parentheses, and are clustered at the geographic level described in Table 1. The regressions include dummies for age groups and geographic regions as defined in Tables 1 and 2.

column controls for the education of the husband, and shows that educated men tend to marry educated women. The second column also shows that polygynous men marry less educated women, even after controlling for the man’s education. These results are all conditional on controlling for the woman’s age, religion, and place of residence. Although the coefficients are not statistically significant, the results in Table 3 suggest that higher quality women will tend to be the single wife of a high quality man, while less educated women will tend to be one of the multiple wives of a low quality (but wealthy) man.

Although there is an established empirical literature on the assortative mating patterns of men and women on education levels (Fernandez et al., 2005), this literature is restricted to monogamous

societies. Our results show that strong patterns of assortative mating exist within polygynous societies, and that preferences for the quality of a wife are considered jointly with preferences over the quantity of wives. As a result, men who are wealthy because of their non-labor income spend their money on multiple women of lower quality, while educated men prefer to have fewer wives, but of higher quality. The mechanism for this result in GMS stems from the idea that educated men can produce educated children with an educated woman at a lower cost, relative to a less-educated man. This mechanism predicts not only that educated men will marry fewer, more educated wives, but also that they will do so in order to have children with higher levels of education. This prediction is examined in Table 4.

Table 4
Explaining the education level of children.

	OLS regression				Probit			
	Dependent variable: education level of the child				Dependent variable = 1 if child has any education, 0 otherwise			
Number of wives in household	−0.115 (0.051)	−0.042 (0.040)	−0.054 (0.032)	−0.056 (0.030)	−0.050 (0.024)	−0.032 (0.020)	−0.030 (0.021)	−0.031 (0.021)
Father’s total income	0.105 (0.031)	0.039 (0.010)	0.044 (0.009)	0.048 (0.009)	0.053 (0.013)	0.040 (0.008)	0.035 (0.009)	0.037 (0.009)
Father’s education		0.050 (0.013)	0.049 (0.012)	0.054 (0.015)		0.023 (0.007)	0.025 (0.006)	0.027 (0.007)
Mother’s education		0.048 (0.012)				0.021 (0.006)		
Mean education of all wives in household			0.046 (0.005)	0.064 (0.016)			0.020 (0.005)	0.032 (0.005)
Father’s education * mean education of wives				−0.002 (0.002)				−0.002 (0.001)
Male	0.294 (0.043)	0.313 (0.033)	0.296 (0.044)	0.296 (0.044)	0.108 (0.026)	0.108 (0.025)	0.109 (0.026)	0.109 (0.026)
Observations	2225	1909	2186	2186	2225	1909	2186	2186

Standard errors appear in parentheses, and are clustered at the geographic level described in Table 1. The sample is restricted to children between the ages of 5 and 12. Age dummy variables are included for each age within this range. The income variable has been normalized by dividing by one million. Each regression includes dummies for each geographic region and religion as defined in Tables 1 and 2.

Table 5
Explaining the number of children in households.

	OLS regressions		
	Dependent variable: number of children in the household		
Number of wives in household	2.040 (0.116)	2.023 (0.117)	1.991 (0.118)
Father's total income	0.188 (0.124)	0.218 (0.103)	0.230 (0.104)
Father's education		−0.029 (0.024)	0.018 (0.032)
Mean education of all wives in household			−0.113 (0.038)
Observations	1358	1357	1203

Standard errors appear in parentheses, and are clustered at the geographic level described in Table 1. The sample is restricted to households with a male head between the ages of 21 and 70. The income variable has been normalized by dividing by one million. The analysis uses the average education of wives in the household because the regressions are performed at the household level and, therefore, the education level of multiple wives in polygynous households had to be aggregated to a household measure. Each regression includes dummies for each age group, geographic region, and religion as defined in Tables 1 and 2.

Table 4 regresses the education level of children on the characteristics of their parents. The results show that the education levels of both the mother and father are significant determinants of the child's education level—higher educated parents have higher educated children, even after controlling for household income. These findings are consistent with an important implication of the model: the components of income, in addition to the level, are important determinants for investing in child quality. Furthermore, Table 4 shows that children in polygynous households are less educated, even after controlling for parental education and household income. Educated men are using their income to acquire fewer high quality women in order to produce high quality children, while wealthy men with less human capital are using their wealth to acquire more wives and children with less education.³

Table 5 closes out the analysis by showing that polygynous households have more children after controlling for household income and parental education. Interestingly, parental education negatively affects the number of children, but only the mother's education level is statistically significant.⁴

4. Conclusion

Overall, the data from Cote d'Ivoire reveal many patterns which are consistent with the model in Gould et al. (2008). Although polygyny is banned, the ban is clearly not binding. The analysis reveals an underdeveloped country which is struggling to escape poverty because polygyny allows men with high levels of non-labor income to spend their wealth on multiple women of low quality and raise many low quality children. However, these tendencies are reduced very significantly if the man's wealth is derived from education or wage income rather than non-labor

income. Therefore, all of these results confirm the main implication of the model: polygynous mating is related to the sources of income and inequality, and not just the levels. Furthermore, the analysis demonstrates that norms are not the entire explanation for the existence of polygyny or monogamy: variation in polygynous behavior is found *within* various social groups, defined by religion and location of residence. Therefore, these findings demonstrate the importance of economic incentives in determining the prevalence of polygyny versus monogamy in a society. These results can perhaps guide policy makers to enact changes which push the equilibrium towards a more monogamous outcome, which is typically associated with less poverty and higher rates of economic growth.

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³ The results are robust to including an interaction between the mother and father's education levels. Although the interaction coefficient comes out negative, the magnitudes of the coefficients imply that an increase in the education of either parent leads to a more educated child. For example, the marginal effect of increasing a father's education when the mother has 10 years of education (three times the mean for male education) is 0.034, while the marginal effect of the wife's education is 0.44 evaluated at 10 years of education for men. These findings are consistent with the model in GMS which is based on the assumption that the cost of educating a child decreases with the education level of either parent.

⁴ For polygynous households, the analysis in Table 5 uses the average education of wives in the household because the regressions are performed at the household level and, therefore, the education level of multiple wives in polygynous households had to be aggregated to a household measure. For monogamous households, the average education level of all wives is simply the education level of the mother.