
A Theory of Polygamy

This chapter could more accurately be called a theory of "polygyny," which is Greek for "marriage to many wives." It presents an analysis of polygamy which is "economic" in that it considers marriage as a situation of constrained choice. In contrast, most anthropological studies of polygyny have used "economic" in a more restricted sense. Murdock (1949), who stresses the "basic importance of economic factors" in explaining the incidence of polygyny in a society, includes in his concept of "economic" labor in agriculture, trades, and crafts, preparation of food, and political and religious functions. While Murdock excludes certain domestic activities, Boserup (1974) leaves them all out. It is the same restricted concept of "economic" that Goody (1974) has in mind when he criticizes Boserup, maintaining that the "reasons behind polygyny are sexual and reproductive rather than economic and productive." "Economic" as I have defined it invalidates Goody's dichotomy: the economic analysis of polygyny treats both its productive and its reproductive aspects.

This chapter explains the theoretical propositions regarding polygamy that were mentioned in Chapter 4. First, hypotheses are developed at the micro-level, with the purpose of explaining who lives in a polygamous household within a polygamous society. Second, hypotheses are developed at the macro-level. The effects of legalizing polygamy are shown, and hypotheses are deri-

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ved regarding the likelihood that a society legalizes polygamy. Both types of hypotheses are tested. The testable hypotheses which relate male and female characteristics to the incidence of polygamy within a polygamous society were tested using data collected in the Nigerian city of Maiduguri. The hypotheses regarding the likelihood that a society allows polygamy were evaluated based on cross-cultural evidence.

Theory

This theoretical section addresses two questions. First, within the context of a polygamous society, who are the individuals more likely to live in a polygamous household? Second, which societies are more likely to prohibit polygamy? Based on the theoretical framework of Part Two, I derive a number of hypotheses regarding these two questions. As the other type of polygamy--polyandry, multiple husbands--is almost non-existent, the discussion alternates between the use of polygamy and polygyny (multiple wives).

Who Lives in a Polygamous Household?

The theory presented in Part Two had been applied to a number of aspects of marriage. Chapter 4 offered an analysis leading to many of the hypotheses summarized in Table 4.1. The same theory can be applied to derive predictions regarding the likelihood that a particular individual lives in a polygynous household within a polygynous society.

As in the rest of this book, marriage is considered as a framework for domestic production and reproduction valued by the members of a society who follow rules of optimization. Individuals determine the extent of their participation in a polygynous household according to endowed and acquired attributes.

Male Income and Education. It was hypothesized in Part Two that if spousal labor is a normal input, men with more income demand more spousal labor. Within the context of a polygamous society a man can obtain more spousal labor by marrying more women. Therefore, the likelihood that a woman is part of a polygamous household varies directly with husband's income and

education, an indicator of permanent income.

Hypothesis 34

Polygyny is a positive function of male income and education.

This was based on the following reasoning. The higher a man's income, the more spousal labor he will demand. (Graphically, a higher income shifts the demand schedule upwards.) Within the context of a polygamous society a higher quantity of spousal labor demanded may translate into a larger number of wives. Education increases one's resources, in terms of both income and the ingenuity with which time is utilized; thus a man's education may also generate an upward shift in his demand for spousal labor, and is likely to increase the likelihood of polygamy.

Male Age. To the extent that income is not measured well and can not be controlled for adequately, a further approximation for income can be found in a man's age. If a man is limited in his ability to borrow funds when young, and if his income grows over time until it peaks, his demand for spousal labor will increase with age until a certain point of maximum productivity. As polygyny is a function of the demand for spousal labor, it follows that

Hypothesis 35

Polygyny varies over a man's life-cycle; a man is most likely to be polygynous when he attains peak productivity.

Empirically, Hypothesis 35 implies a curvilinear relationship between husband age and polygyny. This can be estimated by specifying a quadratic function of number of wives as a function of age. In contrast, other studies have posited a positive linear effect of age on polygyny.¹

Next, let us look at the effects of variations in female attributes on the number of wives in the household. Hypotheses relating female attributes to likelihood of living in a polygamous household can be derived on two theoretical grounds. First, as argued in Chapter 4, whether a woman shares her husband or not is an aspect of her compensation for spousal labor, the quasi-wage w^* . The higher her w^* the more she is likely to translate that into the privilege of

monogamy. Second, differences among women are partially reflected in their productivity as wives. More productive wives are less likely to have to share a husband as they can possibly provide the equivalent of more spousal labor (see Grossbard 1976).

Female Education. A factor which is possibly related to women's productivity in spousal labor, and therefore to the likelihood of polygyny, is education. Education is a resource which can possibly affect a wife's productivity positively. More educated women are probably more efficient in running a household and are capable of providing better education for their children. As a result, despite the possible countereffect of complementarity, educated women are expected to have fewer co-wives if they are more productive (see Grossbard 1976, 1980). Furthermore, if their market value is higher, probably reflecting their higher productivity, their w^* is higher and they are more likely to express that in the non-monetary benefit of not having to share their husband. It is thus predicted that

Hypothesis 36

Female education relates inversely to polygyny.

Fecundity. Another factor related to productivity of wives is fecundity. Certain women are more fecund, partially as a function of age. The productivity of a woman in marriage helps explain the number of co-wives that she will have. As explained in Grossbard 1976, women differing in fecundity vary in (1) their supply of spousal labor and (2) their demand for marriage (spousal labor). There is no reason to expect complementarity between women of varying fertility. Therefore, if, given his resources, a man aims for a specific number of children, the possibility of polygyny widens the range of substitute routes towards that target. A given number of offspring can be obtained with one unusually fertile wife or with a number of wives of lower expected fertility, where expected fertility is related to fecundity. There may exist a timing factor: if after a few years it becomes apparent that the first wife is not able to bear the desired number of children, the husband may start to look for a second wife.

A woman of higher fertility may also use that asset to acquire more privileges for herself. This, in turn, may persuade her to choose

a husband with fewer wives. Combining these two considerations brings us to another hypothesis:

Hypothesis 36'

Women of higher fertility have fewer co-wives.

A direct way to test this will be to assess the relationship between completed fertility per wife and number of wives. Alternatively, an element of expected fertility, the age of a woman, may be examined and tested to generate another hypothesis:

Hypothesis 36''

Women at an age of peak fecundity have fewer co-wives.

Rules on Intermarriage. So far, I have discussed the differential impact of individual male and female characteristics on membership in a polygynous household. Clearly, people live within a culture imposing constraints on their individual choices. If this culture effectively prohibits polygyny, men will be limited to choosing one wife at a time. Observers have noticed that, on a worldwide scale, cultural background and religion considerably affect the legal status of polygyny (see Murdock 1949).

The absence of an absolute prohibition on intermarriage implies that all men and all women belong to the same markets for spousal labor. Were there an acute shortage of men in one ethnic group, some of the women belonging to that group would marry men from other groups. This suggests a sixth hypothesis:

Hypothesis 37

Where all coexisting ethnic groups allow polygyny and intermarriage, there will be no major effect of ethnic group on the number of wives.

Even though most people in Maiduguri usually marry within their own group (Steckle and Ewanyk 1973), the Kanuri dominate the Shuwa Arabs politically, one result of which is an asymmetric intermarriage rule: Kanuri men may marry Shuwa women, but Shuwa men and Kanuri women are not allowed to marry (Cohen and Middleton 1970). The ensuing marriage squeeze for Shuwa men may lead to a lower degree of polygyny among the Shuwa in comparison to

the Kanuri.

Like all the preceding hypotheses, Hypothesis 37 states a partial effect: tribes generally do not differ in polygyny, once other attributes of men and women are taken into account. In groups with more wealth and education, however, men may have more wives.

Divorce. According to sociological theory, the strength of a marital relationship is a direct function of the attraction within the marriage (Levinger 1965). In terms of an economic theory, fewer returns from marriage increase the likelihood of divorce (Becker, Landes, and Michael 1977). To the extent that polygyny reduces the gains of marriage between a polygynist and each of his wives, in view of the existence of diminishing returns and the selectivity of women entering polygynous marriage, it follows that

Hypothesis 38

Polygyny leads to more divorce.

Cohen (1971) derived the same prediction by using "simple logic." Hypothesis 38 is applicable to individual cross-sectional data within a given culture. If one expands its applicability to a cross-cultural context, more factors could influence the association between divorce and polygamy. If one considers women's preference for stable relationships, the existence of polygyny can either encourage or discourage divorce. It encourages divorce to the extent that women's marriage market is more favorable (see Hypothesis 39) and that women know it will be easy to remarry. However, it could discourage divorce if women want to translate their higher w^* into more stable relationships.

Tests for Hypotheses 34 to 38 explaining polygyny and for Hypothesis 39 regarding the effect of polygyny on divorce are reported in the section analyzing data from Maiduguri, Nigeria. Before turning to such empirical analysis, let us look at hypotheses analyzing polygamy from a macro perspective.

A Macro Analysis of Polygamy

It follows from an economic analysis of marriage markets that women are likely to benefit from the legitimation of polygyny.

This was shown by Becker (1973) and also follows from the theory presented in Chapters 3 and 4. Consider a market for women's spousal labor. A prohibition on polygamy or legal imposition of monogamy can be viewed as an interference in the marriage market curtailing men's aggregate demand for spousal labor, whatever that means within the specific culture. Consequently, assuming the supply of spousal labor by women has not changed, the new equilibrium quasi-wage w^* will be lower than if polygamy is allowed and demand for spousal labor is higher. Societies that impose monogamy therefore cause the equilibrium market-determined compensation for spousal labor to go down due to reduced competition for spousal labor by potential husbands.

Hypothesis 39

Women are better off when polygyny is permitted (Becker 1973).

A higher w^* is expected to be translated into advantages for women, as was stated in Becker (1973) and Grossbard-Shechtman (1980). However, as suggested by Guttentag and Secord (1983), men may be tempted to impose more restrictions on women if they stand to gain more from such restrictions. If women would get very high benefits according to free marriage market conditions, it is likely that men will organize politically to prevent such free market conditions from being established. Polygamy is therefore often accompanied with men's use of violence to impose compensation levels for women--including women's rights--which lie below market equilibrium conditions. We are now ready to derive a number of hypotheses regarding the likelihood that a society will impose monogamy.

Wherever monogamy is imposed, this causes a loss of consumer surplus and producer surplus in the market for women's spousal labor. The larger the benefits from allowing polygamy (polygyny), the more polygyny is likely to occur. Such benefits depend on the existence of marriage squeezes.

Marriage Squeezes. Let us assume that there is a marriage squeeze for women, i.e., the number of women exceeds the number of men. As shown in Part Two, this implies that the demand for spousal labor is low compared to such demand under conditions of a marriage

squeeze for men. That causes the w^* in an unrestricted market for spousal labor to be lower if there is a marriage squeeze for women than if there is a marriage squeeze for men. In a marriage squeeze for women, when w^* is relatively low, the imposition of monogamy can be even more harmful to women's conditions in the market for spousal labor than in a marriage squeeze for men. In fact, one can look at a marriage squeeze for women as a factor pushing down the demand for spousal labor, while legalization of polygamy is a factor pushing the demand for spousal labor up. In a marriage squeeze for women, women and society in general benefit more from the legalization of polygyny than in a marriage squeeze for men. Therefore,

Hypothesis 40

In a marriage squeeze for women, polygyny is more likely to occur than in a marriage squeeze for men.

This assumes no political interference with market-determined w^* s. As shown in Grossbard-Shechtman (1980), where equal numbers of men and women enter the marriage market, equilibrium under imposed monogamy could possibly have been the same as under a system allowing polygyny. When the number of women exceeds that of men, women's equilibrium conditions in marriage are always higher in polygyny than in monogamy, which is likely to benefit women. Society as a whole is likely to be better off as well. By allowing polygyny, society enables previously unmarried women to add to the total production in marriage. With more women than men, it is more advantageous for society to allow polygynous marriage. In such circumstances polygyny is also more likely to be observed.

Any factor raising the productivity of spousal labor in marriage will affect the demand for spousal labor performed by men and women. With the total unrestricted demand for spousal labor being higher, there is more to lose from a restriction on that demand taking the form of a prohibition on polygamy. This is especially clear in a marriage squeeze for women. Each additional marriage, possible only when polygyny is instituted, then yields a larger gain, and society as a whole benefits more from the legalization of polygyny. The larger the gain from marriage--i.e. the surplus from consuming and producing spousal labor--the more a society is likely to experience

polygyny. In graphical terms, a larger gain from marriage is reflected in an upward shift of the derived demand for spousal labor or a rightward shift in the supply of spousal labor (see Chapters 3 and 4). Next, we look at two factors shifting the demand for spousal labor.

Children. The surplus(es) generated by marriage depends on complementarity between husband and wife, an important component of which is complementarity in procreation and childrearing.

Hypothesis 41

The more children are important, the more a society is likely to experience polygyny.

Substitutes. The availability of substitutes for spousal labor is another factor influencing the demand for spousal labor. The more other services can be substituted for women's spousal labor (for instance, in cleaning, food preparation, or sexual activities), the larger the demand for women's spousal labor.

Hypothesis 42

The more costly substitutes to women's spousal labor, the more a society is likely to experience polygyny.

Women's Earnings. The higher women's earnings from work in the labor market, the lower the demand for their spousal labor by men and the more their own supply of spousal labor shifts to the left. Consequently,

Hypothesis 43

The lower women's earnings, the more a society is likely to experience polygyny.

Diminishing Marginal Productivity. As shown in Grossbard-Shechtman (1980) all previous implications can be derived with the simplest conceivable assumptions, one of which is constant marginal productivity of wives. This assumption implies that men's demand for women's spousal labor does not depend on the number of wives. However, there are two main reasons to expect decreasing marginal productivity of additional wives. First, conflicts may arise among co-wives married to the same man. Second, the constraint of a fixed

amount of male spousal labor leads to decreasing marginal productivity of additional female spousal labor. If there is only one man in the marriage, increasing the number of wives increases the supply of wife-time relative to that of the fixed factor, husband-time, which leads to diminishing marginal productivity.

In addition, men's demand for wives is determined by the value of marginal productivity, and there may be decreasing marginal utility from the products of marriage. Only one man is enjoying the benefits from marrying a number of wives, and his capacity to appreciate services such as child services is limited. For instance, depending on the target number of children he aims at and on the fertility of each wife, the second wife may have little to contribute.

If the sex ratio equals one, and all men are equal, monogamy will occur even if polygyny is permitted. No man will be able to offer more to a second wife than what an identical man offers her if she were his first wife. But, as shown in Grossbard-Shechtman (1980), it still follows that allowing for polygyny tends to improve the equilibrium position of women in the marriage market. The likelihood that a society will impose monogamy depends on the degree to which each consecutive wife exhibits diminishing marginal productivity in spousal labor.

Hypothesis 44

The more rapid the decrease in the value of the marginal productivity of each additional wife the less polygyny is likely to occur.

This is also shown in Grossbard-Shechtman (1980). The effect of decreasing marginal productivity of wives on the prevalence of polygyny has its equivalent in zoology. According to Orians (1969), the larger the difference in mean reproductive success of females in monogamous and bigamous matings in equivalent environments, the smaller the likelihood that polygyny will evolve.² Factors influencing reproductive success under conditions of monogamy and polygyny, i.e., the extent of diminishing marginal productivity of female mates are (1) the extent of male parental care, (2) the possibility for successive females of a male to be staggered in their breeding so that the periods of dependence of their offspring overlap little or not at

all, and (3) the nature of food resources controlled by males (p. 594). Factor 1 parallels the reasoning for diminishing marginal productivity due to fixed husband-time (however, the present analysis is not exclusively restricted to productivity in childrearing). Factor (3) could be related to fixed physical resources owned by the husband.

Male Inequality. The above analysis assumed that all men are homogeneous, and all women are homogeneous. If the assumption of homogeneity is relaxed, we can derive the following hypotheses. First assume that males differ in attributes, while women remain identical. It can be shown that

Hypothesis 45

The more unequal the distribution of productivity-augmenting traits among men in a society, the more one is likely to find polygyny.

Similar statements are found in Becker's theory of marriage (1974). Some of the analyses by biologists are also relevant here. For instance, in his theory of mating systems in the animal world Orians has used the expression "equality in the quality of the territories of the males of a species" (1969).

It is shown in Grossbard-Shechtman (1980) that by prohibiting polygyny, the society with more male inequality stands to lose more, since the more productive men would all marry twice while only a fraction of the other men would marry, so that total additional surplus after polygyny is larger in the society with unequal distribution of productivity. The more unequal the distribution of productivity in marriage, the more the gain from a second marriage by a high-productivity man is likely to exceed the gain from a first marriage by a low-productivity man, so that polygyny is more advantageous even under more general assumptions concerning the marriage market.

Female Inequality. Until now, women were assumed to be identical. Relaxing this assumption yields the following

Hypothesis 46

Because of positive sorting, female inequality in productivity-augmenting traits is likely to dampen the positive effect of male inequality on the incidence of polygyny.

In other words, male inequality has a positive effect on the incidence of polygyny, whereas female inequality is likely to be associated with less polygyny and more monogamy. This statement has applications regarding the degree of positive sorting that will be observed in a society.

Polygamy and Positive Sorting. As pointed out in Becker (1974a), positive sorting is a prediction from economic theory that has received ample support from empirical evidence, e.g., men marry women of similar income, height, and education. Likewise, sociologists have hypothesized that people tend to sort each other positively due to the desire to share values and norms.

Allowing for polygyny is expected to weaken the tendency for positive sorting. Given polygyny, it may be optimal for a very productive man to marry two women of low productivity, who would have each married a man with traits similar to theirs had monogamy been imposed. Since polygyny and positive sorting are two alternative strategies by which husbands can obtain more spousal labor, it follows that

Hypothesis 46'

Societies prohibiting polygyny are expected to have more positive sorting.

A demonstration of this hypothesis can be found in Grossbard-Shechtman (1980).

Later in this chapter, cross-cultural evidence will be brought to bear on some of these macro-level hypotheses regarding the effects of polygyny on women and the incidence of legal polygyny. But first, I present a test of the first micro-level hypotheses based on data from the Nigerian city of Maiduguri.

Maiduguri, Nigeria

Maiduguri was selected for a study of polygyny on two fundamental grounds. First, approximately at the same time three separate informative surveys were carried out in that predominantly Kanuri city. In 1969, Ronald Cohen conducted interviews for his study of divorce among the Kanuri (Cohen 1971). In 1973, Jean Steckle and Linda Ewanyk surveyed the city for their study of

consumer preferences in grain utilization. That same year Margaret Hardiman undertook a household survey requested by city planners. The opportunity to use the raw data collected by Cohen and by Steckle and Ewanyk and to refer to Hardiman's survey partially compensated for the lack of personal fieldwork. Second, polygyny is common in Maiduguri. In the surveys of Cohen and Steckle and Ewanyk, the average number of wives exceeds 1.5 (Table 11.1).

Maiduguri, the capital of Nigeria's Northeastern State, also functions as the center of the Bornu-Emirate, homeland of the Kanuri people. Despite a recent influx of animist and Christian migrants from the south and the west, the majority of the 165,000 inhabitants adhere to Islam. According to Hardiman's survey, Maiduguri is 52 percent Kanuri (a Muslim tribe), while other Muslims--Hausa, Fulanyi, and Shuwa Arabs--account for another 25 percent of the population.

One of the principles of Islam limits the number of wives to four, a regulation strictly respected by Muslims and even non-Muslims: none of the households surveyed by Steckle and Ewanyk and Cohen had more than four wives.

According to Cohen (1967,1971), Islam pervades all aspects of Kanuri life. Women lead a separate social existence and take no part in public life. They are considered inferior and sexually untrustworthy, which results in ideas of seclusion and the "code of modesty." Table 11.1 suggests that well over half the wives of urban Kanuri men are secluded. A woman's sexual activities, her reproductive power, and some stipulated parts of her economic potential are transferable to her husband at marriage. The children belong to the father, and when divorce occurs they remain with him, unless they are not yet weaned. Divorce is extremely widespread and occurs more often than in the United States (Cohen 1971). As Table 11.1 shows, 69 percent of all marriages of the 45 men in Cohen's sample had ended in divorce, and the average duration of a marriage (including extant marriages!) was 7.7 years. From a comparison of the average numbers of wives and marriages it follows that the latter figure is high (5.1 marriages per man), in part as a function of the high divorce rate. This partially reflects the simplicity of divorce; it occurs automatically if a husband tells his wife "I divorce you" three times. Cohen's total sample reported approximately 450 divorces, only 3 percent of which involved recourse to the courts.

Maiduguri's economy relies on an old tradition of commerce with the East (Steckle and Ewanyk report that 33.6 percent of all men were traders and businessmen) and on a large sector of public services (12.1 percent were civil servants, 7.3 percent Koranic teachers, and 3.4 percent teachers and professionals). Only a small proportion of the population owned a grain farm (16 percent), and even fewer were farmers and fishermen (5.4 percent).

With so many teachers in the city, it is not surprising that a large segment of the population had received some schooling. According to Steckle and Ewanyk (1973), two-thirds of the men and one-third of the women had undergone formal schooling, most of it Koranic. Although few Koranic schools are recognized by the Ministry of Education, the skills they provide--including reading and writing ability--make them a worthwhile investment. In economists' language, schooling seems to raise individual productivity in terms of earning capacity and/or ability to produce goods in the home. For instance, a woman with Koranic education may be more skilled as a hostess or mother than a woman who did not go to school.

Most families (75 percent) lived in their own homes, usually part of a compound. Most compounds did not have a waterstandpipe. Water had to be carried, which was done by women, children or paid carriers.

Women married very young. By the age of 15 they had most likely been married at least once. In contrast, most men did not marry before age 20 (Cohen 1971).

Women were most likely to bear children between the ages of 19 and 25 (Hardiman 1973, Steckle and Ewanyk 1973). Hardiman (1973: Table 12) estimated the average fertility rate for women over 35 to be 3.2. The average number of children living in a man's household was reported by Steckle and Ewanyk as 2.5; Cohen found the average number born to a man before and during a particular marriage to be 2.3.

While on the decline, child mortality was very high. Hardiman estimated the mortality rate of newborns at 212 per 1,000 live births. Deaths of women at childbirth did not appear to be very common, since only 2.3 percent of 265 urban Kanuri men's marriages ended with the death of the wife (from all causes).

After age 34 a woman had a high probability of becoming a

divorcee or a widow. In contrast, men older than 34 were more likely to be married. The survival of divorcees and widows depends on relatives, usually children. It appears from Hardiman's survey that many urban divorcees did not receive any support and died prematurely, especially if they were childless.

Limited labor-force participation increases woman's reliance on husband and children. Of the senior wives in the Steckle and Ewanyk sample, 87 percent were full-time housewives.

When testing for the effect of male and female attributes on the number of wives in the household, the characteristics of the mate(s) have to be kept constant. For example, if a man is indifferent between marrying two average women or one gifted one, given their relative wages and productivity, little can be inferred about his number of wives by simply comparing his endowments with other men's endowments. The following hypothesis is more informative: given that a man has one average wife his attributes lead us to predict that he will have more than one wife. Consequently, the regressions simultaneously include male and female attributes. Table 11.2 presents the results obtained with the two data-sets. The method of estimation was Ordinary Least Squares.

The positive income effect predicted in Hypothesis 34 is verified in all regressions. Regression 1 estimates income through occupation and ownership of a waterstandpipe, a grain farm, and a house. All coefficients are positive and significant.³ Regressions 2 and 3 reflect the same effect with occupation as the measure of income. Regression 3 also indicates a wealth effect.

A positive income effect on polygyny is well documented, as already reported by Becker (1974a). Also, Clignet (1975) found that in Yaounde, Cameroun, 84 percent of the household heads working as manual laborers in the private sector and having three wives or more owned their house in 1972, whereas only 76 percent of those with two wives and 57 percent of those with one wife did so. In three Nigerian towns, it was found that men with the highest incomes had the largest households and more wives, irrespective of occupation (Ware 1974). Even in the polyandrous society studied by Majumdar (1962), where women can marry more than one man and men can marry more than one woman, men of the higher castes had more wives: 40 percent of the members of the higher castes were

polygynandrous (i.e., a number of brothers were jointly polygynous), while a much lower fraction of the lower caste husbands had more than one wife.

Earnings vary over the lifetime and in the absence of reliable information on income, age can serve as a proxy for earnings. Cross-tabulations (Clignet 1970) have indicated a positive linear relationship between husband's age and number of wives (with a slight downturn at later ages when income may fall because of reduced productivity).

It was also predicted that education of the husband raises the number of wives, which is confirmed by Regression 1. Given the poor quality of the proxy for income, however, education may affect the demand for wives through its effect on earnings.

Similarly, Clignet (1970) has found that men with some primary education tended to be more polygynous than illiterates, and those going beyond primary schooling more than men who completed their primary education. However, Clignet also found that those who completed primary schooling were less polygynous than those with some primary education. In Clignet's opinion, as well as in Goode's (1963), education modifies the traditional values of polygyny among the educated population. But Goode also quotes a Liberian study (Goode 1963) that found that over one-half of the literate husbands were polygynously married. In order to detect an effect of education which is separate from an income effect, a partial analysis is necessary. Such analysis is offered in this study, but not by Clignet or Goode. It is also desirable to specify how education modifies "values," if it does. For instance, it may encourage more demand for child quality (in the United States, father's education is known to increase child's education), thus discouraging fertility and consequently polygyny.

It was also hypothesized that at the age of peak productivity a man is likely to be married to more wives. In all regressions, older men appear to have more wives. Regression 3, which includes variables "age of husband at last marriage" and "age of husband at last marriage, square," shows that peak polygyny occurs when men are between ages 43 and 46,⁴ which seems consistent with a lifetime earnings profile.

Another male attribute included in regression 2 is the

husband's age at the time of the interview. The number of wives is probably a positive function of the length of time since marriage. We expect the number of wives of a man who is 70 years old at the time of interview and was 25 at the time of marriage to exceed the number of wives married to a man who is 25 at marriage and time of interview. The first base for that hypothesis is the health component. If a man living in Maiduguri has lived 70 years, he is probably healthier than average. That is an endowment leading to more marital output and more wives. Secondly, there may be a cohort effect. If there has been some modernization in Maiduguri, polygyny may be decreasing over time. This hypothesis is verified: the age of husband at the time of the interview is significantly positive in both regressions.

Table 11.2 also shows the effect of female attributes on the number of wives in the household. Regression 1 confirms Hypothesis 36: the more educated the senior wife, the smaller the number of co-wives. This suggests that some men substitute marriage to one highly educated wife for marriage to a number of uneducated wives. Alternatively, this result may be interpreted as evidence of a higher quasi-wage w^* for educated women.

Other studies have also shown evidence for this hypothesis. Simple tabulations show that 11 percent of Aboure women who were monogamously married had completed some primary studies or more, while the corresponding percentages were 8.4 percent and 9.8 percent for senior and junior co-wives. Among the Bete, these numbers were respectively 7.6 percent, 3.8 percent and 3.0 percent (Clignet 1970, Table 16). In the Yoruba sample, 25 percent of the monogamous wives were completely illiterate, as compared to 39 percent and 47 percent of the women living in households with respectively two or three (or more) wives (Yoruba Social Structure 1976). The evidence provided here is more convincing, given that it is based on multivariate analysis.

The finding of a negative relationship between wife's education and number of wives in the household suggests that educated women are more productive in spousal labor than uneducated women. If education simply affects women's preferences for monogamy, without any productivity gain in spousal labor, it is hard to grasp how educated women would have the opportunity to marry more

monogamously. What they want has to be matched with available opportunities. In Chapter 9, one also finds indirect evidence of a positive effect of education on women's productivity in spousal labor. Part Six addresses the link between education and spousal productivity more directly.

Regression 3 shows that young and old women have more co-wives than women around an age of peak productivity. As is predicted in Hypothesis 36', women at their age of peak productivity have fewer co-wives. That peak age, as computed from the regressions, was between 21 to 23 years, which is consistent with the description of fertility patterns in Maiduguri.⁵

The negative relation between fertility per wife and polygyny predicted in Hypothesis 36" is confirmed in all regressions.⁶ In Regression 1 fertility per wife is measured as an average for the household. Regression 2 includes the number of children born to a particular marriage between one man and one woman, while Regression 3 includes this last variable as well as an estimate of the fertility of previous wives. All three estimates of fertility per wife show a negative sign. This result does not invalidate the interpretation of age in terms of fertility, since a woman's potential as a mother is a function of her age and differs from her actual number of children. A problem with the variable "average fertility" is the spurious correlation, since the number of wives appears on both sides of the equation. It is worth noticing that the two sets of data give similar results despite the difference in the definition of children.

The variable "seclusion," reported by Cohen, differentiates between women who are secluded and women who are not. Women who agree to marry a husband who will seclude them are giving up the right to leave the home except on special occasions, thereby reflecting either a lower productivity or a smaller demand for satisfaction inside and outside of marriage. The significantly positive sign may therefore be another evidence of substitution between more women of lower quality and fewer women of higher quality. Seclusion could also be an additional proxy for husband wealth or a factor reflecting more taste for marriage on the part of the husband. The positive sign found in Table 11.2 is consistent with any of these interpretations.⁷

Ethnic-group membership appears to have little effect on the

degree of polygyny. As expected in Hypothesis 37, Regression 1 shows that members of most tribes did not have a number of wives significantly different from the Kanuri. While Hausa are Muslim, the other tribes are mostly animist or Christian; compared to the Kanuri they are equally polygynous. One exception, however, is that Shuwa Arabs, subject to disfavorable marriage rules imposed by the Kanuri, have fewer wives.

To conclude this section, I have viewed people as determining their needs for marriage in terms of their personal values and resources and the costs involved in marriage. I have considered women as suppliers of spousal labor and men as demanding these services. Men were expected to marry more wives when their income, education, and age led them to demand more spousal labor. A productivity and a demand effect on the supply of spousal labor generated the prediction of an inverse relationship between polygyny and female education and between polygyny and fertility. Ethnic-group membership was not expected to affect polygyny significantly. Finally, it was hypothesized that polygyny engenders divorce. All of these predictions were tested and most of them confirmed.

The novelty of this study lies not in the discovery of an income effect on polygyny, but in the hypotheses generated by considering housewives as producers. The predictions of a life-cycle effect and of minor tribal effect on polygyny are also indicative of the fruitfulness of an economic approach. The results depend crucially on simultaneous consideration of male and female attributes affecting the demand and supply of women's spousal labor. Methodologically, regression techniques of Ordinary Least Squares and Probit proved as useful in explaining polygyny and divorce as they have been in accounting for paradigms of market economics. The low coefficients of determination (R^2), however, reflect the limitations of an economic analysis. More knowledge of the culture and more culturally meaningful data are necessary to improve the results. Further studies may also try applying regression techniques specifically designed for polychotomous variables such as number of wives, a variable that was truncated at 4 in this sample.

With respect to Hypothesis 38 relating polygyny to divorce, Cohen (1971) has shown a positive relation between divorce and polygyny. Using the method of cross-tabulation, he found that

polygynous marriages were more likely to end in divorce than monogamous unions. Within polygynous families, Cohen showed that in families with two wives the probability of divorce of the younger wife was relatively high, while in families with three wives the probability of divorce of the senior wife was relatively high. Among urban males, Cohen also found a partial effect of polygyny on divorce. A dichotomous variable of monogamy accounted for a sizeable fraction of the variation in divorces. In his multivariate analysis of the probability that a marriage will end in divorce, Cohen found an effect of monogamy in addition to the effect of fertility of the present union and the effect of the secretiveness of the husband towards his wife.

Table 11.3 explains the likelihood that a marriage will end in divorce in terms of the number of senior wives, attributes of the husband (age, wealth), attributes of the wife (age and age square), the duration of marriage, and the number of children (the direction of causality in the last two variables is ambiguous). While in his multivariate analysis Cohen used a dichotomous explanatory variable "monogamy," I used a continuous variable "wives," which local custom limits to 4. In addition, a dummy variable "wives = 4" was included to capture differences between households with four wives and other households. The method used is Probit, a method of estimation especially designed to deal with dichotomous dependent variables.

Cohen's finding was confirmed: polygyny has a positive effect on divorce. Like Cohen, I found a negative effect of fertility. In addition, Table 11.3 shows a significant negative effect of husband's age and wealth on divorce.

The next section brings cross-cultural evidence to bear on this theory of polygyny.

Cross-Cultural Evidence

Findings of previous researchers are one possible source of evidence for the theory of polygyny outlined above. Three kinds of evidence can be brought to bear on Hypothesis 39, namely that women are better off when polygyny is permitted (also see Grossbard 1978a and Chapter 1 here).

1[a]. Nobody has yet given a complete explanation on why bridewealth is paid by husbands in some societies, while elsewhere the bride's family provides a dowry. Whenever such general theory will evolve, it will have to incorporate polygyny among the explanatory factors. According to anthropologist Goody (1973), "dowry is strongly linked with monogamous (and polyandrous), marriage." Similarly, sociologist Clignet (1970) writes that "the institution of brideprice is more often found in polygynous than in monogamous African societies."

These findings make sense if bridewealth versus dowry is seen as an indication of women's share of marital income. Bride payments can be considered as lump sum transfers through which men compete for wives when the equilibrium incomes of married women exceed the income they actually receive after marriage.⁸ Conversely, women or their families would pay dowries prior to marriage in order to obtain a husband when the income they actually receive exceeds the equilibrium income they would get in a free marriage market. If the discrepancy between actual and equilibrium share of women in marital income were greater the larger their equilibrium incomes (as suggested by Becker 1977) "the frequency and magnitude of brideprices would be greater...when poly[gyny] is more common." Conversely, when the equilibrium share of women in marital income is low, their actual income may be higher, especially if inflexible shares derive from the indivisibility of commodities like children (Becker 1977). In turn, it was shown above that a prohibition on polygyny reduces women's equilibrium conditions in the marriage market. It is clear that the presence of polyandry detracts women's bargaining position even more, for once men can pool their resources to marry a common wife, the demand for wives is even lower than in monogamy, and consequently the equilibrium income of married women even less favorable. The concept of a marriage market therefore illuminates these observations by Goody and Clignet.

Economist Bronfenbrenner (1971) has reached a similar conclusion based on his analysis of Indian marriage markets. He observed that in India, "while monogamy and dowries prevailed, there were certain subcastes, such as the laundrymen of Calcutta, in which the master married his labor force. Under these circumstances, not only polygamy but brideprices were found" (see also Tambiah 1973).

He therefore thinks that "the probability of a positive brideprice (or negative dowry) will be greater when inter alia the number of wives per husband exceeds unity."⁹

Not only does it seem that the probability of finding bridewealth versus dowry varies directly with the presence of polygyny, but evidence also suggests that bridewealth payments are higher in more polygynous societies. Comparing two Sebei communities in Eastern Uganda, anthropologist Goldschmidt (1974) found that the bridewealth was considerably higher in the more polygynous community. Goldschmidt also cross-tabulated thirteen separate societies in East Africa by polygyny ("over 150 wives/husbands" and "150 wives/husbands and under") and brideprice (high and low) and found that only three out of thirteen societies were not in the "high polygyny-high brideprice" or "low polygyny-low brideprice" categories.

1[b]. Age at marriage can also indicate benefits from marriage. The more one stands to gain, the younger one is likely to enter marriage. Hypothesis 39, therefore, leads us to expect that women will marry younger in polygynous societies. Since women gain relative to men, a larger sex differential in age at marriage should be found where more polygyny occurs. Simple comparisons provide evidence for the theory: women marry younger in countries allowing for polygyny. For instance, women's average age at marriage is 13 or 14 among the Hausa and the Kanuri of Eastern Nigeria, societies with widespread polygyny. (Among the Hausa, 36 percent of all men of marriageable age were polygynous; see Mair 1953). The Tallensi, another West-African tribe, are slightly less polygynous (30 percent of marriageable men had more than one wife; see Mair 1953) and their daughters marry somewhat later: here the average female age at marriage is 16 and 17. On the whole, women marry considerably earlier in polygynous areas like Africa and the Muslim world than in monogamous Europe and America. In addition, while in the United States the husband is on average two years older than the wife, that difference rises to seven years in the Arab world and to ten years in some heavily polygynous African societies like the Kanuri.

Using data from sixteen districts of Congo, Brass et al. (1968) found a simple correlation of .8 between an index of polygyny

(number of married women per 100 married men) and the difference in mean husband's and wife's age at marriage, evidence for a positive correlation between degree of polygyny and difference in age at marriage. Moreover, the South African government's efforts to limit polygyny (e.g., by imposing taxes on each wife) led to a later female age at marriage (Mair 1953). Recently many Muslim countries have simultaneously restricted polygyny and age at marriage. One explanation for this joint treatment is that, once polygyny is limited, the age at marriage will rise anyway, so that the second restriction becomes less costly.

1[c]. Not only will polygyny encourage women to marry earlier, but it will lead a larger proportion of women to marry at all ages. Comparing two ethnic groups in Abidjan (Ivory Coast) and its hinterland, Clignet (1970) found 42 percent unmarried Aboure females as opposed to 30 percent unmarried Bete females. Not surprisingly, the Aboure are less polygynous: in Abidjan married men were 91 percent monogamous, while that percentage was 81 percent among the Bete. Likewise, better marital income opportunities open to women lead widows to accept being "inherited" by relatives of their husband, as is specified in the institution of "levirate." In South Africa the restrictions on polygyny also led widows to "refuse much more often than in the past to be 'inherited' by relatives of their husband" (Mair 1953), which can be interpreted as the result of a smaller differential between married and widowed income. The same sixteen districts of the Congo also showed a negative correlation of $-.45$ between polygyny and the proportion of married women 15 to 45 years old (Brass et al. 1968).

Hypothesis 40 predicted that polygyny is more likely in a marriage squeeze for women. One of the most dramatic demonstrations of such marriage squeeze effect on polygyny occurred in Paraguay in the nineteenth century. After a major war against neighboring countries, the shortage of marriageable males was so drastic (males were only 13 percent of the total population of Paraguay), that for a limited period Paraguay overruled the prohibition against polygyny (Becker 1974a). Equally convincing is the case of the South Fore, a New Guinean tribe, where an increase in

the male/female ratio due to the sexual selectivity of a neurological disorder led to drastic reductions in the male marriage rate and the rate of polygyny (Glasse and Meggitt 1969). Wagner (1972) finds a positive relationship between availability ratio (wives per marriageable men)¹⁰ and polygyny ratio (wives per married men) in a study of twenty-three units of settlement among the Daribi of New Guinea.

If polygyny may result from a marriage squeeze for women, does it follow that a marriage squeeze for males leads to polyandry? While polygyny is very widespread, polyandry is extremely rare (perhaps because, as Becker 1974a suggests, men like to maximize the likelihood of fathering their own genetic products). In both cases of polyandry on which I obtained documentation, the sex ratio exceeded one, i.e. there was a marriage squeeze for males. Among the Todas of India (Murdock 1949), scarcity of females resulted from female infanticide. In 1951, the polyandrists of Jaunsar-Bawar (Himalaya) had 20 percent more men than women, also related to female infanticide (Majumdar 1962). These mountaineers also had a custom of declaring certain women as witches, whereafter they were often killed, another reason why men experienced marriage squeezes.

While marriage squeezes affect the presence of polygyny, they account for a small fraction of variations found in actual polygyny rates. In the most polygynous area of the world, sub-Saharan Africa, the number of females per hundred males varies between 95.9 and 136 for different countries and periods (Dorjahn 1959), i.e. many of these polygynous societies experienced marriage squeezes for women. As pointed out by Dorjahn, the effective sex ratio can be affected by sex differences in age at marriage. Earlier I emphasized that differences in age at marriage may result from polygyny. But the observed correlations may also be interpreted in the opposite direction, and with the evidence presented here, there is no way to differentiate between the two interpretations. Viewing age at marriage as a determinant of the effective degree of marriage squeeze the Muslim governments' restrictions on age at marriage may act as a means to reduce polygyny.

With regard to the positive relation between the importance of children and polygyny hypothesized in Hypothesis 41, it can be

noted that in continents where more children are demanded, polygyny is more prevalent.

With respect to Hypothesis 42, a broad world overview also shows that the continent of highest polygyny, Africa, has limited markets for consumer goods and servant services ¹¹ and that household production uses a higher ratio of own time to market goods than is the case in monogamous regions like ours. Reduced demand for women's spousal labor may be one explanation for the decline in polygyny in the Middle East (Daghestani 1953).

Smaller markets for consumer goods may also be a cause of restricted job opportunities for women outside the home. In monogamous societies, many jobs performed by women in the labor market substitute for women's spousal labor (for instance, waitresses, seamstresses, salespersons in supermarkets). This supports Hypothesis 43. In Africa, women have fewer possibilities to be independent, and therefore the gains from marriage (and polygyny) are larger. Actual correlations between female labor force participation and polygyny are hard to interpret, for the low demand for wives in more monogamous societies may force women to enter the labor market. Keeping this in mind, the finding that among the more polygynous of two Ivory Coast tribes women participated less in the labor force, is not necessarily a proof of this proposition (Clignet 1970). To Goode (1953), one of the reasons for the "reduction in the proportion of the adult population living under concubinage or some form of polygamy" is that "the female ...now...has alternative modes of employment."

Hypothesis 44 related the prevalence of polygyny to marginal returns from an additional wife. The possibility of sharply decreasing marginal returns from wives because of frictions between co-wives endangers polygyny to such an extent that all polygynous societies have taken active measures to minimize these intramarital conflicts. Four types of arrangements are used to reduce frictions in polygynous households: (1) separate dwellings for each wife, (2) supervisory authority in the hands of the senior wife, (3) customs requiring that the husband cohabitates with each wife in regular rotation, and (4) sororal polygyny, whereby sisters share a husband. The latter custom

was reported in 70 out of 193 polygynous societies surveyed by Murdock (1949). Methods (1) and (4) appear to serve somewhat as substitutes. In 18 out of 21 societies with exclusively sororal polygyny, co-wives live in the same house, while in 28 out of 55 societies with non-sororal polygyny, wives live in separate dwellings. Clignet and Sween (1974) found that one way urban dwellers in Cameroun practice polygyny is by having one wife in the city and one in their village of origin. Higher residential costs in African cities tend to discourage polygyny, because it becomes harder for husbands to keep wives in separate dwellings.

In practice, there is evidence of both frictions and widespread cooperation among co-wives. For instance, co-wives cooperate in childrearing. Out of a sample of 759 co-wives interviewed in the Ivory Coast, only 25.2 percent exerted authority on their children separately from their co-wives, while three-quarters raised children under some form of shared or accepted authority (Clignet 1970).

Reliable cross-cultural data to substantiate Hypotheses 45 and 46, dealing with inequality among men and women, is hard to obtain. Hypothesis 46, relating positive sorting and polygyny, is not testable in its original form, but its corollary, Hypothesis 46', can be tested. Polygyny and positive sorting being two alternative strategies by which husbands can obtain more spousal labor, societies prohibiting polygyny should have more positive sorting. In Maiduguri, I found a simple correlation between married male and female schooling of $+0.37$. In contrast, holding age and wage rates constant, the correlation between husband's and wife's years of schooling was $+0.53$ and $+0.56$ for American whites and blacks respectively (Becker 1974a). The lower correlation in Maiduguri may be due in part to a possible choice between polygyny and positive sorting.

If there is indeed substitution between positive sorting and polygyny, a prohibition of polygyny would benefit educated women, for it will raise the demand for their spousal labor as a replacement for the spousal labor than could be provided by a larger number of noneducated women. Consequently, educated women in Africa and Egypt have often been active in political efforts to prohibit polygyny. Also, West African female students (Omari 1960) were vocal against polygyny (but favored brideprice), while their male

classmates favored polygyny (but were hostile to brideprice). However, as expected, uneducated women did not seem opposed to polygyny. While 12 percent of educated Yoruba women would not let their husband take a new wife under any circumstance, only 0.8 percent of the uneducated women said so (Yoruba Social Structure 1976).

The evidence presented in this section consisted, for the most part, of cross-cultural comparisons by level of polygyny and one other variable, ignoring the many other factors that could intervene and transform an apparently causal relation into a spurious one. Differences in polygyny between Africa and the rest of the world, and among selected tribes in Africa, were used repetitively for different purposes, and it may very well be that in a more careful cross-cultural investigation some of the correlations would disappear.

Conclusions

A general theoretical approach to the study of polygyny enhances our understanding of the reasons for cross-cultural variation in the prevalence of polygyny. It also throws some light on the factors related to the incidence of polygyny within a particular society. This study is another example of how economic theory benefits the study of marriage.

This study also shows some of the advantages of interdisciplinary cooperation. An economic analysis vitally depends on the thorough cultural understanding anthropologists develop through fieldwork. Without the information on Maiduguri generously transmitted by Ronald Cohen and the insights on polygyny previously published by other social scientists, this study would have been very limited in scope.

The economics of polygyny can potentially be useful in leading to a better understanding of the mechanisms behind fertility and female labor force participation in countries allowing polygyny. The study of polygamy comprises an integral part of the study of marriage institutions, a field where theoretically grounded research is still the exception. It is hoped that the theory and empirical research presented here can contribute to the study of marriage in general.

Notes

1. Clignet's (1970) is one study in which elders are viewed as the traditionally privileged segment entitled to polygyny. He makes no mention of a maximum seniority beyond which a man becomes less polygynous.

2. He finds evidence for his hypotheses on the basis of comparisons between different kinds of living creatures, birds in particular. I am indebted to Jack Hirshleifer for this reference.

3. However, the effect of each of these three dummy variables on the number of wives has an alternative interpretation. First, waterstandpipes and houses may be components of the wife's income from spousal labor. This income is principally nonpecuniary, for it consists of provision for room, board, convenience, etc. The more wives a man has, the more he needs room to provide for them--especially since in Maiduguri each wife lives in separate quarters--and the more he is likely to purchase a house. Similarly, the more wives, the more profitable to compensate all wives by saving them the trouble of fetching water or purchasing it from water-carriers. (This assumes increasing returns to scale in waterstandpipe installations.) Owners of grain farms may be wealthier, but they also need wives as farm labor in addition to the other needs shared by all men. Unfortunately, there is no way to differentiate between the different interpretations of these variables. Small simple correlations between possible wealth proxies emphasize that problem. The correlations between waterstandpipe on the one hand, and grain farm, house ownership, and occupation on the other hand are respectively -.07, .15 and .20. The low correlations between house ownership and occupation (.11) and waterstandpipe (.15) partially derive from the recent inflow of migrants who do not own houses but are wealthy enough to rent comfortable housing.

4. In mathematical terms, a peak is a maximum. Let us call the variable "wives" Y and the variable "age of husband" X and abstract from other variables. The regression equation can then be written as $Y = aX + bX^2$. The first order condition for a maximum or a minimum is that the first derivative of this equation equal zero, i.e. $a + 2bX = 0$. This implies that $X = -a/2b$. Based on the coefficients of age and age, squared estimated from regression 2 (.25 and -.0029) we calculate the maximum age as 43.

5. To calculate a minimum value, we follow the same procedure described in note 4. The values for (woman's) age and age, squared in regression 2 are -.12 and .0029. Using the formula $X = -a/2b$, we obtain a minimum age of 21.

6. For a more extensive empirical discussion of the relationship between polygyny and fertility see Grossbard (1986b).

7. However, here too the causality could be inverse: polygyny could facilitate seclusion by adding more variety and companionship to the isolated wife's life. From a separate table (Table II in Grossbard-Shechtman 1980) it appears that the effect of seclusion varies with duration of marriage. In the sample of all marriages, it is significantly positive at the 90 percent level, mainly a result of the strongly positive relation for marriages of intermediate duration.

8. In many societies, the income a married woman actually receives differs from what would be her income based on market-clearing quasi-wages for spousal labor due to regulations enforced through law and custom.

9. Other factors he considers are productive, skilled and/or arduous work expected of a wife; few or no legitimate extracurricular substitutes for wives as sexual partners; high sex ratio of men to women in the population of nubile age; and prospective husband's old age subsistence depending on numerous healthy sons.

10. Apparently, practically all marriageable women do get married in this society.

11. The question of substitution between wives and servants is particularly complex since a society's propensity to rely on servants simultaneously affects a woman's productivity in spousal labor and in outside labor. The institutionalization of reliance on female servants is in itself an economic question, perhaps related to the gains from household specialization among women differing in skills.