Marriage Laws and Growth in Sub-Saharan Africa

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Many countries in Sub-Saharan Africa are highly polygynous. The percentage of married men in polygynous unions ranges from 10.2 in Malawi to 55.6 in Cameroon. Polygynous countries are poorer than similar non-polygynous countries, and are characterized by higher fertility, higher spousal age gaps, and lower savings rates (Tertilt 2005).

The economics of polygyny was pioneered by Becker (1974), Grossbard (1978), and Bergstrom (1994). Recently, a small literature has emerged analyzing the link between marriage institutions and economic outcomes (Jacoby (1995), Edlund (1999), Edlund and Lagerloef (2004), Lagerloef (2005), and Gould, Moav and Simhon (2004)). Tertilt (2005) argues that polygyny might be contributing to underdevelopment in SSA: Polygyny raises demand for wives, which increases the equilibrium bride-price. While men make payments to obtain brides, they are also the recipients of these payments when they sell their daughters. Women thus function as a good investment opportunity. This scheme can crowd out investment in physical assets, lowering the aggregate capital stock. Moreover, the incentives to have children are high. Together, a low capital stock and high fertility lead to low GDP per capita. Based on a calibrated model, Tertilt (2005) argues that enforcing a ban on polygyny might decrease fertility by 40 percent, increase the savings rate by 70 percent, and increase output per capita by 170 percent.

If enforcing monogamy raises output, then an obvious questions is: should countries in Sub-Saharan Africa be encouraged to give up their traditions and adopt a law that prescribes monogamy? The United Nations (UN), for example, has been pursuing such a policy.[1] In this paper we analyze the transitional dynamics following a marriage reform. We study how rapidly the economy converges to the new, higher-savings steady state.

We also identify the winners and losers along the transition path.

The results may shed some light on recent experiences in countries like Gambia, Togo, and the Ivory Coast that have made polygyny illegal but have found enforcement to be difficult (Tertilt 2006). While some of the resistance may be due to cultural factors, we argue that there are also economic forces that work against moving to a monogamous society. While output might increase in the long run, we find that initial generations of men are clear losers from the marriage reform. Some of the women alive during the reform period benefit from the change in marriage laws; however, their gain is not large enough to compensate the men. Hence, it is difficult to argue that enforcing monogamy is unambiguously beneficial.

I Model

We add transitional dynamics to the steady state model described in Tertilt (2005). The framework is an infinite-horizon, overlapping generations model of marriage, fertility, and savings. People live for one period as a child and for two adult periods. Young adults are endowed with one unit of labor which they supply inelastically at wage w_t. People can save assets at interest rate r_t. Utility depends on consumption in both adult periods and on the total number of children. Women are fertile only when young, while men can always have children as long as they have a fertile wife. We assume that fertility is chosen by men. Women have no control over their own fertility; they choose savings and consumption to maximize utility. Having children is costly. If a woman has f children, the total cost is $2\epsilon f^2$, which is shared equally between husband and wife. We assume that half of the children are female. There is a decentralized marriage market in which fathers sell their daughters and men of both ages may acquire brides at price p_t. Marriage market clearing requires that all men and women get married eventually.

There is an aggregate technology that uses capital and labor to produce the consumption good, $Y_t = AK_t^{\alpha} L_t^{1-\alpha}$. The capital stock available for production in $t+1$ is equal to aggregate savings in t. Labor supply equals the total number of young adult men and women. Wages and interest rates are equal to the marginal products of labor

and capital.

We assume that the economy starts in the steady state associated with the absence of marriage legislation, calibrated to the average polygynous country as in Tertilt (2005). We denote by period $t = 0$ the initial steady state. A permanent and unexpected reform that perfectly enforces monogamy is carried out in the middle of period $t = 1$, after marriage decisions have taken place, but before consumption and fertility decisions have been made.[2] That is, the first period in which all new marriages are monogamous is period $t = 2$. Of course, fertility and consumption choices already adjust in period $t = 1$, in anticipation of the falling demand for brides.

All men from period 1 onward must choose whether to marry when young or when old. The problem of a man after the reform is[3]

$$
\begin{aligned}
(1) \qquad \max_{c,s,n,f} \quad & \ln c_t^y + \beta \ln c_{t+1}^o + \gamma \ln(f_t^y + f_{t+1}^o) \\
\text{s.t. } & c_t^y + p_t n_t^y + s_t^y + \epsilon \frac{f_t^{y^2}}{n_t^y} \leq w_t \\
& c_{t+1}^o + p_{t+1} n_{t+1}^o + s_{t+1}^o + \epsilon \frac{f_{t+1}^{o^2}}{n_{t+1}^o} \leq (1 - \delta + r_{t+1}) s_t^y + p_{t+1} \frac{f_{t+1}^y}{2} \\
& (1 - \delta + r_{t+2}) s_{t+1}^o + p_{t+2} \frac{f_{t+1}^o}{2} = 0, \qquad (n_t^y, n_{t+1}^o) \in \{(1,0),(0,1)\},
\end{aligned}
$$

where c_t^y, c_{t+1}^o denotes consumption, s_t^y, s_{t+1}^o savings, f_t^y, f_{t+1}^o fertility and n_t^y, n_{t+1}^o bride choices when young and old respectively.

The problem of a man who is old during the reform period is

$$
\begin{aligned}
(2) \qquad \max_{c_1^o, f_0, s_0^o} \quad & \beta \ln c_1^o + \gamma \ln(f_1^o) \\
\text{s.t. } & c_1^o + p_{ss} n_{ss} + s_1^o + \epsilon \frac{f_1^{o^2}}{n_{ss}} \leq (1 - \delta + r_1) s_{ss}^y \\
& (1 - \delta + r_2) s_1^o + \frac{p_2 f_1^o}{2} = 0
\end{aligned}
$$

where the subscript ss denotes steady state values, which are chosen before the reform is announced.

Note that in period 1, all young women are already married to the initial old men, hence, marriage market clearing requires all initial young men to wait a period and marry when old. As long as there is positive population growth, then from period $t = 2$

onward, some young women will marry old men, and the remaining young women will marry young men.[4] The bride-price will adjust to assure that men are indifferent about the timing of marriage. Along the transition, there will be (ex-post) different types of men, those who marry with an age gap and those who have a same age bride. The composition of types will change along the transition to the new monogamous steady state. Fertility choices of each type together with the type composition will determine the population size in the next period.

II Results

A marriage reform that enforces monogamy drastically reduces demand for brides, which immediately affects the bride-price. Figure 1 shows that p_t falls within one period from \$1,000 to negative \$1,700, where a period should be interpreted as 15 years. This has tremendous effects on the initial old men. They married many brides in anticipation of having many daughters who they intended to sell at a high price to finance old age consumption. Instead, suddenly daughters are a liability. Thus, the fertility rate falls very rapidly. The initial old men reduce their fertility from 12.5 to 7.5 children. In the polygynous steady state, men had an average of 2.5 wives, who had 5 children each, which lead to a total of 12.5 children per man. The initial old men also have 2.5 wives each – recall that the reform is passed after marriages have taken place – but they adjust fertility immediately downward as daughters become expensive. The number of children per woman falls to 3 children. Since a daughter's marriage will be costly, men now have to save for their daughters' dowries, which immediately drives up the savings rate and thereby the capital stock.

The most dramatic adjustments along the transition to the monogamous steady state occur during the first two periods, i.e. over a time horizon of about 30 years, as can be seen in Figure 1. More moderate adjustments follow for several more periods and the transition is basically completed by period 10. The investment rate reaches the new steady state value in period 3. The average fertility rate attains the monogamous steady state level in period 5. The marriage composition changes over time as well. The fraction

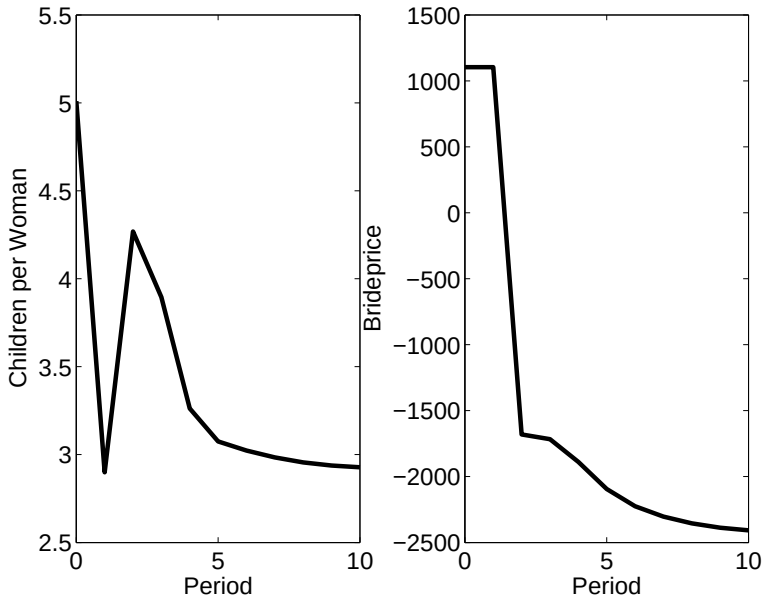

Figure 1: Fertility and Bride-price

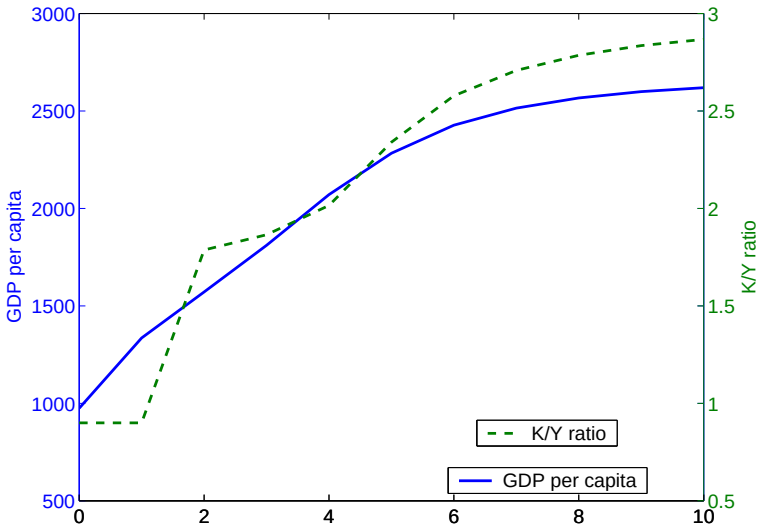

Figure 2: GDP and Capital-Output Ratio

of men who marry old (with an age gap) falls from 100% in period 1 to 30% in period 3 and to zero in the long run.

The capital stock and output are the slowest to adjust, as can be seen from Figure 2. Starting from about 0.9, it takes the capital-output ratio about 10 periods to reach its new steady state level of 2.8. GDP per capita grows about 2% annually during the first model period and 1% annually for another 3 periods. After 4 periods, i.e. 60 years, the

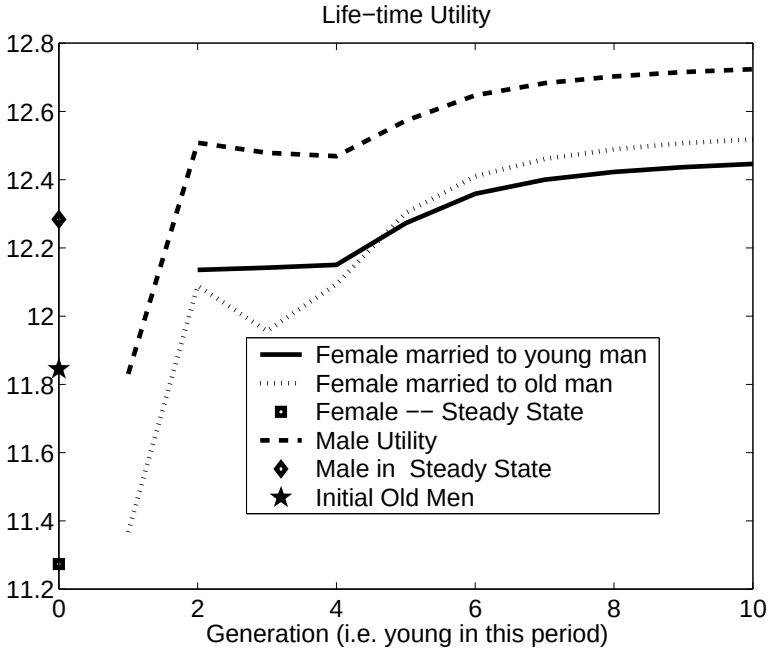

Figure 3: Life-time Utility along the Transition

output gap between the polygynous and monogamous steady states is still only halfway closed.

While in the long run, the marriage law reform unambiguously increases output per capita, which benefits future generations, the reform also creates losers along the transition. Figure 3 shows utility for each generation along the transition. It can be seen that all adult men who are alive during the reform period – men born one and two periods before the reform – experience a loss in utility. Everyone else – all subsequent men, and all women – clearly wins.[5] The reason that initial old men lose is easy to understand and has already been mentioned before: they unexpectedly lose the ability to sell their daughters. Initial young men also experience a loss of utility. In addition to losing the option to sell their daughters for profit, they are also hurt by the low interest rates in period 2 due to the increased capital stock. Thus, men who are young during the marriage reform lower both old age consumption and fertility dramatically, which decreases utility by a large amount.[6] Initial young women are also hurt by the fall of interest rates. However, they benefit from the falling child-rearing costs due to reduced fertility. In period 2 the higher capital stock has increased wage income enough

to compensate for the marriage constraints and lower interest rates, thus, generation 2 (and all subsequent) men will benefit from the reform.

If women do not vote, then the reform would not pass majority voting, since no man alive at the time will benefit. If women do vote, at best one could have a tie, but only if all indifferent women vote in favor of the reform. Note also that the initial young women do not have enough resources to compensate the initial men for their losses. Even if future generations are integrated into the transfer scheme, there is no allocation such that all agents benefit and no one is worse off. More precisely, holding the fertility transition path fixed, we show computationally that there does not exist a transfer scheme across agents that assures that all agents alive at the time of implementation benefit from the switch to monogamy. This result shows that depending on which social welfare criterion is used, a ban on polygyny may or may not be socially desirable.[7] This finding may also explain why implementing a ban on polygyny has been difficult in many countries.

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Notes

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[1]The Office of the United Nations High Commissioner for Human Rights stated in 1998: "The Committee recommends that a uniform family code in conformity with the Convention be prepared in which unequal inheritance rights, land rights and polygamy are addressed, with the aim of abolishing them."

[2]This is the only timing that makes sense. Alternatively, if a reform was passed after fertility decisions had been made, then there would be a generation of men who would not be able to repay their loans. Since the model does not allow for default, we do not consider this possibility.

[3]This formulation assumes that daughters are always sold, even when this is costly. This is a reduced form formulation of a more explicit model where fathers incur a cost of providing for their unmarried daughters (Tertilt 2005).

[4]Women typically are not indifferent between marrying a young or an old man. However, since marriage is not a choice for women, a utility differential between different women is consistent with equilibrium.

[5]The initial old women are indifferent as they are not affected by the reform.

[6]Note that this transition generation does not yet benefit from higher wages as only young men are endowed with time.

[7]Note that Pareto efficiency is not defined in this environment (Golosov, Jones and Tertilt 2004).