

Growth: What's Love Got to do with It?*

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Abstract

This paper argues that love, as opposed to arranged, marriage promotes growth. Men pay for marriage. However, an important difference between love and arranged marriage is who makes and receives the payment. Under love marriage, typically the groom pays his wife, while under arranged marriage, the groom (or his father) pays the bride's father. Clearly, love marriage directs resources from the father of the bride to the bride. Moreover, love marriage may redistribute resources from the father to the son. If young (v. old) and women (v. men) are more prone to save or invest in the human capital of children, then love marriage promotes physical or human capital accumulation. We propose that the adoption and adherence to love marriage in Europe, starting in the 7th century at the instigation of the Church, may be one reason why Europe surged ahead of other advanced pre-industrial societies, notably India and China, around A.D. 1500.

“Europe was lucky, but luck is only a beginning. Anyone who looked at the world, say a thousand years ago, would never have predicted great things for this protrusion at the western end of the Eurasian landmass that we call the continent of Europe. In terms popular among today's new economic historians, the probability at that point of European global dominance was somewhere around zero. Five hundred years later, it was getting close to one.” Landes [1999]:29.

1 Introduction

Europe surge ahead of the other advanced pre-industrial societies, notably India and China, in A.D. 1500. Why?

There are several reasons for why the Eurasian continent (and the Circum-Mediterranean area) came to house the most advanced pre-industrial societies:

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its east-west elongation; the presence of domesticable animals; and the absence of virulent disease allowed for plough agriculture and population growth (e.g. Diamond [1997]; Reader [1998]). Larger populations, and more densely settled such, may in turn have been conducive to technological innovation (e.g. Boserup [1966]; Kremer [1993]). However, neither explanation singles out Europe as the cradle of industrialization. In A.D. 1500, Eurasia was home to the three most populous societies: the European, the Indian and the Chinese. They were all pre-industrial and had similar population sizes (81, 105, and 100 million respectively [McEvedy and Jones 1978]). Moreover, India and China were roughly twice as densely populated as Europe. Still, it was Europe that surged ahead of the others.

This paper focusses on different marriage institutions and their potential impact on growth. In particular, the role of love – as opposed to arranged – marriage. Among India, China and Europe, it was only Europe that practised love marriage, on the insistence of the Catholic Church [Goody 1983]. Moreover, Europe was more monogamous than either India or China, see table 1. It was also the first to achieve an industrial revolution.

We argue that there is more to these observations than coincidence. Men pay to marry, further discussed in section 1.1. In arranged marriage the payment is not to the bride but to her father (or guardian). Furthermore, the groom is often highly dependent on his father for the bride price payment, at least for his first wife. By contrast, in love marriage, typically the groom pays the bride.

Clearly, love marriage redistributes resources from the father of the bride to the bride. This may be important for growth if women are more prone to invest in human capital of their children than men. Moreover, love marriage may redistribute from old adults to young young adults, which may be growth promoting.

Obviously, if the only difference between love and arranged marriage were whether the bride or her father received the bride price, love marriage redistributes to the young. However, as noted, who pays may also differ between the two marriage institutions. If the only difference between love and arranged marriage were that in the former, young paid young, and in the latter old paid old, it is less clear that love marriage redistributes to the young. A reason why this may still be the case is that love marriage shifts agency from the parents to the grown children. As noted, for young women this means that they are the recipients of the bride price instead of their fathers. For young men this means that they decide how to allocate resources between (own) wives and other expenditures. Consider an economy where old men control the labor income of their sons. Under love marriage, old men interested in grand children cannot directly buy daughters-in-law. Instead they need to induce their sons to buy wives. This can be done through a transfer of resources. Since young men will live off the labor income of their children when old, young men have an incentive to invest in the human capital of the children. Consequently, young men will not devote the entire transfer to purchasing wives, but spend some of it on human capital investments in the children. Hence, love marriage may induce a redistribution from old fathers to adult sons, which in turn can raise human

capital investments.

Moreover, European marriage was more monogamous than other cultures. We argue that monogamy favors parental investment in daughters, which may boost growth if mothers are important for the human capital investments in children.

In sum, if the young (v. old) and women (v. men) are more prone to save or invest in the human capital of children, love marriage, in particular if monogamous, may promote physical and human capital accumulation.

This inquiry adds to the existing literature in several ways. First, we point to a potentially important but hitherto largely ignored difference between love and arranged marriage.¹ Second, we add to a recent and expanding growth literature on the causes of the industrial revolution, and why it happened in Europe (an incomplete list includes e.g. Goodfriend and McDermott [1995]; Hansen and Prescott [forthcoming]; Lucas [2002]; Galor and Weil [2000]; Jones [2001]; and Galor and Moav [2002]).² Third, contrary to the prevailing view among economists that monogamy is inefficient and to the detriment of women [Becker 1991] we advance reasons for why monogamy may favor women and – for that very reason – promote growth.

We do not deny the importance of the discovery of the New World, colonialism, trade, innovations such as the printing press, or the work ethics promoted by Protestantism for understanding the economic hegemony of Europe. However, these were all factors that came into play after A.D. 1500. We hope to fill a gap by proposing an explanation to what gave Europe an edge in the period leading up to A.D. 1500.³

The paper proceeds as follows. The remainder of this section gives a brief background to love and arranged marriage. Section 2 presents three different models. Common to all is that love marriage places more resources in the hands of young adults which we assume is growth promoting. Section 3 concludes.

1.1 Love v. arranged marriage

Arranged marriage was common in pre-industrial societies and its prevalence may be linked to the ability of parents to exploit their adult children. For sons this has meant working for old parents, “Just as dogs were raised to hunt for their masters before they were pets, so in early traditional China children were raised a source of income and a store of wealth.” [Cheung 1972:641]. As workers, daughters are likely to be less valuable than sons. However, the difference can be made up if daughters are more valuable than sons on the marriage market. Hence, arranged marriage may be the mechanism through

¹Bergstrom [1994] noted that the bride price may not benefit women if not paid to her.

²Lagerlof [2001] analyzes the interaction between monogamy, equality, and long-run growth, but in a very different setting, and without studying the growth implications of love marriage.

³Legal institutions are also important for understanding economic performance, for a recent contribution see e.g. Glaeser and Shleifer [2002]. However, Europe is not unique in having an established legal code or protecting property rights prior to A.D. 1500. All Chinese dynasties established legal codes, and property rights were well defined in both India and China.

which parents benefit from the reproductive value of their daughter. In Africa “Bridewealth... goes to the bride’s male kin...a man is...highly dependent upon ‘sisters’ for bringing the wealth and ‘fathers’ for distributing it...The authority of the older generation is linked to the extent to which the young are dependent on them for marriage cattle or the equivalent” [Goody 1973:5].⁴ This has also largely been true of China and India (Freedman [1970]; Mandelbaum [1970]). Note that female infanticide, widely practised in India, China and the Roman Empire, may be one way through the returns to sons and daughters are equalized if women do not fetch a sufficient bride price at balanced sex ratios.

Edlund [2001] argued that men will pay for marriage, because in the absence of marriage, there is only one default parent, the mother. The mother is also the parent who up to the point of the birth of the child has made the most important parental investment [Trivers 1972]. Hence, even if paternity were as easily established as maternity, e.g. through DNA-testing, this suggests that the default parental rights should be given to the mother and not the father. Family law and custom stipulate that parental rights accrue to the mother alone (or her guardian) unless she is married, in which case they accrue to the husband of mother (as well). Marriage may thus be seen as the form contract that societies have devised to allow men parental rights.⁵ If marriage transfers parental rights from a woman to her husband, we would expect marriage to be accompanied by a payment from the husband (or his kin) to the wife (or whoever owns her), and we will call this payment the *bride price*.

A key difference between love and arranged marriage is who has agency, the prospective spouses or their parents. Typically, in love marriage, the prospective spouses have agency, while in arranged marriage parents have agency. A closely linked issue is who will receive the bride price: the bride or someone who can claim the right to her, e.g. her father. In most pre-industrial societies, the payment was not to the bride but to her father (e.g. Goode [1970]; Goody [1973]).

For the purpose of this paper we define love marriage to mean that the groom and bride decides whom and whether to marry, and the bride price goes to the bride; and arranged marriage to mean that the parents decide the marriage, and the bride price is paid to the bride’s father. Note that neither the absence or presence of love is part of our definition, nor is the degree of third party involvement in the actual search process. These may be correlates, but, we believe, not defining features of the two marriage institutions. For instance, it is often noted that in arranged marriage, the actual search process is conducted by others than the prospective bride (or spouses). However, intermediates are also used in love marriage. Friends, relatives, newspaper advertisements and formal matrimonial agencies are often enlisted in the search for a spouse (e.g. [Blood 1967]). One reason why arranged marriage are often done without the

⁴The term bridewealth instead of bride price is used by Goody to indicate that what is brought in by a daughter is always used for the purchase of a wife. The term bride price has been used when what the daughter fetches is fungible.

⁵Parental rights may have monetary value, if they entail, e.g. the right to the bride price a daughter fetches, or ownership of the labor of either child.

prospective spouses' involvement may be the need to enforce parental choice by controlling the amount of information the children have. Moreover, if there is demand for female chastity, parents who stand to benefit from delivering a virginal daughter will try to do so. Hence, to the extent that individual search would compromise the chastity of the daughter, and this would reduce the bride price, we would expect parents to not allow their daughters to search out prospective partners. We can note that in Africa, female labor and fertility have been highly prized, possibly due to the continent's low population density. Hence, the withdrawal of women from the public sphere may have been costly, and the rewards in terms of a chastity premium low. Consequently, women were not secluded and while marriage payments are to the bride's father, individual search was more common than in China and India (e.g. Mair [1953] and Goody [1973]).

Parental authority over children varies not only with the institutional setup but also with the ability of children to resist parental control. Hence, although there is substantial social pressure on daughters (and to a lesser extent sons) to comply with an arranged marriage, control is rarely complete. One way of minimizing resistance from the prospective spouses is to conclude the marriage contract when the children are young. In both India and China, child or infant marriages were common, while in Europe brides (and grooms) were rarely pre-pubescent.

What is the evidence that women received higher transfers in marriage in Europe than in India or China? First, in Europe, wives received lump sum payment from the husband, early in marriage, in the form of a morning gift or a dowry. Second, wives probably received higher transfers in marriage than in India and China. For instance, (i) there was more emphasis on the conjugal bond than the extended family in Europe [Goody 1983], which arguably strengthened the position of the young wife (who did not have to submit to her parents-in-law; the traditional position of the daughter-in-law in China and India is uniformly described as pitiful, e.g. Mandelbaum [1970]; [Wolf 1995]); (ii) men could not take additional wives (the case in China, and, to a lesser extent, India); and (iii) *pardah* (the seclusion of women within the household) was never practised in Europe, while this was the case in India and China.⁶ Third, widows inherited their husbands. In traditional India, China (or Africa) this was not the case. Instead, a male relative inherited (Tambiah [1973]; Bernhardt [1999]). One reason for the payment to the bride to take the form of higher transfers while married (or when widowed) may have to do with credit constraints. A marriage contract that is favorable to women may allow young but asset less men to compete for a wife by the promise of a cut in future earnings. However, this is only going to be feasible under love marriage, since future payments are valuable to a wife, who will be around, but much less so to her father, who will be dead. Finally, one may note that the emphasis on the nuclear, instead of the extended family, not only favored young women, but also young men.

⁶The General Report of the Indian Census 1931 attributes the excess mortality of adult Muslim women to the practise of *pardah*, implying that *pardah* affords lower standard of living to women than men.

1.1.1 Marriage and the Church

The Church started to formulate its attitude towards marriage already in the 4th century. However, its enforcement was gradual. For instance, in England, Church authority over matrimonial questions were slowly established between the 7th and the 12th century (Howard [1904]; cited in Goody [1983]:148). By the 12th century, marriage was considered a sacrament, administered by the prospective spouses through individual consent (Goody [1983]:147). By the 16th century, there was considerable pressure from the landed classes to introduce a parental consent requirement, as clandestine marriages threatened the devolution of property. The Council of Trent, Decree Tamesi, stopped short of instigating parental consent. However, it introduced public announcements and a public ceremony as a requirement for marriage, which made it easier for parents to if not force marriages, at least be aware of their offspring's marital plans [Glendon 1996]. Moreover, Martin Luther rejected marriage as a sacrament and viewed parental consent as essential. The challenge to the Church's authority was not restricted to Protestant countries. By the mid 16th century, in France, children who married without the consent of their parents were disinherited and virtually outlawed (Flandrin [1979]:132, cited in Goody [1983]:151). Still, these restrictions on the individual's freedom of marriage affected mainly the propertied class (through the threat of disinheritance) [Stone 1979]. Among the lower classes, individual choice prevailed. Moreover, while parental consent was added in some countries, the individual consent requirement was never rescinded.⁷

In most of the rest of the world, arranged marriage prevailed well into the mid 20th century, when civil codes increasingly substituted individual consent requirements for parental consent (e.g. Goode [1970]). The Church's doctrine did not follow in the tradition of the Germanic tribes, that had practised both bride price and marriage to close kin, nor was it a continuation of Roman traditions, whose practices ranged from arranged marriage to informal consensual unions [Goody 1983]. Why did the Church come to impose monogamous love marriage?

Goody [1983] argued that the Church's policies on family formation were motivated by a desire to amass wealth, primarily in the form of land. To this end, the Church sought to limit the number of legitimate offspring of men. Monogamy clearly served that role. However, it does not readily explain why the Church came to insist on individual consent. It has been argued that in order to make monogamy (and indissolubility) of marriage a practical proposition, the Church sought to promote "companionate" marriage [Glendon 1996]. However, in India, monogamy and arranged marriage have coexisted, suggesting that individual consent is not a necessary condition for monogamy (or life long marriage). Another possibility is that love marriage promoted the Church's strive to prevent land concentration to take place, which, if unchecked, could form the basis for secular power groupings. Love marriage limits parental ability to arranged marriages for political and economic benefits, and while young adults are not insensitive to such considerations, they may put less weight on

⁷The Church also banned female infanticide.

Table 1: Societies by marriage form

	Monogamy	Polygyny
Arranged	India ^a	China/Africa
Love	Europe	

^a Hinduism does not proscribe polygamy, however, monogamy is upheld as the ideal, and in practise, monogamy largely prevailed (e.g. Chatterjee [1972]).

them. One can note that another policy consistent with such a motive was the Church’s banning of marriage within seven canonical degrees of consanguinity. For instance, this ruled out marriage between first cousins (four canonical degrees), common in other parts of the world [Murdock 1967]. These policies met with resistance, and as the strategic importance of land increased in the 16th century, as already mentioned, there were partially successful attempts to impose parental control over marriage.⁸

1.1.2 Other Eurasian cultures

We have focussed on the European (Christian), Chinese and Indian marriage institutions. The Eurasian continent housed other important forms. For instance, the Buddhist (primarily Burma and Thailand) allowed for polygyny but resembled the European in that marriages were not arranged, at least not outside the aristocracy [Tambiah 1973]. In the Middle East, marriages were often arranged, but a part of the bride price was channelled back to the bride in what has been called indirect dowry. In Judaism, polygyny was originally allowed and individual consent was deemed important for a marriage to be valid. However, in Europe, Judaism renounced polygyny around the 10th century. Also, the individual consent requirement was often compromised, and in effect amounted to a parental consent requirement [Biale 1995]. On the other hand, in terms of payments, one could argue that arranged marriage gave way to love marriage. Early on, the *Mohar*, the purchase price, was paid to the bride’s father, but later the bride became the recipient ([Epstein 1973]:58).

2 Models

This section presents three different models. Common to all is that love marriage places more resources in the hands of young adults which we assume is growth promoting. Subsection 2.2 focusses on the groom side. Under both love and arranged marriage, young men are “owned” by their fathers in the sense that while young men produce, their output belongs to their old fathers. Under arranged marriage, the father of the groom purchases daughter(s)-in-law (from father(s)-in-law). Under love marriage, old fathers are not allowed to directly

⁸The dominance of love over arranged marriage in later centuries may owe as much to industrialization, and the concomitant availability of wage work, as to Church doctrine.

purchase daughters in law but have to rely on transfers to their sons in order to obtain daughter(s)-in-law (who are the recipients of the bride price). The marrying sons, in turn, will rely on their children for income in old age. This implies that they young will have greater incentives to invest in human capital of children than the old, and hence love marriage can result in higher growth than arranged marriage. Having established that love marriage may induce fathers to transfer more resources to sons than arranged marriage, subsections 2.3 and 2.4 focus on the allocation between the bride and her father. To that end, we assume that the young man owns his own labor income, and purchases wives; paying the bride under love marriage, and her father under arranged marriage. Subsection 2.3 considers the difference between monogamy and polygyny, and shows that monogamous love marriage achieves higher growth than arranged marriage of either type. Subsection 2.4 allows for endogenous factor prices and, in addition to human capital investments, focusses on savings.

2.1 Basic set up

Consider the following overlapping-generations framework. Agents live in two periods (other than childhood), young and old, and are either male or female. Men pay to marry, and we refer to this payment as the bride price. This price is paid either to the bride directly (love marriage), or to her father (arranged marriage). We model this by a variable $\lambda \in [0, 1]$, which measures the fraction of the bride price paid to the father (the bride gets $1 - \lambda$). $\lambda = 0$ corresponds to pure love marriage, and $\lambda = 1$ to pure arranged marriage.

A young man marries z_t young women in period t . Old do not marry. Under polygyny, each man chooses z_t to maximize his utility, taking the bride price, p_t , as given. We abstract from any heterogeneity across men or women. Thus p_t must adjust so that the representative man chooses $z_t = 1$ (as long as sex ratios balance). Under monogamy, $z_t \leq 1$ is imposed on the male maximization problem.

In period t each woman exogenously gives birth to b_t children, half of whom are daughters. Of these children, a fraction s_t survive infancy. The population thus grows at a gross rate of $b_t s_t \equiv n_t$.⁹ In our first two models, we keep n_t constant; in the last model we let n_t depend on income (thus generating a stable Malthusian steady state which the economy can break out of by shifting from arranged marriage to love marriage).

Men care about their own consumption when young, $c_{1,t}^m$, and old, $c_{2,t+1}^m$. They also care directly about their own number of wives, z_t .¹⁰ Finally, we allow men to care about each son's number of wives, z_{t+1} . Men's preferences for the number of wives they, and their sons, take can be thought of as a preference for the number of children and grand children, respectively. He could also care

⁹To be precise, the population grows at a gross rate of $n_t/2$, since n_t is the number of surviving children per *couple*. When there is no risk of confusion we shall refer to n_t as the (gross) population growth rate.

¹⁰This is imposed to ensure that they do not choose a close-to-zero measure of wives, having very few offspring and investing a very large amount in each.

about the number of sons-in-law, but we assume that they do not affect the number of grand children, hence the asymmetry. We write the utility function for a young man in period t as

$$(1) \quad U_t^m = (1 - \phi) \{ (1 - \beta) \ln c_{1,t}^m + \beta \ln c_{2,t+1}^m + \beta \delta \ln z_t \} + \phi \beta \ln z_{t+1}.$$

We make the simplifying assumption that women only consume when young. We could let women be similar to men and let them consume as old as well (and live off income generated by their children and/or savings). However, such a formulation would not yield additional insights regarding the growth impact of love and arranged marriage, and is thus superfluous for our purposes (unless old women's attitudes towards the younger generations are assumed different from old men, which is a possibility, e.g. [Dufflo 2000]).¹¹

The utility function for a young woman in period t is

$$(2) \quad U_t^f = (1 - \gamma) \ln c_t^f + \gamma \ln h_{t+1} + \gamma \omega \ln z_{t+1},$$

where c_t^f is her consumption (which for women only takes place when young, and hence the age subscript is suppressed); h_{t+1} is the human capital with which she endows each of her (surviving) offspring; and z_{t+1} denotes her number of daughters-in-law. The last term captures a concern for the number of grandchildren.

Other than the young's potential interest in the human capital of their offspring, inter generational "altruism" is limited to concern for number of descendants. We allow saving and borrowing. However, in equilibrium there can be no borrowing.¹²

2.2 Model A: Father v. son

This subsection argues that love marriage redistributes resources from father to son. To that end, we let women be passive – they consume what they receive in bride price and give birth to one son and one daughter, i.e. $b_t = n_t = 2$. Furthermore, we need that $\lambda < 1$.¹³ Hence, $\lambda = 0$ corresponds to love marriage and λ arbitrarily close to 1 corresponds to arranged marriage. We abstract from savings and physical capital accumulation.

Under both love and arranged marriage old men control the labor income of their sons. However, under arranged marriage, old fathers pay for the brides of their sons, whereas under love marriage the young men (the grooms) pay themselves. We further assume that under arranged marriage fathers control directly how many wives each son buys. By contrast, under love marriage this

¹¹Of course, allowing women to benefit wholly or partially from their grown children would affect gender equality.

¹²Under arranged marriage, it will be efficient for the young to borrow from the old, but the old who will not be around in the next period cannot be repaid.

¹³Since the woman's only source of income is the bride price and utility is logarithmic, $\lambda < 1$ must formally be imposed for her utility function to be well defined (cf. Footnote 2.3).

choice rests with the sons alone. To ensure that a sons married, a father has to transfer resources to his son, whereafter the son spends it on wives, own consumption, and human capital investments in children.

Male preferences are given by (1), and female preferences are given by (2), where $\gamma = 0$, i.e. $U_t^f = \ln c_t^f (= \ln(1 - \lambda)p_t)$.

2.2.1 Labor income

We assume that labor income is generated by young men, but belongs to their fathers. Period $t + 1$ income is generated by $y_{t+1} = wh_{t+1}$, where w is an exogenous wage rate and h_{t+1} and human capital investment in the (child) son at time t . For simplicity we abstract from investment in daughters.

This formulation implicitly assumes that old men care more about the *quantity* of their offspring, including their grand children (as captured by their number of daughters-in-law), than young men, who also care about the *quality* of their children.¹⁴ To see this, we may ask who has an incentive to raise h_{t+1} ? Consider a man who is old in period t . He will be dead in period $t + 1$ and does not care about any variable dated that period. In particular, he does not care about labor income, y_{t+1} , and accordingly prefers to set h_{t+1} at its lowest feasible level, which we set to some strictly positive \bar{h} (imposed to ensure that family income is always positive). Consider instead a young man in period t . He will be old in the next period and in control of the son's labor income. He therefore has an incentive to set $h_{t+1} > 0$, and possibly, $h_{t+1} > \bar{h}$.

2.2.2 Budget constraints

Love marriage Under love marriage, wives are purchased by the son, not his father. However, the son has no means to purchase a wife.¹⁵ Hence, to induce marriage, the father has to transfer resources, τ_t , to his son. Moreover, since this is love marriage, the old man receives no income from his daughters. The male budget constraints are thus

$$(3) \quad c_{1,t}^m = \tau_t - z_t[p_t + h_{t+1}],$$

when young, and

$$(4) \quad c_{2,t+1}^m = z_t[wh_{t+1} - \tau_{t+1}].$$

when old. As for women, they bride price is paid to the bride and simply consumed by her, i.e. $c_t^f = p_t$.

¹⁴For simplicity, we assume that old men do not care about quality of the next generation, but our results would hold as long as young men care more about quality than old.

¹⁵We have assumed away women's consumption when old, so the man cannot pay by promising a cut in a future son's earnings.

Arranged marriage Under arranged marriage the right to purchase daughters-in-law rests with the father. The father would thus like to set his son's consumption to zero, but we assume that he cannot set it below some subsistence level, \bar{c} .¹⁶ Similarly, the father would like to set human capital investment in grand sons to zero but we assume a lower bound \bar{h} . The father receives p_{t+1} in bride price for his daughter. The male budget constraints are thus

$$(5) \quad c_{1,t}^m = \bar{c},$$

when young, and

$$(6) \quad c_{2,t+1}^m = z_t [wh_{t+1} - \bar{c} + p_{t+1} - z_{t+1}(p_{t+1} + \bar{h})],$$

when old.

For completeness, we note that female consumption is close to zero but positive.

2.2.3 Dynamics

Love marriage Under love marriage, we first consider a man who is young in period t . His utility function is given by (1) and his budget constraints by (3) and (4). He takes τ_t as given and maximizes utility with respect to z_t , h_{t+1} , and τ_{t+1} . The first-order condition for z_t implies that

$$(7) \quad (1 - \beta) [c_{1,t}^m]^{-1} (p_t + h_{t+1}) = \beta(1 + \delta) (z_t)^{-1},$$

and that for h_{t+1} that

$$(8) \quad (1 - \beta) [c_{1,t}^m]^{-1} z_t = \beta \{z_t [h_{t+1} - \tau_{t+1}]\}^{-1} z_t.$$

Combined, these two conditions imply that

$$(9) \quad h_{t+1} = \frac{1}{\delta w} [wp_t + (1 + \delta)\tau_{t+1}].$$

A high bride price induces higher human capital investments because it reduces the number of desired wives, and thus fewer sons. This in turn induces higher human capital investment, h_{t+1} , in each son. Also, we see that the more the father expects to transfer to his son in the next period, τ_{t+1} , the more he will invest in his son to afford the transfer.

From (7) and (3) we also note that

$$(10) \quad z_t = \left[\frac{\beta(1 + \delta)}{1 + \beta\delta} \right] \frac{\tau_t}{p_t + h_{t+1}},$$

meaning that the son's expenditures on wives and sons, $z_t (p_t + h_{t+1})$, constitute a constant fraction of the transfer received from his father, τ_t .

Next we need to find the son's optimal τ_{t+1} . To that end, we first guess the relationship between z_{t+1} and τ_{t+1} . Conjecture that

¹⁶The utility function is not well defined for $c = 0$.

$$(11) \quad z_{t+1} = \eta \frac{\tau_{t+1}}{p_{t+1}},$$

for some $\eta > 0$.

We need to confirm that this functional form also holds in period t .¹⁷ The first-order condition with respect to τ_{t+1} implies that

$$(12) \quad \tau_{t+1} = \phi w h_{t+1}.$$

Using (9) and (12) we note that

$$h_{t+1} = \frac{p_t}{\delta - \phi(1 + \delta)},$$

which implies that

$$(13) \quad h_{t+1} + p_t = p_t \frac{(1 + \delta)(1 - \phi)}{\delta - \phi(1 + \delta)},$$

(we assume that $\delta - \phi(1 + \delta) > 0$). Insert (13) into (10) and we obtain

$$(14) \quad z_t = \left[\frac{\beta[\delta - \phi(1 + \delta)]}{(1 + \beta\delta)(1 - \phi)} \right] \frac{\tau_t}{p_t} = \eta \frac{\tau_t}{p_t}.$$

which confirms the conjecture in (11).

We can now derive a dynamic equation for human capital investments. Recall that $h_{t+1} = p_t/[\delta - \phi(1 + \delta)]$. In equilibrium, $z_t = 1$, hence (14) implies that $p_t = \eta\tau_t$, where τ_t is given by (12) lagged one period. This gives

$$(15) \quad h_{t+1} = \left[\frac{1}{\delta - \phi(1 + \delta)} \right] \underbrace{\left[\frac{\beta[\delta - \phi(1 + \delta)]}{(1 + \beta\delta)(1 - \phi)} \right]}_{=p_t} \overbrace{\phi w h_t}^{=\tau_t},$$

or

$$(16) \quad h_{t+1} = \left[\frac{\beta w \phi}{(1 + \beta\delta)(1 - \phi)} \right] h_t.$$

If the expression within brackets is greater than unity the economy can exhibit sustained growth. Intuitively, what drives growth in this setting is that successive generations of old men transfer resources to their sons to induce them to buy many wives. Since sons also care about the next period's family income, part of the transfer is allocated to quality investment in the next generation, which can sustain perpetually rising income levels.

¹⁷Formally, this is a Markov Perfect Equilibrium of an extensive form game where the strategy of each player (each man) is a function which determines z_t as a function of τ_t .

Arranged marriage Under arranged marriage, in any period t the old generation sets h_{t+1} at its minimum level, \bar{h} . Income is thus constant at $w\bar{h}$, and there is no growth.

For completeness, we can also solve for the bride price. Maximizing the old man's utility in (1) over z_{t+1} , and then imposing marriage market equilibrium, $z_{t+1} = 1$, the bride price is $\bar{p} = [\phi(w\bar{h} - \bar{c}) - \bar{h}]/(1 - \phi)$, which is positive if w is large enough.

Figure 1 about here

2.2.4 Summary

Love marriage is a necessary condition for growth. At any point in time, women are better off under love marriage, and so are young men. Old men are better off under arranged marriage.

The intuition behind these results is that the old man is not going to be around in the next period and hence only cares about leaving many grand children. By contrast, the young man is going to be around in the next period and will live off his grown children. He therefore has an incentive to invest in their human capital. Under love marriage, the old man cannot directly buy wives for his son and has to rely on a transfer. The son will only use part of this transfer to buy wives, the remainder being split between own consumption today and human capital investments, hence higher consumption of young men and higher growth. The result that women are better off under love marriage simply derives from the assumption that she receives the bride price and hence have higher consumption than under arranged marriage.

2.3 Model B: Polygyny and monogamy

Model A showed that love marriage redistributes resources to young men. This and the next model study the growth consequences of the bride price being paid to the daughter instead of the father. For simplicity, we assume that the groom pays the bride price.

To focus on the impact of love and arranged marriage on the gender allocation of resources and growth, we assume in this, and the next, model that human capital investments are made by mothers only. This is clearly a simplification made to highlight the potential role of women in promoting human capital. The validity of this assumption hinges on whether one believes that mothers are more interested in the quality of their offspring than fathers, a commonly made assertion in the development literature, as well as theoretically defensible on biological grounds.

The previous model analyzed love and arranged marriage under polygyny, i.e. although in equilibrium each man only married one woman, his optimization problem was unconstrained. However, Europe stood out not only in that it imposed love marriage but also that monogamy was more strictly enforced than in other societies, see table 1. Hence, we are also interested in comparing the

growth performance of monogamous love marriage (Europe) as compared to polygynous arranged marriage (China), and monogamous arranged marriage (India).¹⁸

The reason monogamy outperforms polygyny in our model is that polygyny deprives women of resources. This is because men (as opposed to women) buy wives. Under polygyny, this boosts returns to the human capital investments in sons but not daughters. Consequently, daughters receive less human capital than under monogamy. These daughters are the next generation's mothers. As a result, mothers have fewer resources to invest in their children. To model this mechanism, we now distinguish between h_t^m , which denotes a man's human capital, and h_t^f , that of a woman.

We let the survival and birth rates be constant, letting the number of surviving children equal n in all periods. We abstract from savings and physical capital accumulation, and let the parameter measuring the degree of arranged marriage be a continuous variable, $\lambda \in (0, 1]$. Love marriage now refers to system where λ is arbitrarily close to zero, but strictly positive.¹⁹

2.3.1 Polygyny

Men We abstract from any concerns for daughters-in-law, i.e. $\phi = 0$. Hence, the utility function for a young man in period t is given by

$$(17) \quad U_t^m = (1 - \beta) \ln c_{1,t}^m + \beta \ln c_{2,t+1}^m.$$

Every man is endowed with h_t^m units of human capital (invested by his mother; see below), which earns him an income of wh_t^m , where the wage rate, w , for now is exogenous. The young man's budget constraint in (32) thus becomes

$$(18) \quad c_{1,t}^m = wh_t^m - z_t p_t.$$

The budget constraint when old is

$$(19) \quad c_{2,t+1}^m = \frac{\lambda n}{2} z_t p_{t+1}.$$

Since there are no savings, daughters are the old man's only income source: $n/2$ daughters per wife times z_t wives; each daughter is sold for p_{t+1} , of which the father keeps a fraction λ .

Men maximize the utility function in (17), subject to the budget constraints in (18) and (19). The first-order condition for z_t can be used to derive the demand for wives:

¹⁸For completeness, one would also be interested in ranking a polygynous love marriage. However, it is unclear to what extent this combination has been practised. As noted earlier, Buddhist Burma and Thailand may be examples, as well as the practises of the more recent Mormon Church.

¹⁹Since there are no savings, old men live off selling their daughters, hence $\lambda > 0$ must formally be imposed for the utility function to be well defined (cf. Footnote 2.2).

$$(20) \quad z_t = \beta \frac{wh_t^m}{p_t},$$

i.e. spending on wives, $p_t z_t$, constitutes a constant fraction β of the man's income (from logarithmic utility).

Women To distinguish between human capital of sons and daughters we rewrite the utility function in (2) as

$$(21) \quad U_t^f = (1 - \gamma) \ln c_t^f + \gamma [\ln h_{t+1}^f + \ln h_{t+1}^m] + \gamma \omega \ln z_{t+1}.$$

where h_{t+1}^m and h_{t+1}^f are the human capital of each son and daughter, respectively.

Note that the formulation in (21) implies that if the mother takes the number of daughters-in-law, z_{t+1} , as fixed she will find it optimal to give sons and daughters the same amount of human capital.

Each woman is endowed with h_t^f units of human capital by her mother, and thus earns wh_t^f . She also receives $(1 - \lambda)p_t$ in bride price. Hence, the budget constraint is:

$$(22) \quad c_t^f = wh_t^f + (1 - \lambda)p_t - \frac{n}{2} (h_{t+1}^m + h_{t+1}^f).$$

The woman maximizes her utility function in (21) over h_{t+1}^m and h_{t+1}^f , subject to the budget constraint (22). The first-order condition for investment in daughters, h_{t+1}^f , is

$$(23) \quad (1 - \gamma) [c_t^f]^{-1} \left(\frac{n}{2}\right) = \gamma [h_{t+1}^f]^{-1}.$$

The mother's choice of investment in sons has an impact on the number of daughters-in-law, z_{t+1} , since the son's income determines his demand for spouses. To see this forward (20) one period:

$$(24) \quad z_{t+1} = \beta \frac{wh_{t+1}^m}{p_{t+1}}.$$

Inserting this into the utility function in (21) we can now write the first-order condition for investment in sons, h_{t+1}^m , as:

$$(25) \quad (1 - \gamma) [c_t^f]^{-1} \left(\frac{n}{2}\right) = (1 + \omega) \gamma [h_{t+1}^m]^{-1}.$$

Son bias The female-male human capital ratio, h_{t+1}^f/h_{t+1}^m , is derived from the first-order conditions for investment in sons and daughters, (23) and (25). Multiplying through by h_{t+1}^f , it is seen that this ratio is constant over time and given by:

$$(26) \quad \mu = \frac{h_{t+1}^f}{h_{t+1}^m} = \frac{1}{1 + \omega}.$$

Note that μ falls between zero and one. If $\omega = 0$, mothers do not care about the number of daughters-in-law, and there is no gender discrimination and $\mu = 1$. As will be seen in the monogamous setting, the same holds if the mother takes the number of daughters-in-law as fixed (i.e., if $dz_{t+1}/dh_{t+1}^m = 0$).

Dynamics Since female human capital is a constant fraction μ of male human capital, we can study the human capital dynamics of either sex. Using the first-order condition for investment in daughters in (23), and $h_{t+1}^f = \mu h_{t+1}^m$, we can solve for the human capital stock of a man in period $t + 1$:

$$(27) \quad h_{t+1}^m = \left(\frac{\gamma}{\mu + \gamma} \right) \left[\frac{wh_t^m \mu + p_t(1 - \lambda)}{n/2} \right].$$

From (20) we note that in a marriage market equilibrium ($z_t = 1$) it must hold that the bride price adjusts so that $p_t = \beta wh_t^m$, illustrated in figure 2. Hence, we can write the growth rate of male (and female) human capital as

$$(28) \quad \left\{ \frac{h_{t+1}^m}{h_t^m} \right\}^{\text{pol}} = \frac{\gamma w}{\mu + \gamma} \left[\frac{\mu + (1 - \lambda)\beta}{n/2} \right].$$

Figure 2 about here

2.3.2 Monogamy

In the case of monogamy, the *maximum* number of wives a man can take is one. The man thus maximizes utility in (17) subject to the budget constraints in (18) and (19), and $z_t \leq 1$. In a marriage market equilibrium where the representative man has one wife the constraint that $z_t \leq 1$ must be binding.

Formally, the man's demand for spouses is given by (20) whenever it falls below unity, and equal to unity otherwise, so that

$$(29) \quad z_t = \min \left\{ 1, \beta \frac{wh_t^m}{p_t} \right\}.$$

As seen in figure 3, there is a range of bride prices that are consistent with a marriage market equilibrium. Setting the right-hand side of (29) equal to unity, the interval for the equilibrium bride price is $p_t \in [0, \beta wh_t^m]$. Note however that if the sex ratio were to fall slightly below unity, the equilibrium bride price would jump up to the upper bound of the interval. For reasons not captured explicitly in the model, one could argue that there is always a latent shortage of women even under monogamy, due for instance to differential fecundity (and, for instance, higher remarriage rates or widowers than widows), e.g. [Siow 1998]. Thus, under monogamy we let the equilibrium bride price be given by $p_t = \beta wh_t^m$.

Figure 3 about here

Taking $z_{t+1} = 1$ as fixed, the mother's optimal investment in children is now the same for both sons and daughters:

$$(30) \quad (1 - \gamma) \left[c_t^f \right]^{-1} \left(\frac{n}{2} \right) = \gamma [h_{t+1}^f]^{-1} = \gamma [h_{t+1}^m]^{-1},$$

implying that $\mu = 1$. The gross growth rate of male human capital is therefore the same as in the polygynous setting, except that μ is now replaced by 1. Analogous to (28) we can write the growth rate as

$$(31) \quad \left\{ \frac{h_{t+1}^m}{h_t^m} \right\}^{\text{mon}} = \frac{\gamma w}{1 + \gamma} \left[\frac{1 + (1 - \lambda)\beta}{n/2} \right].$$

2.3.3 Summary

A society with love marriage (a low λ) always grows faster than a society with arranged marriage (a large λ).

Monogamy is better for growth than polygyny if marriages are arranged. However, under love marriage, whether monogamy outperforms polygyny or not depends on the parameters of the model. Under polygyny, mothers invest more in sons' human capital, at the expense of their own consumption, as well as their daughters' human capital. A lower human capital stock for daughters tends to hamper growth. However if polygyny is coupled with love marriage, part of the extra earnings than men gain is reallocated to women via higher bride price, and that tends to enhance growth. In other words, polygyny reallocates resources from women to men (which is bad for growth), but under love marriage, also from old women to young men, and thus (via the marriage market) to young women (which is good for growth).

Which effect dominates depends on the parents's preferences. From (28) and (31) the growth rates can be derived. They are summarized in table 2. The growth rate is maximized with a combination of love marriage and monogamy if $\gamma > \beta$; vice verse, growth is maximized with a combination of love marriages and polygyny if $\gamma < \beta$. However, since none of the cultures considered here practised polygynous love marriage, this is of somewhat peripheral interest (cf. table 1).²⁰

2.3.4 Caveat

The model has abstracted from intra male heterogeneity. This has been done in order to focus on the link between polygyny and male biased investments, and in the interest of tractability. However, this may seem an artificial environment in which to study polygyny since polygyny tend to arise from male heterogeneity [Becker 1991]. The set up, however, allows us to focus on possible harmful

²⁰As already noted, Buddhist societies such as Burma and Thailand may have practised polygynous love marriage. This may also have been the case among the Maori [Biggs 1960].

Table 2: Growth rates by marriage regime.

	Monogamy	Polygyny
Love	$\frac{\gamma w}{(n/2)} \left(\frac{1+\beta}{1+\gamma} \right)$	$\frac{\gamma w}{(n/2)} \left(\frac{\mu+\beta}{\mu+\gamma} \right)$
Arranged	$\frac{\gamma w}{(n/2)} \left(\frac{1}{1+\gamma} \right)$	$\frac{\gamma w}{(n/2)} \left(\frac{\mu}{\mu+\gamma} \right)$

effects of polygyny that has not been noticed in the literature. This adds to the existing literature that has so far noted that polygynous societies tend to produce more bachelors, a potentially disruptive social force (e.g. Becker [1991]; Posner [1992]).

2.4 Model C: Physical and human capital

This subsection introduces capital in order to study savings behavior under love and arranged marriage. It is commonly claimed that in less developed countries, children provide old age support and thus substitute for savings. Implicitly, this argument assumes that the old parents can make their children support them. Arguably, arranged marriage provides the institutional set up for this. As argued in model A, old fathers extract fewer resources not only from their daughters but also from their sons under love marriage. This model formally looks at the impact of arranged marriage on savings and human capital investments, and we show that both are depressed under arranged marriage. We derive factor prices from a production function, but in order to obtain a tractable solution we have to impose an exogenous bride price. Hence, we assume monogamy and let the bride price, p_t , be determined exogenously as a constant fraction, π , of the man's income. As in the previous model, we let the parameter measuring the degree of arranged marriage be a continuous variable. Since we allow savings, we let $\lambda \in [0, 1]$. To focus on the savings mechanism, we assume that neither men nor women are interested in number of grand children (i.e. $\phi = 0$ and $\omega = 0$).

2.4.1 Utility functions and budget constraints

Men Noting that $\phi = 0$, the male utility function is given by (17), i.e.

$$U_t^m = (1 - \beta) \ln c_{1,t}^m + \beta \ln c_{2,t+1}^m.$$

The young man's budget constraint says that $c_{1,t}^m$, savings, a_t , and bride price, p_t , must add up to his income, $w_t h_t$, where w_t (now endogenous) denotes the wage rate and h_t his human capital.

Hence, consumption when young is

$$(32) \quad c_{1,t}^m = w_t h_t - a_t - p_t = (1 - \pi) w_t h_t - a_t.$$

where we recall that the bride price is set to an exogenous fraction, π , of the man's income. The budget constraint when old becomes

$$(33) \quad c_{2,t+1}^m = a_t(1 + r_{t+1}) + \frac{\lambda n_t}{2} p_{t+1},$$

where r_{t+1} is the interest on savings held from period t to $t+1$. The second term is the income from selling daughters: $n_t/2$ surviving daughters; each daughter is sold for p_{t+1} , of which the father keeps a fraction λ .

Women Noting that $\omega = 0$, female utility function becomes

$$U_t^f = (1 - \gamma) \ln c_t^f + \gamma \ln h_{t+1}.$$

The woman earns $w_t h_t$ and receives $(1 - \lambda)p_t$ in bride price. Hence, her budget constraint is

$$(34) \quad c_t^f = w_t h_t + (1 - \lambda)p_t - n_t h_{t+1},$$

where $n_t h_{t+1}$ is her expenditure on children.

2.4.2 Production

Per-capita output of the consumption good is produced using a Cobb-Douglas technology:

$$(35) \quad y_t = k_t^\alpha h_t^{1-\alpha},$$

where k_t and h_t denote the physical and human per-worker capital stocks, respectively. Each factor is paid its marginal product, so that

$$(36) \quad 1 + r_t = \alpha k_t^{\alpha-1} h_t^{1-\alpha} = \alpha \frac{y_t}{k_t},$$

(assuming full depreciation of the physical capital stock), and

$$(37) \quad w_t h_t = (1 - \alpha) k_t^\alpha h_t^{1-\alpha} = (1 - \alpha) y_t.$$

2.4.3 Dynamics

The man's first-order condition implies that savings are

$$a_t = \beta(1 - \pi)w_t h_t - (1 - \beta) \left[\frac{\pi \lambda n_t}{2} \right] \left(\frac{w_{t+1} h_{t+1}}{1 + r_{t+1}} \right),$$

where we have used that $p_{t+1} = \pi w_{t+1} h_{t+1}$. The per-worker capital stock evolves according to $k_{t+1} = a_t/n_t$.²¹ Using (36) and (37) forwarded one period, this gives

²¹Recall that only men save, so $a_t/2$ is period- t saving per worker (since a_t is saving per couple). Likewise, $n_t/2$ is the number of (surviving) children per worker (since n_t is the corresponding number per couple). Thus, $k_{t+1} = (a_t/2)/(n_t/2) = a_t/n_t$.

$$k_{t+1} = \frac{a_t}{n_t} = \frac{\beta}{n_t}(1-\pi)(1-\alpha)y_t - (1-\beta) \left[\frac{\pi\lambda}{2} \right] \left(\frac{1-\alpha}{\alpha} \right) k_{t+1},$$

or

$$(38) \quad k_{t+1} = \frac{\beta(1-\pi)(1-\alpha)}{1 + (1-\beta)\left[\frac{\pi\lambda}{2}\right]\left(\frac{1-\alpha}{\alpha}\right)} \left[\frac{y_t}{n_t} \right] \equiv \Psi(\lambda) \frac{y_t}{n_t},$$

where we note that $\Psi'(\lambda) < 0$: arranged marriage reduces growth. The reason is that the larger the fraction of the bride price that goes to old men, the less they will save for old age, and the lower the next period's physical capital stock.

The woman's maximization problem gives her total spending on children's human capital as $n_t h_{t+1} = \gamma[1 + \pi(1-\lambda)]w_t h_t$, which together with (37) implies that

$$(39) \quad h_{t+1} = \gamma[1 + \pi(1-\lambda)](1-\alpha) \frac{y_t}{n_t} \equiv \Lambda(\lambda) \frac{y_t}{n_t},$$

where we note that $\Lambda'(\lambda) < 0$: arranged marriage reduces growth. The reason is that when fathers receive more of the bride price, daughters receive less, and hence young women invest less in the children's human capital.

Inserted into the production function in (35), (38) and (39) give us the growth rate of output:

$$(40) \quad \frac{y_{t+1}}{y_t} = \{\Psi(\lambda)\}^\alpha \{\Lambda(\lambda)\}^{1-\alpha} \frac{1}{n_t} \equiv \frac{\Omega(\lambda)}{n_t},$$

where $\Omega'(\lambda) < 0$, i.e., arranged marriage reduces growth. The channels are two-fold. Arranged marriage means less incentives for men to save, and less resources for women to invest in their children. The importance of each factor depends on the shares of physical and human capital in the production function, and on exogenous parameters like π .

2.4.4 Growth?

Treating population growth, n_t , as exogenous the (gross) growth rate of output, y_{t+1}/y_t , is constant over time. The economy thus displays either sustained growth, or shrinks perpetually (i.e., exhibits global contraction). Hence, these models fail to generate a stable Malthusian steady state, or a story for how and why a shift to love marriage can push the economy out of such an equilibrium.

However, by introducing an exogenous relationship between population growth and per-capita income which captures the stylized demographic history of Western Europe the model can replicate the main features of the associated changes in per-capita income growth, in the spirit of a "unified framework" approach of e.g. Galor and Weil [2000].

To see this, postulate that population growth displays a hump-shaped pattern when plotted against per-capita income, consistent with the demographic transition in many countries: rising rates of population growth occurred as survival rates, s_t , increased; with a lag fertility rates, b_t , started to decline, making

population growth rates fall. Here we let $n_t \equiv n(y_t)$, where $n'(y_t) > 0$ for low levels of y_t , and $n'(y_t) < 0$ for higher levels of income. Moreover, we let $\lim_{y \rightarrow \infty} n(y) \equiv n^* > 0$, so that population growth does not approach zero as per-capita income exhibits sustained growth.

The resulting growth schedule is illustrated in figure 4. Population growth is rising in y_t for low initial levels of y_t , making the per-capita income growth rate, y_{t+1}/y_t , decline. As the level of y_t reaches some critical level, population growth starts to fall, generating an increase in per-capita income growth rate. Growth rates stabilize at $\Omega(\lambda)/n^*$ as y_t approaches infinity. As seen, this generates a locally stable Malthusian poverty trap, as well as a sustained growth path. Where the economy ends up depends on which side of the threshold steady state it starts off.

Figure 4 about here

A shift to love marriage (a fall in λ) shifts up the growth schedule, potentially pushing the economy out of the poverty trap. Interestingly, such an institutional shift – even if its temporary – can have permanent effects, since the economy will not contract back to the Malthusian trap once it has reached a point above the threshold steady state.

The Catholic Church established authority over marriage between the 12th and the 16th century [Goody 1983]. In this period, many factors other than marriage institutions have benefitted or harmed development. For instance, in Europe the 12th century ushered in a period of relative peace, and in the mid 14th century, the Black Death decimated the population. But those factors may have been more or less idiosyncratic; sometimes a good shock hit Europe, another time it hit China, or India. In terms of figure 4, unless these shocks were substantial enough to move the economy beyond the threshold steady state, these shocks would not have a lasting impact on the performance of these economies.

3 Summary and discussion

The three different models are summarized in table 3.

The paper argues that the introduction of love marriage in the (four to eight) centuries preceding A.D. 1500 may have laid the ground for the subsequent take off known as the Industrial revolution. The paper does not address many of the factors that later contributed to accelerate growth in per capita income, perhaps most importantly, the interplay between technology and fertility.

The paper’s historical focus does not preclude the possibility that the mechanisms pointed to may be relevant for understanding different growth performances of countries today. For instance, why, in the last 50 years, the Middle East, West and South Asia have failed to keep up with the economic performance of China and East Asia. Recently, the potential role of women in development, and the institutional barriers facing women, have received more attention (e.g.

Table 3: Summary

	Model		
	A	B	C
Love better than arranged marriage	Yes ^a	Yes	Yes
Physical capital	No	No	Yes
by	n.a.	n.a.	males
Human capital	Yes	Yes	Yes
by	males	females	females
Wage	X	X ^b	N ^c
Bride price	N	N	X
Fertility	X	X	X
Polygamy	Yes	Yes	No
Monogamy	No	Yes	Yes
Focus on	Inter-generational male resource allocation	Monogamy v. human capital polygyny	Physical and investment

^a – weakly; ^b – exogenous; ^c – endogenous .

[World Bank 2001]). This paper points to the possibility that arranged marriage is an institution that denies the young – young women in particular – access to resources; depress human and physical capital investments; and reduces growth.²²

3.1 Random thoughts

Literature on the effect of pension systems on savings and growth TBA

Arranged marriage more efficient? The reason arranged marriage generates less growth than love marriage is that the young generation makes human capital investment in the children and save; and human and physical capital drive growth. However, a possible reason why arranged marriages have been so prevalent for an extended period of time may be that arranged marriage was as or more efficient as love marriage. Arranged marriage gives old people with many adult daughters an advantage. Hence, arranged marriage favors both longevity and population growth. Longevity may be an advantage in a society where experience matters more for productivity than human capital investments. Population growth may be advantage when population density is

²²The list of potential sources of underdevelopment is undoubtedly long, a recent contribution is Galor and Mountford [2001], they point to the role of trade in delaying the demographic transition in already labor abundant economies.

low. Both are arguably features that may describe relatively early periods in human history.

Moreover, the advantage of human capital investments may at low human capital or technology levels be slight. Hence, at low levels of development, a society that switches to love marriage may not immediately experience an advantage over the society that stays with arranged marriage. While the love marriage society may eventually create the conditions for human capital to be important, this may be a prolonged process, which could be why love marriage have not out performed arranged marriage until the Christian experiment a thousand years ago.

Love v. arranged marriage and sorting Do love and arranged marriage institutions result in different sortings and thus output? This paper has emphasized agency and payments as distinguishing love and arranged marriage rather than the absence or presence of love or idiosyncratic preferences. Undoubtedly, the shifting of agency to the marrying parties rather than their parents means that it is their rather than their parents' preferences in these matters that will have more weight.²³ On the other hand, one may ask to what extent these are important enough to changed the sorting along observables such as education level, intelligence, religion, social background, age and physical attractiveness. Becker [1991]:117 noted an array of evidence suggesting that there is tremendous amount of sorting on the marriage market in Western societies, belying the idea that love marriage results in random matching. One should keep in mind that a universal feature of marriage not so long ago was to provide men with legitimate children and women (and their guardians) with a livelihood (see e.g. Edlund and Korn [2002]). Hence, pragmatic aspects took precedence over romantic feelings irrespective of marriage institution. It is well established that earnings power among men and nubility among women are highly valued on either marriage market, be it arranged or love. Consequently, it is not clear that the sorting along measurable dimensions is actually affected by who has agency, as the Coase theorem would predict.

Love v. arranged marriage and stability Contemporary marriage in societies practising arranged marriage is more stable than in those practising love marriage, supporters of arranged marriage would be quick to point out – arranged marriage avoids the pitfalls of myopia on the part of the young and is motivated on the grounds of paternalism. However, it can be noted that the instability of love marriage is fairly recent and may have much more to do with the rise in employment opportunities of women and the contraceptive revolution than the marriage institution *per se*, see e.g. Edlund and Pande [????]. Moreover, it is unclear if say traditional Chinese marriage were more stable than

²³Wolf [1995] noted that in traditional China, parents actively sought to avoid feelings of love between the son and the daughter-in-law lest the son's loyalty would shift away from the parents. This is an example where the absence or presence of love redistributes rather than affect sorting or stability of marriage.

traditional European marriage. For instance, Cheung [1972] noted that divorce was allowed in imperial China. Interestingly enough, the right to divorce lay in the hands of the household head, i.e. in many cases the father of the husband. The son's marriage was initiated by the father's purchase of a bride, and could be terminated by the father's selling.

Dowry? Dowry raises two questions. First, how are our results modified by the presence of dowry. Second, does dowry belie the assumption that men pay to marry? In the context of this paper, the effect of dowry on growth would be beneficial because it redistributes resources from the old to the young.

The short answer to the second question is that positive dowry does not imply that women are net payers for marriage. The wealthy in Europe and India, and to a lesser extent China, have practised dowry giving – the endowment of a daughter at the time of her marriage. Dowry serves many functions. Becker [1991] proposed that dowry, positive or negative, may be viewed as a payment that clears the marriage market in case division of output in marriage is inflexible. If dowry is positive, the bride side pays the groom side, and if negative, the groom side pays the bride side (and the payment was called bride price). However, positive dowry does not imply that daughters are more expensive to marry than sons and hence does not belie the assumption that men pay to marry. The reason is that dowry is also in many cultures the principal way in which parents pass on wealth to their daughters, and often dowry substitutes for inheritance. Historically, there are many examples of how increases in wealth have been followed by “dowry inflation”, e.g. Stuard [1981]; Ebrey [1996]:158-161, also it may be argued that the current case of dowry inflation in India may have its roots in greater affluence [Edlund 2000]. If parents choose to bequeath their children, the son's inheritance will play into his attractiveness on the marriage market, as will the daughter's dowry. Hence, in this sense, both sons and daughters are costly to marry off. The initial claim that men would pay to marry, would in this context be reformulated as men would pay more to marry than women. Hence, a positive dowry at the time of the marriage, need not make the bride a net payer, since her spouse's future inheritance may have a higher value than her dowry.²⁴

²⁴There are examples of brides bringing in more in dowry than the groom can expect to bring in inheritance. In these cases, marriage tend to confer social status or political favors to the bride and her kin.

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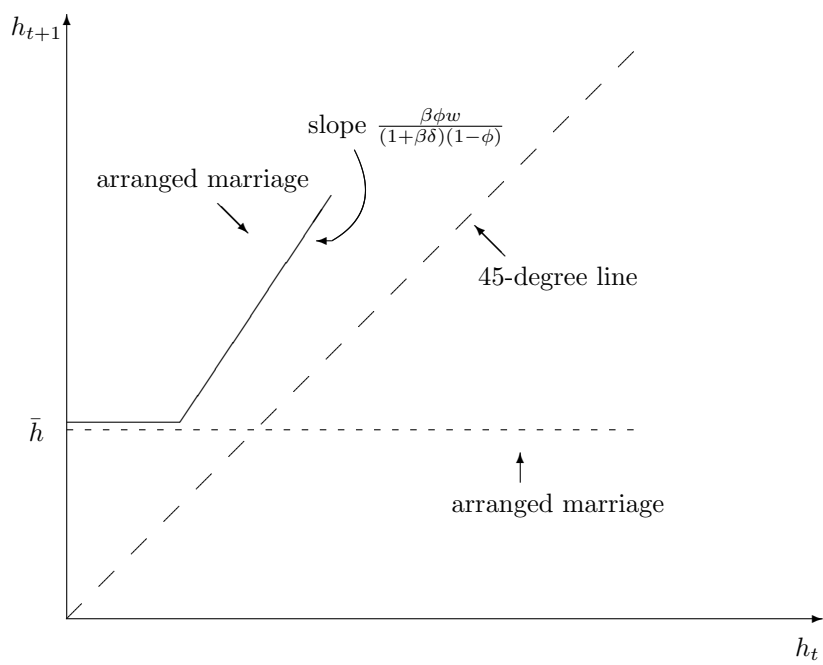


Figure 1: Human capital dynamics under love and arranged marriage

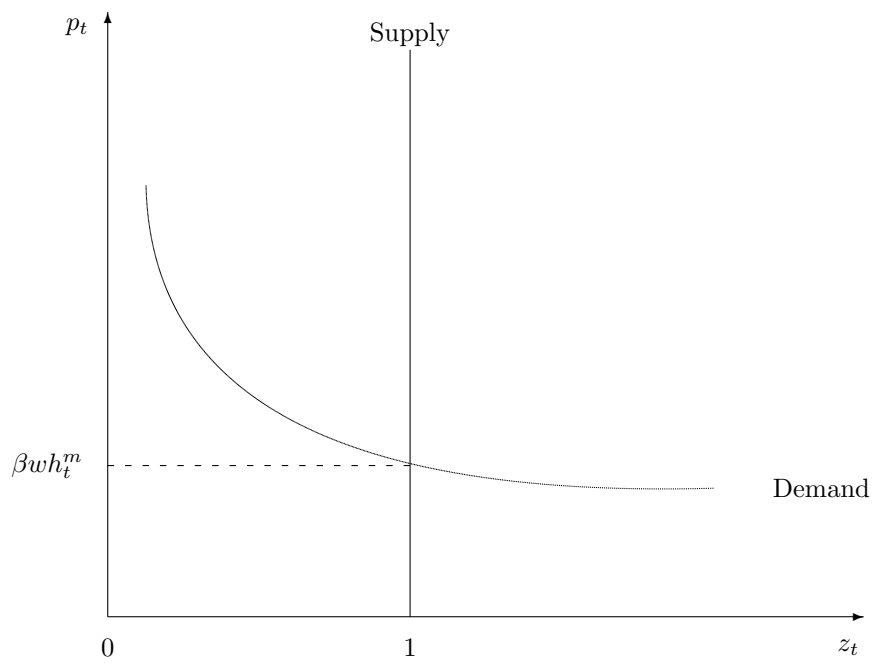


Figure 2: The marriage market under polygyny

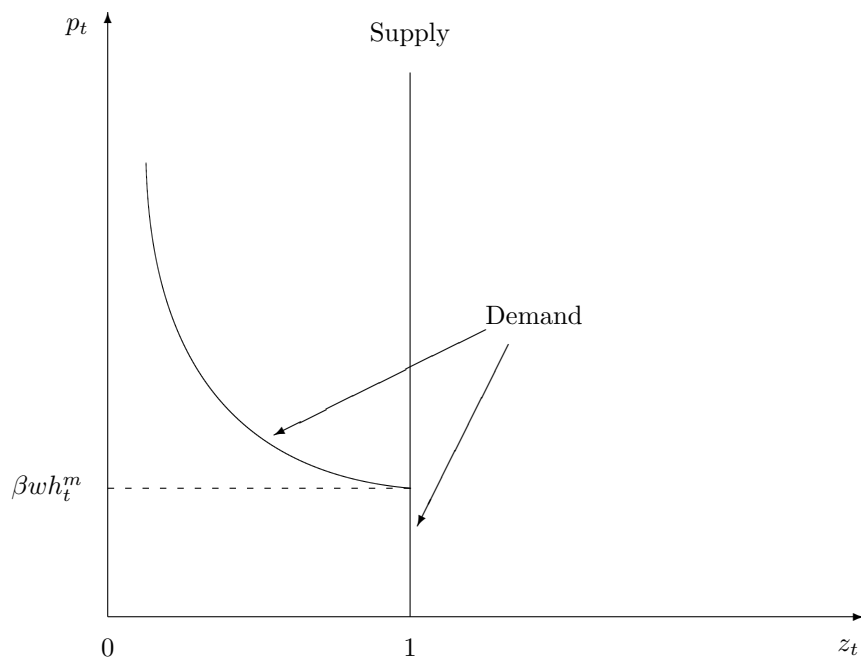


Figure 3: Marriage market equilibria under monogamy

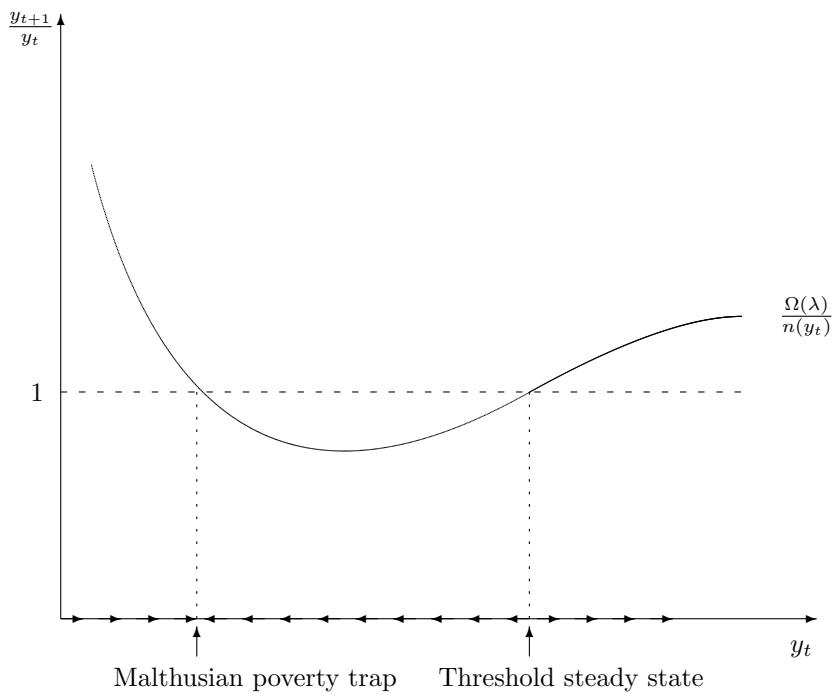


Figure 4: Dynamics