Implications of Marriage Institutions for Redistribution and Growth[*]

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Abstract

This paper argues that love – as opposed to arranged – marriage promotes growth. Men pay for marriage, but who receives and pays the bride-price differs between the two marriage institutions. Typically, under love marriage the groom pays his bride, 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, we argue that love marriage may redistribute resources from father to 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. If so, the adoption and adherence to love marriage in Europe, starting in the 8th century at the instigation of the Catholic Church, may have been a factor in Europe's economic ascent.

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> Think not that I am come to send peace on earth: I came not
> to send peace, but a sword. For I am come to set a man
> at variance against his father, and the daughter against her
> mother, and the daughter in law against her mother in law.
> And a man's foes shall be they of his own household.
>
> Matthew 10:34-36.

1 Introduction

This paper studies marriage institutions and their potential impact on growth. In particular, we consider the role of love – as opposed to arranged – marriage. Historically, most advanced pre-industrial societies practised arranged marriage. Around the 8th century, love marriage was introduced in Europe at the instigation of the Catholic Church [Goody 1983].

Edlund [2001] argued that in order to marry, men pay (further discussed in section 1.1). For the purpose of this paper, let us call this payment the *bride-price*. We argue that an important distinction is who receives the bride-price. In arranged marriage the bride-price goes not to the bride but rather to her father (or guardian) [Goody 1973]. Moreover, 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 the human capital of their children than men.

Moreover, love marriage may redistribute resources from old adults to young adults, which may also promote growth. 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, then it is less clear that love marriage redistributes resources to the young. Still, this may be the case. Under love marriage, agency is typically shifted from the parents to the grown children. For young men this means that they decide how to allocate resources between 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 a young man will live off the labor of his children when he

is old, he has an incentive to invest in their human capital. Consequently, young men will not devote the entire transfer to the purchasing of wives, but will allocate a portion to human capital investment. Hence, love marriage may induce a redistribution from old fathers to adult sons, which in turn can raise human capital investment.

The redistribution from old to young adults associated with love marriage may also promote savings. Under arranged marriage, fathers can finance old-age consumption by the selling of daughters in marriage and the appropriation of sons' labor. Under love marriage, these two incomes are reduced: daughters capture a larger share of the bride-price and sons retain a higher share of their labor income. Hence, a shift from arranged to love marriage may encourage saving for old age.

Marriage in Europe was also more monogamous than in other cultures (see table 2), due to the Church's doctrine. This paper argues that monogamy may favor parental investment in daughters, which may boost growth if mothers are important for the human capital investment in children. The practise of dowry – the endowment of daughters – may be an example of how institutionally imposed monogamy may lead to higher investment in daughters (e.g., Gaulin and Boster [1990]).[1] Historically, dowry has been primarily restricted to Europe and India, the two main monogamous societies (e.g., Goody [1973]). Dowry is further discussed in section 3.

Many factors contributed to the economic upswing that brought Medieval Europe to the top of the world income league around A.D. 1500. There were important technological advances (e.g., Cipolla [1972]; Mokyr [1990]). For instance, better shipping may have been pivotal for the discovery of the New World, colonialism and the growth of trade [Acemoglu, Johnson, and Robinson 2002], all of which may have helped propel Europe towards an industrial revolution and a subsequent demographic transition. Cities grew, and a professional middle class emerged. Geographical fragmentation led to political competition which made Europe more diverse than China [Landes 1999]. The financial and legal systems became more sophisticated. The list is long, and this paper does not deny the importance of these explanations. Rather, it seeks to add an hitherto overlooked factor: the European marriage.

The paper adds to the existing literature in several ways. First, we point

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[1]Anthropologists have noted that monogamy in *stratified* societies is associated with dowry (in non-stratified societies, monogamy would be an endogenous outcome and would therefore not need to be imposed).

to a potentially important, but thus far largely ignored, difference between love and arranged marriage.[2] Second, we add to a recent and expanding literature on long run growth, an incomplete list which includes Kremer [1993]; Goodfriend and McDermott [1995]; Galor and Weil [2000]; Galor and Mountford [2001]; Jones [2001]; Lagerlöf [2001]; Galor and Moav [2002]; Lucas [2002]; Hansen and Prescott [????]; Lagerlöf [????]. Third, our work is related to the literature on family forms and growth (e.g., Becker, Murphy, and Tamura [1990]; Ehrlich and Lui [1991]; Cole, Mailath, and Postlewaite [1992]). Fourth, we point to a potential drawback of polygyny not previously discussed (e.g., Becker [1991]; Posner [1992]). Finally, the paper is in the spirit of the growing empirical literature which rejects the unitary model (e.g., Schultz [1990]; Thomas [1990]; Bourguignon, Browning, Chiappori, and Lechene [1994]; Udry [1996]; Lundberg, Pollak, and Wales [1997]), and suggests the importance of mothers for the human capital investment in children (e.g., Behrman, Foster, Rosenzweig, and Vashishtha [1999]; Duflo [2000]).

The paper proceeds as follows. The remainder of this section gives a brief background to love and arranged marriage. Section 2 presents three mechanisms through which love marriage may result in higher growth than arranged marriage. Common to all is that love marriage places more resources in the hands of young adults. Section 3 concludes.

1.1 Love and 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 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 as 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 an institution that allows parents to benefit from the reproductive value of their daughters. In Africa "Bridewealth[price]... 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

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

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young are dependent on them for marriage cattle or the equivalent" (Goody [1973]:5). This has also largely been true of China and India (e.g., Freedman [1970]; Mandelbaum [1970]).

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 delivery, has made the most important parental investment [Trivers 1972]. Hence, even if paternity were as easily established as maternity, this suggests that the default parental rights should be given to the mother and not the father. Family law and custom universally 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 (entirely or additionally) (see Edlund [2001] and references therein). Marriage may thus be seen as a contract that societies have devised to allow men parental rights. 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 whomever owns her) – a bride-price.

A key difference between love and arranged marriage is who receives the bride-price. In most pre-industrial societies, the payment was not to the bride but to her father or family (Murdock [1967]; Goode [1970]; Goody [1973]; also see table 1 in appendix, and note that among 64 % of societies, the payment is not to the bride). A closely linked matter 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.

1.1.1 Defining features

For the purpose of this paper we define love marriage to mean that the bride-price goes to the bride, and the groom and bride decide whom and whether to marry. Arranged marriage is defined to mean that the bride-price is paid to the bride's father, and parents decide the marriage.

While the person who makes or receives the bride-price is typically the same as the one who has agency, there are exceptions. In cases where parents choose partners but the brides are recipients of the bride-price, which arguably was the case among upper class European and Indian families, the growth implications are those of a love marriage and hence would, for the purpose of this paper, be classified as such. Conversely, if the children have

agency but the bride's parents receive the bride-price, as in the case of Africa, the growth implications would be those of arranged marriage.

Neither the absence or presence of love is part of our definition of marriage type, nor is the degree of third party involvement in the actual search process.[3] These may be correlates, but – we believe – not defining features of the two marriage institutions. For instance, in arranged marriage the actual search process is often conducted by a third party. However, intermediates are also used in love marriage (friends, relatives, newspaper advertisements or formal matrimonial agencies). One reason why arranged marriage is often done without the 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 arguably try to do so. Hence, to the extent that individual search would compromise the chastity of a daughter, reducing the bride-price, we would expect parents to prevent their daughters from searching out prospective partners.[4]

Parental authority also varies with the ability of children to resist parental control. Hence, although there may be substantial social pressure on daughters (and to a lesser extent sons) to comply, control is rarely complete. One way to minimize resistance from the prospective spouses is to conclude the marriage contract while 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 (e.g., Cipolla [1972]).

1.1.2 Love marriage and the Church

The Church started to formulate its marriage doctrine in the 4th century. However, its enforcement was gradual. For instance, in England, Church authority over matrimonial questions was slowly established between the 7th and the 12th century (Howard [1904]; cited in Goody [1983]:148). By the 12th

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[3]Past literature has focused on the nature of the search process as a feature distinguishing arranged from love marriage, e.g., Batabyal [2001].

[4]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 went to the bride's father, individual search was more common than in China and India (e.g., Mair [1953] and Goody [1973]).

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 instituting parental consent. However, it introduced public announcements and a public ceremony as a requirement for marriage, which made it easier for parents to be aware of, if not to force, 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. In France, by the mid-16th century, 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, and in contrast to China and India, no bride-price was paid to the bride's father. Moreover, while parental consent was added in some countries, the individual consent requirement was never rescinded.

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, which practised both bride-price and marriage to close kin, nor was it a continuation of Roman tradition, whose practices ranged from arranged marriage to informal consensual unions [Goody 1983]. This begs the question why the Church came to impose monogamous-love marriage.

Goody [1983] argued that the Church's marriage doctrine was motivated by a desire to amass wealth, primarily in the form of land.[5] 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, sug-

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[5]In France, by the 7th century, one third of all productive land was in the hands of the Church (Goody [1983]:105).

gesting that individual consent is not a necessary condition for monogamy (or lifelong marriage).

Another possibility is that love marriage promoted the Church's interest in preventing land concentration, which, if unchecked, could form the basis for secular power groupings. Love marriage limits parental ability to arrange marriages for political and economic benefits, and while young adults are not insensitive to such considerations, they may put less weight on them. 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 economic importance of land increased in the 16th century, as previously noted, there were partially successful attempts to impose parental control over marriage.[6]

A third possibility may be deduced from Stark [1997]. He argued that the early Church (1st and 2nd century) drew support from women, and this may have resulted in women friendly policies. Other than insisting on individual consent, the Church banned abortion and infanticide; made marriage indissoluble; and safeguarded widow's inheritance rights. While the banning of abortions may not seem obviously women friendly, one can note that in Roman Antiquity, a married woman did not have the right to abort without her husband's consent. Given the high mortality associated with the procedure, one may conjecture that most abortions were demanded by the husband rather than the wife. Also, the ban on infanticide may seem gender neutral but reduced female infanticide more than male infanticide since Roman society practised the former more widely than the latter.[7]

1.1.3 Evidence of redistribution?

A key assertion in this paper is that love marriage redistributes resources from old to young and/or from men to women. Since love marriage was introduced in Europe in the Middle Ages, what historical evidence exists to

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

[7]Female infanticide was also legally sanctioned to a greater extent than male infanticide. The Twelve Tables permitted the father to expose any female infant and any deformed or weak male infant (Stark [1997]:118).

suggest that women received higher transfers in marriage or that the young were relatively better off in Europe than in India or China?

First, in Europe wives received a lump sum payment from the husband early in marriage, in the form of a morning gift or a dower. 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) purdah (the seclusion of women within the household) was never practised in Europe, while this was the case in India and China.[8] Third, widows inherited their husbands' estates. In traditional India and China this was not the case. Instead, a male relative received the inheritance (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.[9]

Turning to the young-old dimension, the emphasis on the nuclear, instead of the extended, family favored the young. Clearly, the young did care for their aging parents in Europe as well. However, the position of the old was different: the old were dependents and not heads of households [Goody 1983].

2   Model

This section presents three mechanisms through which love marriage may be growth promoting. Common to all is that love marriage places more resources in the hands of young adults. Subsection 2.2 focuses on old-young allocation. To that end we restrict attention to the groom and his father. Under both love and arranged marriage, we assume that young men are "owned" by their fathers in the sense that while young men produce, their

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[8]The General Report of the Indian Census 1931 attributes the excess mortality of adult Muslim women to the practise of purdah, suggesting that purdah afforded a lower standard of living to women than men.

[9]A marriage contract that is favorable to women may allow young men without assets to compete for a wife by the promise of a cut in future earnings. However, this is only 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.

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 purchase daughters-in-law but have to rely on transfers to their sons in order to obtain daughter(s)-in-law (who receive the bride-price). The marrying sons, in turn, will rely on their children for income in old age. This implies that the 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 gender allocation. Therefore, we assume that the young man owns his labor income and purchases wives under either marriage form; but that the bride receives the bride-price under love marriage, and her father receives it under arranged marriage. Subsection 2.3 considers the difference between monogamy and polygyny, and shows that love marriage produces higher growth than arranged marriage irrespective of whether there is monogamy or polygyny. Subsection 2.4 allows for endogenous factor prices and savings (in addition to human capital investment). We show that love marriage may encourage more savings than arranged marriage because under the former, the old cannot rely on the young for old-age support to the same extent as under arranged marriage. Hence, our claim that love marriage can be growth promoting is not restricted to situations in which growth is driven by human capital.

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 let $\lambda \in [0, 1]$ measure the fraction of the bride-price paid to the father (the bride retains $1 - \lambda$). $\lambda = 0$ corresponds to pure love marriage, and $\lambda = 1$ to pure arranged marriage.

A young man marries z_t young women in period t. The old do not marry. Under polygyny, each man chooses z_t to maximize his utility, taking the bride-price, p_t, as given. Each young woman gives birth to one son and one daughter. We abstract from any heterogeneity across men or women. Thus p_t must adjust so that the representative man chooses $z_t = 1$. Under

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monogamy, $z_t \leq 1$ is imposed on the male maximization problem.

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. 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. Men could also care about the number of sons-in-law, but we assume that it does not affect the number of grand children, hence the asymmetry. We write the utility function for a young man in period t as

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

where $\beta \in (0, 1), \phi \in [0, 1)$.

We make the simplifying assumption that women only consume when young. We could let women consume when 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 or arranged marriage, and is thus superfluous for our purposes.[10]

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 $\gamma \in [0, 1), \omega \geq 0$; 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 she invests in each of her offspring; and z_{t+1} denotes her number of daughters-in-law. The last term captures a concern for the number of grand children.

2.2   Model A: Love marriage redistributes to young

This subsection shows that love marriage can redistribute resources from father to son. To that end, we let women be passive – they consume what they receive in bride-price. Since women's actions have no bearing on growth, we abstract from human capital investment in daughters. For the female utility

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[10]Unless old women's attitudes towards the younger generations are assumed to be different from old men's, which is a possibility, e.g., [Duflo 2000]. Of course, allowing women to benefit wholly or partially from their grown children would affect gender equality.

function to be well defined, we need $\lambda < 1$. Hence, $\lambda = 0$ corresponds to love marriage and a λ arbitrarily close to 1 corresponds to arranged marriage.

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} denotes the human capital investment in a son at time t. The difference between arranged and love marriage is that under arranged marriage, old fathers pay for the brides of their sons, whereas under love marriage the young men (the grooms) pay for the brides themselves. We further assume that under arranged marriage, fathers control directly how many wives each son buys. By contrast, under love marriage this decision rests with the sons alone. To ensure that sons marry, a father has to transfer resources to his son. The son allocates this transfer between the purchasing of wives, own consumption, and human capital investment in children.

The male utility function is given by (1), and the female utility function by (2), where $\gamma = 0$, i.e. $U_t^f = \ln c_t^f$.

2.2.1 Budget constraints

Love marriage Under love marriage, wives are purchased by the son. However, the son has no means with which to buy a wife.[11] Hence, to induce marriage, the father has to transfer resources, τ_t, to his son. Moreover, the old man receives no income from his daughters. The male budget constraints are thus

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

when young, and

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

when old. As for women, they consume the bride-price, i.e. $c_t^f = p_t$.

Arranged marriage Under arranged marriage the father purchases daughters-in-law. The father would like to set the son's consumption as low as possible, which we assume to be $\underline{c} > 0$. Similarly, the father would like to minimize human capital investment in grand sons, and we assume a lower bound $\underline{h} > 0$.[12]

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[11]We have assumed away women's consumption when old, so the young man cannot pay by promising a cut in a future son's earnings or a daughter's bride-price.

[12]The utility function is not well defined for $c_{1,t}^m, h_{t+1} = 0$.

The father receives p_{t+1} in bride-price for each daughter. The male budget constraints are thus

$$(5) \qquad\qquad c_{1,t}^m = \underline{c}$$

when young, and

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

when old.

For completeness, we note that female consumption, $c_{1,t}^f = (1 - \lambda)p_t$, is close to zero (but strictly positive since $\lambda < 1$).

2.2.2 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 his transfer, τ_t, as given and maximizes utility with respect to number of wives, z_t, human capital investment, h_{t+1}, and the future transfer to each son, τ_{t+1}. The first-order condition for z_t implies that

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

and that for h_{t+1} implies that

$$(8) \qquad\qquad (1 - \beta) \left[c_{1,t}^m\right]^{-1} z_t = \beta w \left[wh_{t+1} - \tau_{t+1}\right]^{-1}.$$

Combined, these two conditions imply that

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

In words, a higher bride-price leads to fewer desired wives, and thus reduces the number of (male) offspring in which human capital can be invested. This in turn induces higher human capital investment in each son. Also, the more the father expects to transfer to his son in the next period, τ_{t+1}, the more he will invest in him in order to afford that transfer.

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

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

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i.e., the son's expenditures on wives and own sons, $z_t (p_t + h_{t+1})$, constitute a constant fraction of the transfer received from his father, τ_t (which follows from logarithmic utility).

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}. We conjecture that

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

for some $\eta > 0$. We need to confirm that this functional form also holds in period t.[13] The first-order condition with respect to τ_{t+1} implies that

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

Using (9) and (12) we note that

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

which implies that

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

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

$$(14) \qquad z_t = \frac{\beta[\delta - \phi(1 + \delta)]}{(1 + \beta\delta)(1 - \phi)} \frac{\tau_t}{p_t} = \eta \frac{\tau_t}{p_t},$$

which confirms the conjecture in (11).

We can now derive a dynamic equation for human capital investment. 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. For $h_t > \underline{h}$ this gives

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

or

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[13]Formally, 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.

$$(16) \qquad \frac{h_{t+1}}{h_t} = \frac{\beta \phi w}{(1 + \beta \delta)(1 - \phi)}.$$

The economy can exhibit sustained growth if the right hand side of (16) is greater than unity. The growth mechanism is that successive generations of old men transfer resources to their sons to induce them to buy 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.

Arranged marriage   Under arranged marriage, in any period t the old set h_{t+1} at its minimum level, $\underline{h}$. Income is thus constant at $w\underline{h}$, and there is no growth.[14]

2.2.3   Summary

The growth enhancing effects of love marriage originate from the fact that old men do not care about the future, since they will not be around in the next period. They care about leaving many grand children, but not about their grand children's quality. Young men, by contrast, will live off their grown children in the next period, which gives them an incentive to undertake human-capital investment in these offspring.

Love marriage is a necessary condition for sustained growth in income. Hence, in the long run love marriage may make everyone better off. The short-run effects are more ambiguous: at any point in time, women and young men are better off under love marriage, whereas old men are better off under arranged marriage.

The different growth performances under love and arranged marriage are illustrated in figure 1. Note that (16) increases in w, the wage. This suggests that the growth advantage of love marriage is more likely to be present when the returns to human capital investment are high. This could in turn be due to high levels of physical capital in combination with some form of capital-skill complementarity. In other words, the growth advantage of love marriage may show up with a considerable time lag.

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[14]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 $\underline{p} = [\phi(w\underline{h} - \underline{c}) - \underline{h}]/(1 - \phi)$ (which is positive for a sufficiently large w).

Figure 1 about here

2.3 Model B: Love marriage redistributes to women

Model A showed that love marriage redistributes resources from old to young men and that this may promote growth. Model B focuses on how love marriage can redistribute resources from men to women, which may have a similar effect. To this end, we let mothers alone undertake human capital investment, and let men only consume. This is clearly a simplification, the validity of which hinges on whether one believes that mothers are more interested in their offspring's quality than are fathers. It is, however, a reasonable interpretation of the findings of the empirical literature on intra-household allocation of resources. Moreover, it is theoretically defendable on the biological ground that while women are more capacity constrained than men in terms of fertility, they know with certainty that they are biologically linked to their putative children.

For simplicity, we assume that the groom pays the bride-price. Under love marriage the bride is the recipient. By contrast, under arranged marriage, her father receives the bride-price.

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 its adoption of love marriage but also in its enforcement of monogamy. Hence, we are also interested in comparing the growth performance of monogamous-love marriage (Europe) to that of polygynous-arranged marriage (China), and that of monogamous arranged marriage (India).[15]

We find that monogamy may outperform polygyny because polygyny can deprive women of resources. A son's reproductive success increases in his number of wives. If a son is given more than the male average human capital investment, he will be able to buy more than one wife, unless constrained by monogamy to only one wife. This raises the reproductive rewards to investing in sons rather than daughters (whose reproductive success is invariant to her human capital). Consequently, daughters may receive less human capital under polygyny than under monogamy. These daughters are the next generation's mothers. Hence, mothers may have fewer resources to invest in their

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[15]For completeness, one may rank polygynous-love marriage. However, it is unclear to what extent this combination has been practised. Buddhist Burma and Thailand may be examples, as well as the practises of the more recent Mormon Church.

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 parameter measuring the degree of arranged marriage be a continuous variable, $\lambda \in (0,1]$.[16] Love marriage now refers to a situation in which λ is arbitrarily close to zero, but strictly positive.

Men only care about consumption, i.e. $\delta, \phi = 0$. Hence, the utility function for a young man in period t is given by

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

Every man is endowed with h_t^m units of human capital (invested by his mother; see below), which earns him an income of $w h_t^m$. Thus, the man's budget constraints are

$$(18) \qquad c_{1,t}^m = w h_t^m - z_t p_t,$$

when young and

$$(19) \qquad c_{2,t+1}^m = \lambda z_t p_{t+1}$$

when old (more wives reduces consumption when young but boosts consumption when old through the bride price daughters bring in).

We let women care about the human capital of their children and the number of grand children they have, and hence rewrite the female utility function in (2) as

$$(20) \qquad U_t^f = (1-\gamma) \ln c_t^f + \gamma(\ln h_{t+1}^f + \ln h_{t+1}^m) + \gamma\omega \ln z_{t+1},$$

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

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

$$(21) \qquad c_t^f = w h_t^f + (1-\lambda)p_t - \left(h_{t+1}^m + h_{t+1}^f\right).$$

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[16]$\lambda > 0$ must be imposed to ensure that $c_{2,t+1}^m > 0$ holds.

2.3.1 Polygyny

Men 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:

$$(22) \qquad\qquad z_t = \beta \frac{w h_t^m}{p_t},$$

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

Women Women maximize the utility function in (20) with respect to h_{t+1}^m and h_{t+1}^f, subject to the budget constraint in (21). The first-order condition for investment in the daughter, h_{t+1}^f, can be written as

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

The mother's investment in her son 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, lead the first-order condition for z_t in (22) by one period:

$$(24) \qquad\qquad z_{t+1} = \beta \frac{w h_{t+1}^m}{p_{t+1}}.$$

Inserting (24) into the utility function in (20) we can write the first-order condition for investment in sons, h_{t+1}^m, as:

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

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

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

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, i.e., $\mu = 1$.

Dynamics   Since female human capital is a constant fraction 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 $t + 1$:

$$(27) \qquad h_{t+1}^m = \frac{\gamma}{(\mu + \gamma)}(wh_t^m \mu + p_t(1 - \lambda)).$$

From (22) we note that in a marriage market equilibrium ($z_t = 1$), the bride-price adjusts so that $p_t = \beta wh_t^m$ (figure 2). Hence, we can write the growth rate of male (and female) human capital as

$$(28) \qquad \left\{\frac{h_{t+1}^m}{h_t^m}\right\}^{\text{pol}} = \frac{\gamma w}{(\mu + \gamma)}(\mu + (1 - \lambda)\beta).$$

Figure 2 about here

2.3.2   Monogamy

Men   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 $z_t \leq 1$.

Formally, the man's demand for spouses is given by (22) whenever it falls below unity, and equal to unity otherwise, i.e.

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

As seen if figure 3, there is a range of bride-prices that are consistent with marriage market equilibrium: $p_t \in [0, \beta wh_t^m]$. Note however that if the sex ratio were to fall slightly below unity, the equilibrium bride-price would jump 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 to differential fecundity (and, for instance, higher remarriage rates among 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

Women   If the son can take one wife only, then mother's optimal investment in children does not depend on gender:

$$\frac{1-\gamma}{c_t^f} = \frac{\gamma}{h_{t+1}^f} = \frac{\gamma}{h_{t+1}^m}.$$

The gross growth rate of male human capital is the same as in the polygynous setting, except that μ is replaced by 1.[17] Analogous to (28) we can write the growth rate as

(30)
$$\left\{\frac{h_{t+1}^m}{h_t^m}\right\}^{\text{mon}} = \frac{\gamma w}{1+\gamma}(1 + (1-\lambda)\beta).$$

2.3.3   Summary

A society with love marriage (low λ) always grows faster than a society with arranged marriage (high λ). Note that the absolute difference increases in the wage level, so that at low levels of w, the difference in performance is small.

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 and 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 that men gain is reallocated to women via a higher bride-price. 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 parameters of the utility functions. From (28) and (30) the growth rates can be derived. They are summarized in table 3 (in appendix). The growth rate is maximized with a combination of love marriage and monogamy if $\gamma > \beta$; and *vice versa* if $\gamma < \beta$. However, none of the cultures considered here practised polygynous-love marriage (cf. table 2 in appendix). Moreover, the scant occurrence of polygynous-love marriage may point to an inherent contradiction. As Becker

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[17]Another way to see that $\mu = 1$ is to note that under monogamy, $dz_{t+1}/dh_{t+1}^m = 0$.

[1991] noted, polygyny raises demand for wives, and this may make fathers more prone to try to sell their daughters, as argued by Tertilt [2002].

2.4 Model C: Physical capital

So far, we have focussed on human capital. This subsection shows that love marriage can also encourage savings. It is commonly claimed that in less developed countries, children provide old-age support and thus substitute for savings. Implicitly, this argument assumes that old parents can make their children support them. Clearly, arranged marriage provides an institutional framework for this. As argued in model A, old fathers extract less 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 investment, and we show that both are depressed under arranged marriage. We introduce capital and derive factor prices from a production function. In order to obtain a tractable solution we 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. We let λ, the parameter measuring the degree of arranged marriage, be a continuous variable and, since we allow for savings, $\lambda \in [0, 1]$. To focus on the savings mechanism, we abstract from concerns for the number of grand children (i.e. $\delta, \phi = 0$ and $\omega = 0$).

2.4.1 Utility functions and budget constraints

Men Since $\delta, \phi = 0$, 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 consumption, $c_{1,t}^m$, 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

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

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

(32) $$c_{2,t+1}^m = a_t(1 + r_{t+1}) + \lambda p_{t+1},$$

where r_{t+1} is the interest on savings held from period t to $t+1$. The second term is the income from selling the daughter.

Women   Since $\omega = 0$, the female utility function in (2) becomes:

$$(33) \qquad U_t^f = (1-\gamma) \ln c_t^f + \gamma \ln h_{t+1}.$$

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

$$(34) \qquad c_t^f = w_t h_t + (1-\lambda)p_t - 2h_{t+1},$$

where $2h_{t+1}$ constitutes the resources she spends on her two children's human capital.

2.4.2   Production

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

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

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

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

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

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

2.4.3   Dynamics

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

$$(38) \qquad a_t = \beta(1-\pi)w_t h_t - (1-\beta)\frac{\pi \lambda w_{t+1} h_{t+1}}{(1+r_{t+1})},$$

where we recall that $p_{t+1} = \pi w_{t+1} h_{t+1}$. The per-worker capital stock evolves according to $k_{t+1} = a_t/2$.[18] Using (36) and (37) one period ahead, this gives

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

or

(39)
$$k_{t+1} = \frac{\alpha\beta(1-\pi)(1-\alpha)}{\alpha + (1-\beta)\pi\lambda(1-\alpha)}y_t \equiv \Psi(\lambda)y_t.$$

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 $2h_{t+1} = \gamma[1+\pi(1-\lambda)]w_t h_t$, which together with (37) implies that

(40)
$$h_{t+1} = \frac{\gamma}{2}[1 + \pi(1-\lambda)](1-\alpha)y_t \equiv \Lambda(\lambda)y_t,$$

and we note that $\Lambda'(\lambda) < 0$: arranged marriage reduces growth. The reason is simply that when fathers receive more of the bride-price, daughters receive, and invest, less.

Substitute (39) and (40) into the production function (35), and we obtain the growth rate of output:

(41)
$$\frac{y_{t+1}}{y_t} = \{\Psi(\lambda)\}^\alpha\{\Lambda(\lambda)\}^{1-\alpha} \equiv \Omega(\lambda),$$

where $\Omega'(\lambda) < 0$, i.e., arranged marriage reduces growth. The mechanism is two-fold. Arranged marriage lowers incentives for men to save and gives women fewer resources to invest in their children. The importance of each depends on the shares of physical and human capital in the production function, and on other exogenous parameters (such as π).

3   Discussion

Our paper claims that love marriage, as opposed to arranged marriage, redistributes resources from old to young; and from men to women. This, we

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[18]Recall that only men save, so $a_t/2$ is period-t savings per worker (since a_t is savings per couple). Likewise, each worker has one child (since each couple has two children). Thus, $k_{t+1} = a_t/2$.

argue, may encourage human and physical capital accumulation. Thus, arranged marriage – common in many parts of the Middle East, South Asia, and Africa – may be an institution that hampers development. The argument is consistent with the greater attention the role of women in development, and the institutional barriers facing them, have received recently (e.g., [World Bank 2001]).

Fertility Our results could be reinforced by the explicit modelling of the interplay between fertility and growth, along the lines of e.g., Becker and Barro [1988]; Becker, Murphy, and Tamura [1990]; Galor and Weil [1996]. For instance, a shift to love marriage raises the income of women which may induce a growth promoting quantity-quality shift in children.

Fertility patterns may also depend directly on marriage regime. It seems reasonable to conjecture that arranged marriage would lead to higher fertility since it places more power in the hands of the old/men, and these groups may prefer quantity over quality compared to young women.

Another reason why love marriage may lead to lower fertility is that it allows women to retain some control over fertility (for a lower bride-price). By contrast, if she is sold by her father, he may want to give the husband entire control. Hence, women may have better control over their fertility in love marriage which may lead to fewer children (assuming that women have a higher cost of rearing children than men). Moreover, the shift from joint or extended families to the nuclear family (potentially implied by love marriage) may raise the private cost of child rearing since parents cannot free ride on relatives to the same extent [Ray 1998].

Arranged marriage more efficient? The growth enhancing effects of love marriage are stronger the higher the wage rate. In model A, the higher the wage rate, the more likely love marriage is to outperform arranged marriage. Similarly, in model B the growth advantage of love marriage is scaled by the wage level, so that although love marriage always outperforms arranged marriage, the gap in growth rates increases in the wage rate. Hence, at low levels of development where the return to human capital is low, switching to love marriage may have small, or negligible, effects on growth. In other words, while love marriage may generate conditions under which an increase in the return to human capital has an effect on growth, the growth effects could be initially small and not very visible prior to a rise in the return to hu-

man capital. This suggests an explanation to why love marriage was largely limited to Europe for so long and why its growth promoting features were not immediately evident.

In this paper, the reason love marriage generates more growth is that it shifts resources from the older to the younger generation, and the latter – by virtue of having longer to live – are the ones who invest in human or physical capital. However, another reason why arranged marriages have been so prevalent for most of history may be that arranged marriage was at least as efficient as love marriage. Arranged marriage gives old people with many adult daughters an advantage. Hence, it favors both longevity and population growth. Longevity may be an advantage in a society where experience matters more for productivity than human capital investment. Population growth may be an advantage when population density is low. Both are arguably features that may describe most of human history. Moreover, if the old have a higher propensity to invest in the future than the young, then our results are reversed, and arranged marriage can result in higher growth than love marriage.

Lastly, if there is no third generation, i.e. only children and their parents, love or arranged marriage will not have an impact on the redistribution from old to young (obviously, the gender dimension would remain). Hence in societies with short life expectancy, the difference between love or arranged marriage may be academic. However, to the extent low life expectancy is driven by infant and child mortality, it does not imply that children do not have grand parents. The presence of grand parents is determined by mortality *conditional* on having reached adulthood (and reproduced), and it is doubtful if this life expectancy changed much before 1750 in Europe [Mokyr 1990].

Love v. arranged marriage and sorting   Do love and arranged marriage institutions result in different sortings and thus output? This paper has emphasized payments (and agency) 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 that carry more weight.[19] On the other hand, one may ask to what extent these

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[19]Wolf [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 be shifted from the parents. This is an example where the absence or presence of love redistributes

are important enough to have 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 a significant degree 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 earning 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 affected by who has agency, as an application of the Coase theorem would suggest.

Love v. arranged marriage and stability Contemporary marriage in societies practising arranged marriage tends to be more stable than in those practising love marriage. Arranged marriage can avoid the pitfalls of myopia on the part of the young and may thus be 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 [2002]. For instance, Phillips [1988]:402 wrote about the stability of European marriages until the mid 18th century: "Husbands and wives stayed together...not necessarily because the spouses were morally superior to later cohorts of husbands and wives, nor because they loved each other more deeply or cared more for their children, nor because they worked harder at their marriages and were less fickle than their descendants, but simply because there was nothing else they could do, and they accommodated themselves to that reality." Phillips located the beginnings of mass divorce to the 19th century.[20]

Muslim marriages were probably more unstable than marriages in Europe before the 19th century. For instance, Rapoport [2001] found that about one third of marriages among the elite in Cairo in the late 15th century ended in divorce.

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resources rather than affects sorting or stability of marriage.

[20]In 1857, five divorces were granted in England, (Phillips [1988]:404).

It is unclear if marriages (arranged) in Imperial China (where divorce was allowed) were more stable than those in Europe before the 19th century. In China, the head of household had the right to divorce any household members. Hence, a son's marriage was initiated by the father's purchase of a bride, and could be terminated by the father's selling [Cheung 1972].[21]

Dowry?   Dowry raises two questions. First, how would the results be modified by the practise of dowry? Dowry would be beneficial for growth because it redistributes resources from the old to the young, and from men to women (i.e., from brothers to sisters).

Second, does dowry belie the assumption that men pay to marry? Becker used the term dowry to refer the net payment at the time of marriage that cleared the marriage market. If this payment was to the groom, it was called dowry, if to the bride, bride-price. However, this notion of dowry does not correspond to neither an implicit payment to groom (since the groom could still be the net contributor over the life of the union), or what is typically meant by dowry. The term dowry, as understood by anthropologists (and laymen), is not a negative bride-price, but a gross transfer from the bride's kin to her (not a net transfer from the bride side to the groom side), see also Zhang and Chan [1999]. Goody [1973]:6 wrote that "Bridewealth and dowry then are very far from being mirror opposites. Indeed, the mirror opposite of bridewealth would be groomwealth; and of bride-service, groom-service. But there is little to be put in these two boxes by way of actual cases..."[22]

While there are examples of brides contributing more material resources to a couple than the grooms (in the form of inheritance, wealth and income), these are however the exception. Women paying for marriage typically arises if marriage to the groom confers significant social status or political favors to the bride and her kin, more likely to be the case under monogamy since the groom is barred from taking additional wives and thus cannot dilute any

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[21]A system in which the person who decides marriage also decides divorce is likely to produce more stable marriages than one in which these two decisions are vested with separate persons. Contemporary China and Indonesia may provide examples of the latter. Hull [1975]:Ch 5, in her study of Indonesia, found that marriages arranged by parents were much more likely to end in divorce than those arranged by the spouses themselves. Zeng, Schultz, and Wang [1992] reported a similar pattern in China.

[22]The 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.

benefits accruing from marriage to him.

Finally, the prevalence of dowry today in India is a fairly recent phenomenon and may be the product of rising affluence (as opposed to deteriorating marriage market conditions for brides). Historically, there are many examples of rising wealth being followed by "dowry inflation" (e.g., Stuard [1981]; Ebrey [1996]:158-161). Still, for instance, in the ICRISAT data, *net* dowry (bride side's contribution minus groom side's contribution at the time of marriage) was overwhelmingly negative among the marriages concluded before 1940 [Edlund 2000].

Other Eurasian cultures   The Eurasian continent housed important cultures other than the European, Indian or Chinese. Buddhist Burma and Thailand allowed for polygyny but resembled Europe 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 [Kressel 1977]. Muslim marriage limits the number of concurrent wives to four, and women cannot contract marriage but are under the tutelage of a male guardian. In Judaism, polygyny was originally allowed and individual consent was deemed important for a marriage to be valid. However, Judaism renounced polygyny around the 10th century in Europe, and the individual consent requirement was often compromised [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 Jewish purchase price, was paid to the bride's father, but later the bride became the recipient (Epstein [1973]:58).

Heterogeneity   We conclude with a note on the lack of heterogeneity in our modeling approach. By keeping each cohort's men and women identical the model remains tractable. However, this setting does not allow for intra-cohort income distribution to have an impact on growth. Hence, while there may be reasons to believe that the mass of a particular class, for instance the middle or the capitalist class, is important for growth, we cannot address this. Nor do we address the importance of the income distribution for savings, as noted by Cole, Mailath, and Postlewaite [1992], among others. We abstract from these not because they are irrelevant, but rather because our focus is elsewhere.

Moreover, this may seem like an artificial environment in which to study polygyny since its existence may hinge crucially on male relative to female heterogeneity [Becker 1991]. The set-up, however, allows us to focus on a potentially harmful effect of polygyny that, to our knowledge, has not yet been recognized: rent seeking in the form of son biased investments.[23] While it has been noted that polygyny may encourage excessive male competition for partners, the focus has been on elevated male mortality, not on inefficient allocation of parental resources.[24]

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[23]The existing literature has focused on the potentially asocial behavior associated with bachelorhood (a by-product of polygyny), e.g., Becker [1991]; Posner [1992].

[24]In the late 18th century, 15 male Bounty mutineers and 13 Polynesian women settled on Pitcairn island. Male to male competition for these females was intense and 18 years later only one male remained. Twelve had been murdered, one had committed suicide, and one had died a natural death. The surviving male became a devout Christian and preached strict monogamy [Brown and Hotra 1988].

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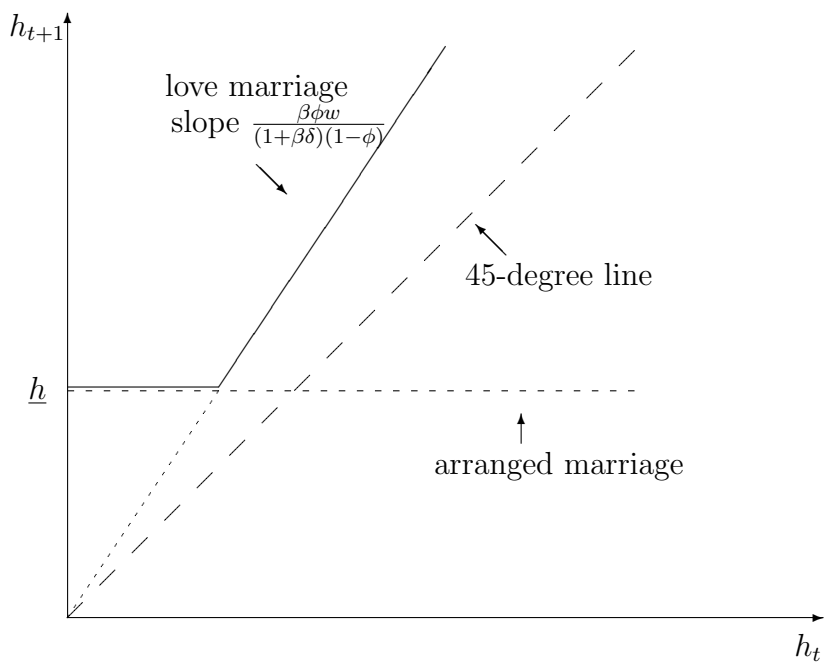
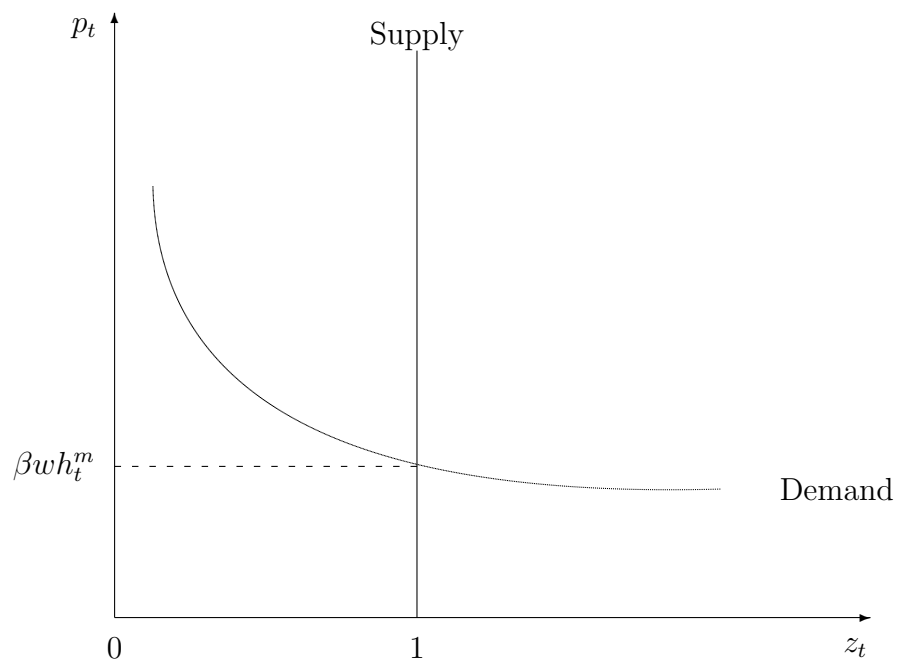Figure 1: Human capital dynamics under love and arranged marriage

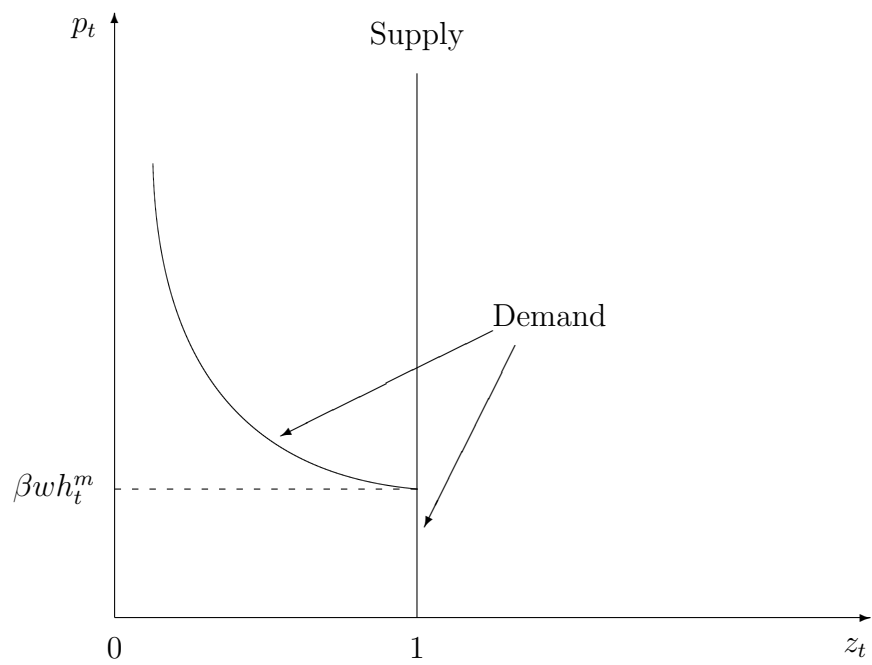Figure 2: The marriage market under polygyny

Figure 3: Marriage market equilibria under monogamy

Appendix

Table 1: Forms of marriage payment among pre-industrial societies

N	%	cum. %	Payment
646	51	51	Bride-price to bride's family
123	10	61	Bride service to bride's family
39	3	64	Sister or female relative exchanged for bride
68	5	69	Token bride price
63	5	74	Gift exchange, reciprocal
276	22	96	Absence of consideration
33	3	99	Dowry to bride from her family
19	1	100	Missing
1267	100		Sum

Source: Murdock's Ethnographic Atlas Codebook, 1998 World Cultures 10(1).

Table 2: 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]).

Table 3: Growth rates by marriage regime.

	Monogamy	Polygyny
	$\gamma w \times$	
Love	$\frac{1+\beta}{1+\gamma}$	$\frac{\mu+\beta}{\mu+\gamma}$
Arranged	$\frac{1}{1+\gamma}$	$\frac{\mu}{\mu+\gamma}$