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**WHY DOWRY PAYMENTS DECLINED WITH
MODERNISATION IN EUROPE BUT ARE RISING
IN INDIA**

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Why dowry payments declined with modernisation in Europe but are rising in India[¤]

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Abstract

In contrast to most dowry oriented societies where payments have declined with modernisation, those in India have undergone significant inflation over the last five decades. This paper explains the difference between these two experiences by focusing on the role played by caste. The theoretical model contrasts caste and non-caste based societies: in the former, there exists an inherited component to status (caste) which is independent of wealth, while in the latter, wealth is the primary determinant of status. Modernisation is assumed to involve two components: increasing average wealth and increasing wealth dispersion within status (or caste) groups. The paper shows that, in caste-based societies, the increases in wealth dispersion which accompany modernisation necessarily lead to increases in dowry payments, whereas in non-caste case based societies, increased dispersion has no real effect on dowry payments and increasing average wealth causes the payments to decline.

JEL Classi¯cation Codes: J12, J16, D10
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1. Introduction

This paper is motivated by the dramatic dowry inflation occurring in India today. Real dowry payments, the transfer of wealth from bridal families to grooms and their families at the time of marriage, have risen over the last five decades. Rao (1993a and 1993b) and Deolalikar and Rao (1990) show that, from 1921-1981, holding constant grooms' characteristics, controlling for the wealth of both families, and imposing a real price index, the price of husbands has gone up.[1] The social consequences of this increase in dowry payments are severe. The sums of cash and goods involved are often so large that the payment can lead to impoverishment of the bridal family. This has a devastating effect on the lives of unmarried women who are increasingly considered burden-some economic liabilities. The custom of dowry has been linked to the practice of female infanticide and, among married women, to the more obvious connection with bride-burning and dowry-death, i.e., physical harm visited on the wife if promised dowry payments are not forthcoming.[2] In addition to real dowry inflation, the custom of dowry payments has spread geographically and socially throughout India into regions and communities where it was never practiced before (Paul 1986, Rao 1993b, Kumari 1989, Srinivas 1980, Sharma 1984).[3]

Income transfers from the family of a bride to the groom or his parents (dowry), or from the groom's parents to the bride's parents (bride-price), have existed for many centuries. The dowry system dates back at least to the ancient Greco-Roman world (Hughes 1985). With the Barbarian invasions, the Greco-Roman institution of dowry was eclipsed for a time as the Germanic observance of bride-price became prevalent throughout much of Europe; but dowry was widely reinstated in the late Middle Ages. It is well known that in Medieval Europe and later, dowries were common practice among the aristocracy.[4] Nonetheless, the convention of dowry has been historically limited to only four percent of the cultures analysed in Murdoch's World Ethnographic Atlas and

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[1]An escalation in Indian dowries has been previously recognized by numerous social scientists. See, for example, Epstein (1973), Srinivas (1984), Paul (1986), Billig (1992), Caldwell et. al. (1983), and Lindenbaum (1981).

[2]Bloch and Rao (1999), Kumari (1989), Chauhan (1995), McCoid (1989), Pawar (1990), Lata (1990), and Pathak (1990) address these issues.

[3]Various authors have documented the transition from bride-price to dowry in southern India (Caldwell et. al. 1983, Billig 1992, Epstein 1973, Srinivas 1984). Similarly, dowry payments now take place in rural areas whereas they were once largely restricted to urban life (Caplan 1984 and Paul 1986). The custom has also permeated the social hierarchy: typically, the practice is adopted by the upper castes, then over a period of time passes down into lower castes, eventually reaching the Harijans, the lowest caste (Billig 1992, Caldwell et. al. 1983, Upadhya 1990).

[4]Botticini (1999) studies the dowry system in a Tuscan town between 1415 and 1436. Stuard (1981) investigates dowries transferred among the nobles of medieval Ragusa (Dubrovnik) during 1235 to 1460. See Hughes (1985) for a historical survey of dowry in Mediterranean Europe.

restricted geographically to Europe and East Asia.[5] The societies in which dowries appear seem to exhibit substantial socio-economic differentiation and class stratification.[6] Moreover, their marriage practices are typically monogamous, patrilineal, i.e., class status follows from the husband's, and endogamous, i.e., men and women of equal status tend to marry (Gaulin and Boster 1990). Marriage patterns in India follow these lines precisely; individuals are ranked according to caste, same-caste marriage is essentially universal and, in the rare cases of across-caste marriage the husband's caste determines that of the children.

Dowry escalation has also occurred in other societies. There are reports of dowry inflation in Roman times and amongst medieval noble families across Europe (see, for example, Stuard 1981, Molho 1994, Saller 1994, and Stone 1965). China also seems to have experienced an episode of dowry inflation amongst the upper classes during the Sung period, 960-1279 (see, for example, and Ebrey 1991 and 1993).[7] However the general pattern in Europe was one of decline and eventual disappearance of dowry with modernisation, as documented by Lambiri-Dimaki (1985).[8] The Indian experience of dowry increases and diffusion with modernisation stands in stark contrast and remains unexplained.[9]

The present paper explains this difference by emphasizing the crucial role played by caste. The model developed here contrasts caste and non-caste based societies. In the former, there exists an inherited component to status (caste) which is independent of wealth, while in the latter, wealth is the primary determinant of status. Modernisation comprises two components: an increase

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[5]Murdoch's World Ethnographic Atlas examines 1267 societies.

[6]This argument is made by Jackson and Romney (1973), Harrell and Dickey (1985), and Gaulin and Boster (1990).

[7]However, in no period was China a dowry society comparable to India (see Tambiah 1973). China was historically both a brideprice and dowry paying society. See Chan and Zhang (1999) for an analysis of their co-existence in Taiwan and Watson and Ebrey (1991) for an overview of marriage in China.

[8]This is also documented for Brazil by Nazzari (1991). Dowry in China ceased to play an important role after the Sung period (see Ebrey 1991).

[9]Another more straightforward economic explanation for dowry inflation than the one provided here recognizes dowry payments as a price, which increases from a scarcity of grooms. This \marriage squeeze" argument relies on the fact that, in a rapidly growing population, where grooms marry younger brides, grooms are in relatively short supply in the marriage market (see, for example, Rao 1993a and 1993b, Billig 1992, and Caldwell et. al. 1983). Since brides reach marriageable age ahead of grooms, increases in population impact upon brides first, thus causing an excess demand for grooms and an increase in price, i.e., dowry inflation. However, it has been shown by Anderson (2000), that this theory is untenable when modeled in a dynamic framework. That is, population growth cannot explain dowry inflation if women who do not find matches at the 'desirable' marrying age can re-enter the marriage market when older, as generally occurs. Secondly, most societies are characterized by persistent differences in ages of spouses, with men on average marrying women who are younger (see, for example, Casterline et. al. 1986), and population growth, however, the convention of dowry is limited historically to relatively few cultures. Notwithstanding this, it is worth noting that the explanation for dowry inflation in this paper can still occur with population growth, i.e., a surplus of brides.

in average wealth across the society and increased wealth dispersion within status groups. The paper's main result is that, in the caste case, the increased dispersion in wealth accompanying modernisation necessarily leads to increases in dowry payments, whereas in the non-caste case, increased dispersion has no real effect on dowry payments and increasing average wealth causes the payments to decline.

Marriage is analysed using a matching model in which dowries are solved as an equilibrium payment made by a bride's family for a groom of a certain market value. An increase in the dispersion of grooms' market values (i.e., wealth) should be expected to increase the spread of dowries.[10] The somewhat surprising result demonstrated here is that, in equilibrium, this also raises average payments when caste (or inherited status) plays a role. That is, dowry inflation occurs in caste based societies. The intuitive reason for this is brought out in a simplified version of the main model which is developed in Section 2.

In the absence of caste, however, an increase in dispersion is shown to simply lead to an increase in the dispersion of dowry payments, with no real inflation. Thus in societies where the class structure only reflects wealth differentiation, equilibrium dowry payments may occur, but the model predicts dowries should not inflate with increased wealth dispersion. Moreover, Section 4.1 demonstrates that if individuals on average become increasingly better off with modernisation, such societies will exhibit dowry deflation. This decreasing wealth effect can also occur in caste-based societies, but Section 4.2 establishes conditions under which the inflating effect outweighs it.

It seems indisputable that the modernisation process entails increasing average wealth, but it need not always be the case that the second assumed component, increased dispersion in wealth within status groups, need arise. In the present-day Indian context, however, the evidence strongly supports this assumption. Traditionally, one's caste (status group) innately determined one's occupation, education, and hence potential wealth in India. Modernisation in India has weakened customary barriers to education and occupational opportunities for all castes and, as a result, increased potential wealth heterogeneity within each caste (see, for example, Singh 1987, Sharma 1984, Kumar 1982, and Singh 1992). This characteristic of modernisation seems also to have played a role during the Sung period in China. There the size of the educated class grew rapidly and, as a consequence, created much competition amongst the educated but non-aristocratic class for elite

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[10]That dowry payments can arise due to a matching problem in the marriage market which consists of relatively heterogeneous grooms is demonstrated by Stapleton (1989) and Edlund (1996).

positions. This contrasts with the prior T'ang period, where there existed a very small number of ruling aristocrat families with no possibility for other classes to acquire elite positions (see, for example, Ebrey 1991). In much of pre-industrial Europe, status group was also essentially determined by birth. There also modernisation created new economic opportunities that tended to increase the dispersion of incomes within status groups.[11] As Stearns (1967) documents, industrialisation at the beginning of the 19th century brought about the abolition of feudalism, the establishment of theoretical equality, and the end of inherited legal status. Modernisation then led to the decline of the aristocracy and created a society where wealth became the principal criterion of social standing.[12] This is in great contrast to present-day India where the inherent caste hierarchy remains rigid. This paper argues that it is this key difference between the modernisation processes in present-day India and pre-Industrial Europe that explains why dowries are increasing in India and declined in Europe. As already mentioned above, the theoretical model predicts that societies based on inherited status will experience inflating dowry payments with modernisation whereas non-status based societies will see a decline. This explanation is also consistent with other instances of dowry inflation which similarly confirm the model's prediction of the importance of inherited status.

The central focus of the paper is to explain why modernisation affects dowry payments differently in caste based, compared to wealth based, societies. The main model of the paper, described in Section 3, develops a matching framework for analysing the marriage market. Before developing this general model, however, the next section provides a toy model that provides the intuition for why caste (inherited status) plays a central role in generating dowry inflation. Because, increased wealth dispersion has no affect on real dowry payments in a wealth-based society, the paper isolates the two components of modernisation and first explores the impact of increased wealth dispersion only in a caste-based society in Section 3.3. Section 4 then analyses the impact of increasing average wealth on dowry payments in both wealth and caste based societies. Section 5 concludes.

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[11]The basis of pre-industrial society was agricultural, ruled by the landed aristocracy. Industrialisation brought about mobility, urbanisation, and created new economic groups. See Stearns (1967) for a general survey of the social impact of industrialisation in Europe.

[12]The social changes did not occur precisely at the same time nor at the same rate across Europe. In particular, the decline of the importance of inherited status occurred ¯rst in the west of Europe then later in the east and south (see Stearns 1967).

2. Increased Wealth Dispersion and Caste

As already discussed, the important feature of modernisation which impacts upon dowry payments differently in wealth and caste based societies is argued to be increased wealth dispersion within status groups. This section develops a simplified version of the main model to highlight the role played by caste, or inherited status groups, in this process.

Consider the case of two status groups, with 3 grooms and 3 brides in each. Since new income earning opportunities brought about by modernisation are predominantly filled by men, modernisation has relatively little impact on the value of brides. Assume then, for simplicity (this will be relaxed in the main model), that all 6 brides are homogeneous (from the perspective of grooms), whereas grooms in the higher status group are of higher quality, represented by a higher income, i.e., $y_2 > y_1$, with the high status group being denoted by 2 and the low by 1.

In a wealth based society, brides are only concerned with the income, y, of their potential partners, whereas in a caste based society, they are also concerned with their status group or caste, equal to 1 or 2. In this latter case, brides rank grooms in terms of both wealth and caste. Suppose that there is some substitutability between these two components and recall that caste is patrilineal. Substitutability implies that, because brides gain by marrying up in caste, brides of the lower caste are less sensitive to income differences in higher caste grooms than are brides of the higher caste. To make the argument even more stark, assume preferences are such that a lower caste bride is indifferent between grooms of different incomes in the higher caste, that is, only caste matters to them. This will again be relaxed in the main model. Brides are, of course, sensitive to income differences of grooms in their own caste.

In the marriage market, dowry is a bid that a bride's family makes for a groom of certain market value. As a result, in equilibrium, higher status grooms receive higher dowry payments. Without explicitly solving for the equilibrium, the precise details of which are not consequential for the point made here, denote the dowry payment that a high status groom receives by $d(2)$ and that of the lower status by $d(1)$, where $d(2) > d(1)$. Note that there are only two prices at this stage because all grooms within each caste group are identical.

Now consider an increase in the wealth dispersion of grooms in status group 2 such that the three grooms now have incomes equal to $y_2 - \mu$; y_2; and $y_2 + \mu$; where $\mu > 0$. In a wealth based society, this increased dispersion will increase the spread of dowries in status group 2. Therefore,

dowries, in their simplest form, will equal $d(2) - \mu$, $d(2)$, and $d(2) + \mu$, but average dowry payments will remain unchanged.

But this will not be the outcome in a caste based society. In this case, because lower caste brides are only concerned with the caste of higher caste grooms, they are willing to offer a dowry payment $d(2)$ to all grooms in caste 2, including the groom with income equal to $y_2 - \mu$. Brides in caste 2, however, value this lower quality groom less, and would like to offer him $d(2) - \mu$. But because these high caste brides will forfeit their caste ranking if they marry into a lower caste, they are willing to match the higher payment this groom is offered from brides in the lower caste. This payment thus acts as a lower bound on the groom's dowry payment. The other two grooms in caste 2 in turn receive equilibrium dowry payments equal to $d(2) + \mu$ and $d(2) + 2\mu$ since they also have higher caste status but also have correspondingly higher wealth. As a result, average dowry payments increase in this caste based society when wealth becomes more heterogeneous within groups even though grooms' average wealth has not changed.

Due to the substitutability between groom's wealth and caste status (which has here been assumed to operate in a very stark way), increased wealth dispersion alone has caused dowry inflation in this caste based model. The point of this model has been to show the avenue through which caste affects payments. However, the model is dramatically simplified since it does not solve for equilibrium values, nor properly specify preferences. The more general model developed in the next sections does both of these things and introduces the other component of modernisation, i.e., increases in average wealth.

3. The Model

The model is developed for the general case of a caste based society which is segregated into caste groups denoted by i, for $i \in \{1, \ldots, h\}$, where $i = 1$ denotes the lowest caste and $i = h$ the highest. Caste is used throughout the paper to refer to the inherited component of status, which is independent of wealth. For analysis of societies that are not caste based we simply collapse the set of caste groups into a single element so that the only differentiating feature is wealth.

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3.1. Preferences

A traditional marriage in dowry paying societies is arranged by the parents of the prospective brides and grooms. Marriage generally unites men and women from the same caste (or status group); in fact, several studies find that assortative mating on the basis of caste in India is close to perfect (see for example, Deolalikar and Rao 1990, Bradford 1985, and Driver 1984). However, the rules of a traditional Hindu marriage do allow for across-caste marriages between males of higher castes and females of lower castes, although the opposite is condemned (Rao and Rao 1982, Avasthi 1979). If a man marries a woman from another caste, he and his children are not deprived of his caste membership; a woman marrying outside her caste, however, loses her membership and her children take on the caste of her husband (Nishimura 1994). Hence for a woman, marrying down in caste is highly detrimental, whereas marrying up in caste may not be. Parents are pressured to marry their daughter to a man who is of the same or higher caste, lest their status be reduced to that of the person who their daughter marries (Rao and Rao 1982, Avasthi 1979). Similar preferences existed for parents in the elite classes of Medieval and Renaissance Europe where social status also passed through the male line and there existed strong prejudices against daughters marrying "down", i.e., marrying men from a lower status group (see, for example, Johansson 1987 and Chojnacki 1974).

Not only are there differences between men and women in potential partnerships, but also the importance of marriage is significantly greater for women. Families have an immense responsibility to marry off their daughters, and the sense of being a liability to one's parents is strong amongst unmarried women. Asymmetries between men and women further extend into the process of selecting mates. Typically, in India, the most important quality of a bride is a good appearance, whereas for a groom it is the ability to earn a living, often reflected in his educational level (see, Rao and Rao 1980, Caldwell et. al. 1983, Billig 1992, Caplan 1984, Hooja 1969, Avasthi 1979, and Chauhan 1995).

We capture these features in the following assumption:

Assumption 1: The quality of a groom in caste i, as perceived by a bride of caste j, is denoted $q(i - j; y_{ik})$, where $q(\cdot)$ is increasing and concave in both its arguments. Both arguments are substitutable (weakly), hence:

$$q(i - j; y_{ik}) - q(i - j; y_{ik} - \mu) > q(i - j + 1; y_{ik}) - q(i - j + 1; y_{ik} - \mu) \qquad (3.1)$$

for all $i \neq j$ and y_{ik} is the kth element from the income distribution of caste i.

Assumption 1 implies that the absolute utility value of a given groom is greater the lower the caste of the bride, but that brides of lower castes are less sensitive to income differences in higher caste grooms than are brides of higher castes.[13] This captures the feature of hierarchical societies where lower caste brides receive a benefit from marrying higher than their own caste. Substitutability between characteristics consequently implies that low caste brides are not as concerned with the wealth of a higher caste grooms as are brides of the groom's same caste, who do not receive any such benefit to marrying at their family's level.

In a wealth-based society, there is no caste component to a groom's quality, i.e., $q(\cdot)$ is only a function of his income.

The bride's family maximizes a utility function, defined over q and a composite family consumption good c, subject to their budget constraint, $y_{jm} \geq pc + d$, where y_{jm} denotes the income of the bridal father, i.e. the mth element from the income distribution of caste j, p is the price of c, and d is the dowry payment for a groom of quality q.[14] Assuming separability in q and c, and that the budget constraint binds, the utility function for a bride's family is represented by:

$$U = q(i - j; y_{ik}) + u(y_{jm} - d),$$ (3.2)

where p is suppressed since it plays no role. The function $u(\cdot)$ is increasing and concave.

For simplicity, assume that a bride's quality does not enter directly into the marriage decision of grooms, this shall be relaxed in a later section. The utility function for a potential groom and his family is:

$$V = v(d),$$ (3.3)

where $v(\cdot)$ is increasing in d.

In equilibrium, dowry payments are a function of the utility parameters of (3.2), the incomes of both families, and of time, t, (since income distributions are varying through time), that is, $d(i - j; y_{ik}; y_{jm}; t)$. However, since the purpose is to monitor changes in dowry payments for a given

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[13] In the event of not marrying a bride keeps the caste of her father.

[14] It is implicitly assumed that each family has only one bride. Introducing more than one daughter into the analysis will alter the level of income available for the marriage of each daughter but will not affect the general results.

quality groom, defined by his income and caste, through time, the notation can be compressed into $d(y_{ik}; t)$.

3.2. Pre-Modernisation Equilibrium

Equilibrium dowry payments for the benchmark pre-modernisation case, with grooms homogeneous within each caste, are first considered. Pre-modernisation income levels are defined as follows:

Assumption 2: Pre-modernisation, each male member of caste i has identical corresponding potential wealth equal to Y_i, where $Y_1 < Y_2 < \mathcal{CCC} < Y_h$.

We take dowry payments in the lowest caste as numeraire. The price for the lowest caste grooms is pinned down by participation constraints for both brides and grooms by arbitrarily dividing the surplus to marriage. An equilibrium is a set of prices, $d(Y_i; 0)$, $1 \cdot i \cdot h$, for a given income distribution, such that no bride or groom can be made better off by marrying someone else. In the marriage market, brides of different castes compete for grooms of varying qualities in rank order of their caste. All potential brides prefer men of higher castes, but since brides of higher castes have wealthier fathers and are subsequently willing to offer higher dowries than lower caste brides, assortative matching according to caste (same caste brides are matched with same caste grooms) is an outcome.[15] That equilibria with positive assortative matching are the only stable equilibria when all men and women have identical preferences over potential mates, has been established elsewhere.[16]

In equilibrium, brides make large enough payments at marriage to ensure that they are not outbid by a lower caste bridal family. In the case of the lowest caste, prices are such that grooms and brides prefer to marry than remain unmarried. The participation constraints for brides and grooms are:

$$q(0; Y_i) + u(Y_i \mathbin{\text{¡}} d(Y_i; 0)) \mathbin{\text{¸}} \overline{U} \tag{3.4}$$

$$v(d) \mathbin{\text{¸}} \overline{V} \tag{3.5}$$

where $\overline{U}$ and $\overline{V}$ denote the reservation utilities of an unmarried bride and groom respectively. There

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[15]The case where higher caste brides do not have wealthier fathers is considered later.

[16]See, for example, Becker (1991) and Lam (1988) for the case of transferable utility, and Gale and Shapley (1962) for the case of non-transferable utility. See also, Eeckhout (2000) for a study of the uniqueness of this equilibrium in the case of non-transferable utility.

can exist many potential equilibria in which (3.4) and (3.5) hold. More specifically, there exists a marriage payment $d(Y_1; 0) = \overline{d}$ such that all brides and grooms, in the lowest caste, prefer to marry than remain single if the following holds:

$$\Phi(\overline{V}) \cdot \overline{d} \cdot Y_1 \dot{\imath} \tilde{A}(\overline{U} \dot{\imath} q(0; Y_1)) \tag{3.6}$$

where $\Phi(\cent)$ and $\tilde{A}(\cent)$ are the respective inverse functions of $v(\cent)$ and $u(\cent)$. Restrictions (3.6) on $\overline{d}$ directly follow from the participation constraints of brides and grooms, (3.4) and (3.5). The left hand side of (3.6) is grooms' minimum acceptable dowry and the right hand side is brides' maximum willingness to pay. It is assumed that $\overline{U}$ and $\overline{V}$ are sufficiently small so that there exists a $\overline{d}$ where both parties prefer marriage to its alternative. Equilibrium payment $\overline{d}$ cannot be precisely determined without adding more structure to the basic framework. As it stands, $\overline{d}$ can be positive (a dowry) or negative (a bride-price). Assuming a numeraire $\overline{d}$, however, we can generate a set of equilibrium prices:

Proposition 1. In the pre-modernisation equilibrium, given a $\overline{d}$ satisfying (3.6), there exists a set of equilibrium prices, $d(Y_i; 0)$, $1 < i \cdot h$, for a given income distribution such that dowry payments are higher in higher castes:

$$\overline{d} < d(Y_2; 0) < \cent\cent\cent < d(Y_h; 0): \tag{3.7}$$

Proof of the above is in the appendix. To understand how dowry payments are determined, consider equilibrium conditions for members of a given caste i. The binding incentive compatibility constraints can be expressed in terms of only two castes, i and $i \dot{\imath} 1$. This follows because the highest price offered for a groom in caste i from all castes below is from the caste just below, $i \dot{\imath} 1$. Since it is never worthwhile for higher caste brides to marry down, due to concavity in caste, the amount a higher caste bride is willing to offer to marry into a lower caste is less than the lower caste brides are willing to pay grooms in their own caste. Hence offers from castes higher than i are not binding constraints.

The grooms of the higher caste i are more desirable to all of the brides in castes $i \dot{\imath} 1$ and i. Bridal fathers of the higher caste are wealthier and will therefore outbid brides in caste i for these more desirable grooms. Taking the dowry price for caste $i \dot{\imath} 1$ grooms, $d(Y_{i \dot{\imath} 1}; 0)$, as given, the highest price a bride of caste $i \dot{\imath} 1$ is willing to pay for a groom of caste i satisfies the following

equation:

$$q(0; Y_{i-1}) + u(Y_{i-1} - d(Y_{i-1}; 0)) = q(1; Y_i) + u(Y_{i-1} - d(Y_i; 0)) \qquad (3.8)$$

where a bride of caste $i - 1$ is indifferent between marrying grooms of caste $i - 1$ or i. The difference between the payments which solve (3.8), $d(Y_i; 0) - d(Y_{i-1}; 0)$, is positively related to $q(1; Y_i) - q(0; Y_{i-1})$; the marginal gain to a caste $i - 1$ bride from marrying a groom of caste i. In this equilibrium, brides of caste i pay $d(Y_i; 0)$, which solves (3.8) and match with caste i grooms for all $1 < i \leq h$. The grooms of caste i receive a higher payment than those of caste $i - 1$, not because caste i brides have wealthier fathers, but rather because they are relatively more desirable than lower caste grooms.[17] Because of concavity in $q(\cdot)$, the marginal gain to a bride from marrying up in caste is less than the marginal disutility of marrying down in caste; it is always worthwhile for a given bride to make the corresponding payment which satisfies the incentive compatibility constraint (3.8).[18]

Equilibrium marriage payments are a function of the quality differences between grooms, the income of bridal fathers, and of the numeraire payment $\overline{d}$. The specification of $\overline{d}$ does not add to the central argument and is not explored further (the focus here is on how a process of modernisation affects the time path of dowry payments, the initial starting point for that path is not relevant).[19] It is possible that, because lowest caste grooms are of the least desirable quality, the marriage transfer is such that these grooms are pushed down to their reservation utility, and therefore that $\overline{d}$ is feasibly negative; i.e., a bride-price. The analysis is thus not inconsistent with bride-prices occurring in lower castes and dowries in upper castes in the pre-modernisation case (as observed in reality).[20]

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[17]That higher dowry payments are transferred in higher castes is a relationship confirmed in numerous studies (see, for example, Paul 1986 and Rao 1993b). It is perhaps worth noting that wealth differentiation among caste groups is not necessary for this result; a caste premium alone would be sufficient since $q(1; Y) > q(0; Y)$ for all Y. The assumption of increasing wealth in rank order of caste is employed to avoid the possibility of higher caste brides not being able to outbid lower caste brides due to credit constraints, as could be the case if $Y_i > Y_{i+1}$. This assumption is relaxed later.

[18]It is implicitly assumed that equilibrium dowry payments satisfy the participation constraint of brides. The case for when this assumption does not hold is analyzed in Section 3.3.3 where, due to credit constraints, higher caste brides prefer to marry into lower castes than compete with lower caste brides for grooms within their own caste. In reality, however, the families of brides will impoverish themselves before marrying their daughters into a lower caste, or leave them unmarried.

[19]There is a substantial literature which does address precisely this question. See, for example, Becker (1991), Grossbard-Shechtman (1993), Chan and Zhang (1999), and Botticini and Siow (2000).

[20]Traditionally, bride-price payments were practiced amongst the lower castes whereas dowry payments occurred within the upper castes (see, for example, Blunt 1969, Srinivas 1978, and Miller 1980). Additionally, there are numerous accounts of a transition from bride-price to dowry in the context of modernization, (see, for example,

The existence of dowry payments here is due to the segregation of grooms into castes that vary by their income and caste ranking. If all grooms were identical in terms of quality, no marriage transfers would be necessary to satisfy equilibrium incentive conditions for brides. That is, with homogeneous grooms and dowry payments equalling zero or a constant, no married couple would prefer to be matched with anyone else, since all other matches would be identical from each individual's perspective. Alternatively, when grooms are heterogeneous and brides are homogeneous, as in the above analysis, a marriage market equilibrium exists only if higher dowry payments are transferred to higher quality grooms. Otherwise all brides married to lower quality grooms would prefer to match with higher quality grooms and a stable equilibrium in the marriage market would not exist. Dowry payments occur in a wealth differentiated society for the same reason, there high wealth grooms are compensated for the relatively high wealth that they bring to the marriage. That dowry payments arise due to quality differentiation amongst grooms coincides with a consensus in the literature that the custom of dowry is generally confined to socially stratified societies (see, for example, Goody 1976, Harrel and Dickey 1985, Gaulin and Boster 1990, and Jackson and Romney 1973).

It is important to note that an equilibrium of endogamy (i.e., same status matching) can only be supported if dowry payments occur (when grooms are heterogeneous). The underlying mechanism which determines the value of these payments is that higher status brides outbid lower status brides. This does not imply that, in reality, lower caste brides actively compete with higher caste brides for their grooms. More realistically the analysis implies that, if payments did not exist there would exist economic incentives for members of one caste to look for matches with members of the others. With the existence of payments in equilibrium however, individuals have no incentive to marry outside of caste, so that the system (of same caste marriages) remains an equilibrium outcome.

Caldwell et. al. 1983, Lindenbaum 1980, and Billig 1992). These ¯t well with the analysis here where it will be demonstrated that development places an upward pressure on real marriage payments turning formerly negative payments (or bride-prices) into positive payments (or dowries). However, the initial existence of bride-prices in lieu of dowries is not explained. Bride-prices in India are typically associated with lower castes residing in rural areas and are more common in southern regions. It can be reasoned that the value of a bride is higher in poorer families where women generally engage in informal income-earning activities. Similarly, the societies of South India are traditionally matrilineal and in consequence women have a somewhat higher status compared to northern states. This could lower initial dowry levels by increasing the share of marriage surplus accruing to bridal families. When men are also a homogeneous group, as in the pre-development scenario, marriage negotiations which reward this higher value for women could induce bride-prices to occur. Once only men begin to reap the bene¯ts of development, the relative value of men and women can be overturned and dowry payments emerge.

3.3. Increasing Within Group Wealth Dispersion

Modernisation has two components in our framework: an increase in average wealth, and an increase in dispersion within caste groups. In this section we consider the impact of the increase in dispersion and delay consideration of increasing average wealth to Section 4.

The effects of modernisation are typically felt more strongly on the groom's side of the marriage market, since formal job opportunities are filled predominantly by males.[21] Hence it shall be assumed for now that increased wealth dispersion occurs only amongst grooms while among brides the situation remains unchanged. This assumption is relaxed in a later section.

For simplicity, the within caste group spreading of the income distribution around Y_i, which denotes the pre-modernisation income level in caste i, is assumed to affect caste groups in a chronological order, percolating downwards from the highest caste. This accords with the Indian context, where the pattern of increased heterogeneity seems to have followed a top-down path, but, in any case, does not qualitatively affect results.[22] In the first period of modernisation, members of caste h have income distributed around Y_h while incomes in other castes are unchanged. In the next period, members of caste $h-1$ follow suit, and so on. Thus, denote the period in which caste i undergoes its first increase in heterogeneity by s_i, where $s_h = 1$ and $s_{i-1} = s_i + 1$ for $1 < i \cdot h$. Let periods be denoted by t and we have the following,

Assumption 3: The evolution of wealth follows:

$$\text{for } t < s_i \quad y_i \in \{Y_i\} \tag{3.9}$$

$$\text{for } t = s_i + \iota \quad y_{ik} \in \{Y_i - (\iota + 1)\mu; \cdots; Y_i + (\iota + 1)\mu\} \tag{3.10}$$

where y_{ik} denotes the kth income of members of caste i and $\iota = 0; 1; 2; 3; 4; \ldots$

The wealth distribution thus evolves according to:

- Period 0: $\{Y_h\}; \{Y_{h-1}\}; \{Y_{h-2}\}; \{Y_{h-3}\}; \cdots ; \{Y_1\}$.

• Period 1: $\{Y_h - \mu; Y_h; Y_h + \mu\}; \{Y_{h-1}\}; \{Y_{h-2}\}; \{Y_{h-3}\}; \cdots ; \{Y_1\}$.

• Period 2: $\{Y_h - 2\mu; Y_h - \mu; Y_h; Y_h + \mu; Y_h + 2\mu\}; \{Y_{h-1} - \mu; Y_{h-1}; Y_{h-1} + \mu\}; \{Y_{h-3}\}; \cdots ; \{Y_1\}$.

$\vdots$

A discrete distribution has been chosen so as to allow marriage market equilibrium conditions to be defined simply over a given groom quality across periods, and enable a closed form investigation of real changes in dowry payments.[23]

To focus only on the role of increasing heterogeneity, consider a mean-preserving, discrete, and uniform income distribution across periods: Let $n^t(y_{ik})$ denote the number of men in caste i with income y_{ik} in period t.

Assumption 4: The evolution of wealth satisfies:

$$\text{for } t = s_i + \iota \quad n^t(y_{ik}) = n^t(Y_i) \quad \text{for} \quad y_{ik} \in \{Y_i - (\iota + 1)\mu; \cdots; Y_i + (\iota + 1)\mu\} \tag{3.11}$$

where $\iota = 0, 1, 2, 3, \ldots$ and $\sum_k n^t(y_{ik}) = \sum_k n^{t+1}(y_{ik})$ for all t.

The above implies that the number of men of each income level within a given caste and period is equal and that the total supply of grooms remains constant across periods.

With modernisation, not only are grooms within each caste becoming a more heterogeneous group, but so too are the fathers of the brides. We calibrate the time length of a period so that it reflects the time difference between two generations; the grooms of period t are thus the bridal fathers of period $t+1$. With assortative matching, grooms and brides marry according to both caste and income. The pattern of matching is complicated, however, by the time difference between two generations. Since, in any given period t, bridal fathers are less dispersed than grooms, brides with fathers of a given income level match with grooms of different income levels. This follows since, given Assumption 4, the number of grooms of a given income level in period t is necessarily smaller than the number of bridal fathers of a corresponding income of period $t-1$. Positive assortative matching then implies that the brides with the highest income fathers within the income distribution of period $t-1$, are matched with grooms of the two highest income levels from the income distribution of period t. A similar reasoning follows for low income bridal fathers and grooms. This pattern of

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[23]A marriage matching framework, analogous to the model here, for a continuous distribution of grooms and brides is considered in Burdett and Coles (1997); however, they do not analyse the occurrence of marriage payments.

matching of grooms and brides is formally established in the following lemma and proven in the appendix.

Lemma 1. A wealth distribution which satis¯es assumptions 2, 3, and 4 and positive assortative matching implies that: (i) for periods $t \geq s_i$, brides with fathers of income Y_i match with grooms of income $y_{ik} \in \{Y_i - \mu, Y_i, Y_i + \mu\}$; (ii) for periods $t \geq s_i + \iota$, where $\iota \geq 1$, brides with fathers of income $Y_i - \iota\mu$ match with grooms of income $y_{ik} \in \{Y_i - (\iota + 1)\mu, Y_i - \iota\mu\}$; and (iii) brides with fathers of income $Y_i + \iota\mu$ match with grooms of income $y_{ik} \in \{Y_i + (\iota + 1)\mu, Y_i + \iota\mu\}$.

For now, assume that the income distributions of each caste do not overlap. That is, as modernisation progresses, the richest groom in caste $i - 1$ has income less than the poorest groom in caste i. This assumption is relaxed later.

3.3.1. Equilibrium Dowry Payments

The following proposition states the effect on dowry payments within a given caste i, of its first increase in wealth dispersion. The more complicated time path of payments in all subsequent periods is considered in the subsequent proposition:

Proposition 2. A real increase in dowry payments for grooms with mean income, Y_i, occurs when caste i experiences its initial increase in wealth dispersion.

Proof: When modernisation occurs in period $t = s_i$, grooms in caste i become a more heterogeneous group. Brides in caste i compete with lower caste brides for the lowest quality groom in their caste and compete amongst themselves for those of higher quality. The highest payment caste $i - 1$ brides are willing to pay for the lowest quality groom in caste i satisfies:

$$q(0; Y_{i-1}) + u(Y_{i-1} - d(Y_{i-1}; s_i)) = q(1; Y_i - \mu) + u(Y_{i-1} - d(Y_i - \mu; s_i)) \qquad (3.12)$$

This condition, together with the equilibrium condition in the period prior to modernisation ($t = s_i - 1$), incentive constraint (3.8), implies:

$$q(1; Y_i) + u(Y_{i-1} - d(Y_i; s_i - 1)) = q(1; Y_i - \mu) + u(Y_{i-1} - d(Y_i - \mu; s_i)). \qquad (3.13)$$

Given Lemma 1, in equilibrium, brides match with different type grooms within their own caste. Brides take as given the highest deviation payment offered by brides in caste $i - 1$, for the poorest

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groom in their caste, $d(Y_i - \mu; t)$ (as defined by condition (3.12)); and offer payments to the higher quality grooms (of income Y_i and $Y_i + \mu$) which solve:

$$q(0; Y_i - \mu) + u(Y_i - d(Y_i - \mu; s_i)) = q(0; Y_i) + u(Y_i - d(Y_i; s_i)) = q(0; Y_i + \mu) + u(Y_i - d(Y_i + \mu; s_i)): \quad (3.14)$$

Assumption (3.1), together with (3.13) and (3.14), yields,

$$u(Y_i - d(Y_i - \mu; s_i)) - u(Y_i - d(Y_i; s_i)) > u(Y_{i-1} - d(Y_i - \mu; s_i)) - u(Y_{i-1} - d(Y_i; s_i - 1)): \quad (3.15)$$

Given the concavity of $u(\cdot)$ and that $Y_i > Y_{i-1}$, the above inequality implies that,

$$d(Y_i; s_i) > d(Y_i; s_i - 1): \quad (3.16)$$

Therefore real dowry inflation occurs. ∎

Recall that in the first period of modernisation the income of bridal fathers is unchanged, so that the above result is independent of any wealth effects on the demand side. The reason for the real dowry inflation is the substitutability between the two components of a groom's quality: his potential wealth, y_{ik}, and his caste, i. Because of this substitutability, grooms who have been made worse off by modernisation, in terms of their potential wealth, can still trade on their caste status because their caste is of value to lower caste brides. Since brides gain from marrying a higher caste groom, and this gain is partially substitutable with income, his lower income is of relatively little importance to them. As a consequence, a poorer groom in caste i is worth more to a bride from caste $i - 1$ than he is to a bride from his own caste, in absolute terms. However, because $q(\cdot)$ is concave, the loss in utility from marrying down in caste is greater than the utility gain from marrying up. Brides of caste i are thus willing to outbid brides of caste $i - 1$ in order to marry the poorer grooms of their own caste, although they are paying a higher price than they would have in the absence of competition from brides of lower castes. Condition (3.14) holds in equilibrium, so that all dowry payments are determined relatively and hence there is a real increase in all other payments. The following proposition, which is proven in the appendix, shows this to be the case in all periods of modernisation.

Proposition 3. There is real inflation in dowry payments for all grooms within a given caste i, in all periods of modernisation, $t \geq s_i$.

Since there is real dowry inflation for all grooms, average dowry payments in all castes also rise. Increases in dowry payments in a caste-based society occurred due to competition from brides of lower castes for higher caste grooms. In other words, dowry inflation arises as an endogenous response to a modernisation process which threatens the traditional social hierarchy; that is, individuals of different castes having comparable income levels. In reality, as mentioned earlier, this does not mean that we should observe active across caste competition. Instead it implies that the observed dowry inflation is serving to maintain the incentive compatibility of within caste marriage when it is threatened by increasing wealth heterogeneity across caste groups. If incentive compatibility were to fail then the caste system would be eroded since high caste grooms would prefer to marry down in caste and accept larger offers from low caste brides. In a sense then the model here suggests that inflation in dowry payments has served to preserve same caste marriage, and hence in turn preserve the caste system. When caste members are no longer homogeneous in occupations and incomes, as is now the case in India, the only defining feature of caste becomes same-caste marriage. Writers on the pre-industrial European episodes of dowry inflation also argued that increased dowry payments played a central role in maintaining endogamous (inherited status) marriages.[24] The results in this section show the mechanism through which such an effect is possible.

In the Indian context, the temporal connection between dowry inflation and income heterogeneity has already been noted by Chauhan (1995), who explicitly links the chronological changes in the Indian dowry custom to increased wealth differentiation. She notes the spread of dowry practices and the increase in payments directly after independence in 1947. This was a time of significant structural change where unprecedented opportunities for economic and political mobility began to open up for all castes (see also Jayaraman 1981).[25] Others have similarly linked Indian dowry diffusion and inflation to new economic opportunities concomitant with modernisation.[26] Some sociologists argue that the spread of dowry payments from upper to lower castes is due to "Sanskritization", or lower caste imitation of the customs practiced in higher castes in order to acquire

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[24]This has been argued by Stuard (1981) for Ragusa, Molho (1994) for Florence, Saller (1994) for Romans, Stone (1965) for England, Chojnacki (1974) and Queller and Madden (1993) for Venice.

[25]The subsequent spread and escalation of dowry payments culminated in the passage of the Dowry Prohibition Act in 1961 which outlawed the practice as a response to its alarming increase. The act has been to little avail, however, since dowry in°ation has persisted despite its illegal standing.

[26]See, for example, Paul (1986), Srinivas (1984), Epstein (1973), Billig (1992), Caldwell et. al. (1983), Upadhya (1990), and Chauhan (1995).

status (see, for example, Epstein 1973).[27] Such activity among lower castes has been facilitated by increased wealth. While I do not argue with their interpretation, the theory here provides an explanation of the same facts based on economic reasoning.

3.3.2. Comparative Statics and Empirical Predictions

Although it is the substitutability between the components of $q(¢)$ which is the central reason for the occurrence of real dowry inflation during the process of modernisation, other factors alter the rate of inflation across periods. These relationships are summarized in the following proposition which is proved in the appendix.

Proposition 4. The rate of inflation in dowry payments of a given caste is: (a) increasing in the degree of wealth dispersion within that caste; (b) increasing in the degree of dispersion in all castes below; and (c) is higher the greater the income disparity between the rich of the lower castes and the poor of the higher castes.

The cause of dowry inflation is across-caste competition forcing a lower bound on dowry payments within caste. Further increases in dowry payments occur when this lower bound is further increased. Effect (a) lowers the income of the lowest groom in a given caste, but this is relatively unimportant to brides of the next lower caste, who are the most direct competitors for him, due to substitutability in $q(¢)$; so that equilibrium dowry payments required from his own caste bride fall less than proportionately. Since within caste payments then only reflect the income differences between other grooms and the lower one, all other payments also rise. Similarly effect (b) occurs because increased dispersion in castes below raises dowry payments in those lower castes and hence raises the highest bid, which is determined relative to these payments, that the richest brides there

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[27]Dowry has also been interpreted as compensation for taking into the family an economically non-productive female member (see, for example, Rajaraman 1983, Srinivas 1984, and Beck 1972). This compensation argument for dowry does not account for its occurrence in places where women's economic activity has continued (see, for example, Chauhan 1995). In general there is little support for this view since increasing the economic qualities of women through education and other income-earning capabilities seems to have had little effect on dowries (see, for example, Billig 1992 and Sandhu 1988). As dowries are variable instead of uniform, as suggested by the compensation conjecture, i.e., valuation placed on subsistence cost of a woman net of her domestic contribution, the compensation argument can again be refuted (see Aziz 1983). Another view of dowry as a medium of hypergamy (when lower status bridal families match with those of a superior status) sheds no light on why dowry has been increasing and also why it occurs where marriage takes place among men and women of equal social status (see Chauhan 1995). Dowry increases have also been associated with a growing necessity to compete for `desirable' grooms (see, for example, Lindenbaum 1981). This association is consistent with the analysis here, but, as already discussed, does not, on it's own, constitute an explanation for real dowry inflation.

will make for the poorest groom in one's own caste. Since the lower bound again rises, all other grooms payments rise accordingly to maintain incentive compatibility in assortative matching. Finally effect (c) follows because, the larger the income of high caste bridal fathers, relative to the highest bidders from the lower castes, the larger the increase in dowry payments relative to this lower bound.

In the above analysis, dowry inflation affects higher castes first because members of these castes reap the benefits of modernisation before the lower castes. This coincides with the observed empirical record in India (see, for example, Paul 1986, Sharma 1984, and Srinivas 1984). However, none of the results in this section depend upon the assumption that modernisation spreads to lower castes one period at time. This can be seen from the previous proposition. Since inflation occurs because across-caste competition forces a lower bound on within caste dowry payments, increasing the lower castes' dispersion before, or simultaneously with, one's own caste implies qualitatively identical results. As the proposition shows, all increases in dispersion, whether within own caste or within another work the same way, so the result is not affected by the ordering of those increases.

3.3.3. Disappearance of Dowry Inflation

In the above analysis, endogamous marriage is the equilibrium matching outcome; all brides and grooms marry within caste. This corresponds with India where assortative matching on the basis of caste is close to perfect. However, the model predicts this will cease to be an equilibrium if income distributions across castes become more equal. In particular, if grooms at the high end of the wealth distribution in caste $i-1$ have significantly greater incomes than those at the low end of the income distribution of caste i, within caste incentive compatibility breaks down and matching across castes occurs; brides from caste i marry down in caste as their spouses have high enough incomes to compensate for the loss of status in terms of caste. Endogamy will similarly break down if dowry payments increase to such an extent that brides' participation constraints no longer hold. At these prices, brides would prefer to marry down in caste.

If endogamy breaks down, increased dispersion no longer leads to dowry inflation. In that case income alone determines dowry payments. Consider the effects of increased wealth dispersion in a wealth-based society. Moving from a period in which all grooms have income Y_i and receive dowry payment $d^\pi(Y_i)$, to one in which grooms are uniformly distributed around Y_i, will simply see a

spread in equilibrium dowry payments accordingly. Brides will be indifferent between marrying the different quality grooms (who now vary by income) and hence lower quality grooms receive payments lower than $d^{\alpha}(Y_i)$, and higher income grooms receive higher payments. If bride's preferences for grooms' quality is concave in income, average dowry payments can even decrease across periods, since then the lower dowry payments have a larger negative impact on average dowry payments then the higher dowry payments have positive, compared to the previous period where average dowry payments are equal to $d^{\alpha}(Y_i)$.[28]

Another way dowry payments can fall is if women start to have value in the marriage market.[29] Within caste dowry payments fall when brides become economically valuable since this value acts as a substitute for their dowry payment. However, increased income dispersion across both brides and grooms will still tend to have an inflationary effect. This is because it is the caste component of groom's quality which is essential to the previous results. Recall that it was the groom's caste which maintained the marriage market value of those whose income fell with modernization. No such effect is present for brides who forfeit their own caste ranking when marrying down. Consequently these gender asymmetries with respect to caste imply that even when women begin to reap comparable benefits to men from modernisation, dowry inflation can persist. This is perhaps why it has been observed that increasing the quality (in terms of education and productivity) of brides has had only a meager effect in reducing the dowry problem in India (see, for example, Saroja and Chandrika 1991 and Sandhu 1988).

4. Increasing Average Wealth

We now turn to the more standard component of the modernisation process, that of a rise in average wealth. We first consider how this aspect affects dowry payments in a non–caste based society. We will see that the effects are similar in a caste based society, however, the wealth dispersion effects discussed in the previous section must also be taken into account in that case.

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[28]This decreasing e®ect on average dowry payments is also present in the caste case. Similarly, because the development process is such that the lowest quality grooms in period $t + 1$ is of lower quality than the lowest of the previous period, the payments received by the lowest quality grooms could conceivably decrease average dowry payments across periods even though dowry payments for all other grooms are increasing. However, a minimal restriction on the concavity of $q(\cdot)$ rules this out, i.e., $2\,[f\,(q_2(0;y_{ik\,i}\,\mu))\,_i\,f\,(q_2(1;y_{ik\,i}\,\mu))] > f\,(q_2(1;y_{ik\,i}\,\mu))$, where $f(\cdot)$ is increasing.

[29]There are several studies which ¯nd that, holding groom characteristics constant, there has been a signi¯cant increase over time in the schooling of brides (see for example, Deolalikar and Rao 1990, and Billig 1992).

Keeping with the notation developed earlier, increasing average wealth necessarily implies that:

$$\sum_k n^t(y_{ik})y_{ik} > \sum_k n^{t-1}(y_{ik})y_{ik} \tag{4.1}$$

where $y_{ik} \in \{Y_i - (\iota+1)\mu, \cdots, Y_i + (\iota+1)\mu\}$ for $t = s_i + \iota$ where $\iota = 0, 1, 2, 3, \ldots$

4.1. Wealth based society

In a wealth-based society, potential spouses simply match according to income, i.e., brides with wealthy fathers are matched with high income grooms. Dowry payments can occur in such a society, just as they did in the pre-modernisation case of the previous section, if men are more differentiated than women. Holding the wealth distribution constant, dowry payments decline if women begin to benefit from modernisation for the reasons discussed above. Similarly, as already mentioned, increasing wealth dispersion can also lead to non-increasing average dowry payments. In addition, real dowry payments also change with the population's average wealth. This works in a seemingly counter-intuitive direction in a matching framework. When individuals become increasingly better off, the supply of wealthy grooms necessarily exceeds the supply of wealthy bridal fathers. As a result, in a matching model of marriage, bridal fathers of a given wealth match their daughters with richer grooms than themselves. This implies that, for a given quality groom, poorer bridal fathers are determining dowry payments across time. Therefore, in other words, real dowry deflation occurs when average wealth is increasing.

Proposition 5. Real dowry payments are non-increasing in a wealth based society when the following conditions hold:

$$\sum_{y_{ik} \geq \bar{y}} n^t(y_{ik}) > \sum_{y_{ik} \geq \bar{y}} n^{t-1}(y_{ik}) \tag{4.2}$$

$$\sum_{y_{ik} \cdot \bar{y}+\mu} n^t(y_{ik}) > \sum_{y_{ik} \cdot \bar{y}} n^{t-1}(y_{ik}) \tag{4.3}$$

where $y_{ik} \in \{Y_i - (\iota+1)\mu, \cdots, Y_i + (\iota+1)\mu\}$ and $\bar{y} \in \{Y_i - (\iota+1)\mu, \cdots, Y_i + \iota\mu\}$ for $t = s_i + \iota$ where $\iota = 0, 1, 2, 3, \ldots$

The above proposition, which is proven in the appendix, establishes sufficient conditions for when dowry payments are non-increasing across periods. Condition (4.2) simply implies that the number of people in the positive end of the wealth distribution is increasing and condition (4.3)

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implies that there are always some people becoming wealthier. Conditions (4.2) and (4.3) are satisfied for a mean-preserving income such as (3.11), and satisfied for most cases of increasing average wealth. The exception would be a wealth distribution where, although the total number at the top end of the income distribution is decreasing across time, average wealth could still be increasing (i.e., (4.1) is satisfied) if the number of the richest people in the top end of the distribution is sufficiently large. Therefore, with the exception of extremely unequal income distributions, we should expect that dowry payments are non-increasing when average wealth is increasing. Since dowry payments are non-increasing for all grooms, average dowry payments should also be non-increasing. However, this latter result is not as straightforward to demonstrate since there are several effects to consider.[30]

Proposition 5 points out that a more simple explanation for dowry inflation, which treats grooms as a normal good and posits an increase in the expenditure on grooms when average wealth increases, is unlikely to hold in a matching model of marriage. Conversely it suggests a force leading dowry payments to decline with modernisation in a wealth-based society such as post-Industrial Europe.

4.2. Caste based society

Though dowry payments are likely to decline with increases in average wealth in a wealth based society, they need not do so in a caste based one. Counteracting the force for decline working through Proposition 5 is the already analysed effect of increased wealth dispersion within caste groups. The following proposition establishes a sufficient condition under which the latter dominates:

Proposition 6. Real dowry inflation occurs if:

$$
\begin{aligned}
& f(q(0; Y_i - z\mu) - q(0; Y_i - (z+1)\mu) \mid Y_i - z\mu) - f(q(1; Y_i - z\mu) - q(1; Y_i - (z+1)\mu) \mid Y_{i-1}) \\
> \; & f(q(0; Y_i + (z+1)\mu) - q(0; Y_i - z\mu) \mid Y_i - z\mu) - f(q(0; Y_i(z+1)\mu) - q(0; Y_i - z\mu) \mid Y_i - (z-1)\mu)
\end{aligned}
$$

$$(4.4)$$

where $z \geq 1$ and $f(a - b \mid y)$ is increasing in y and $(a - b)$ and represents that the marginal valuation of grooms is conditional on bridal father income, y.

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[30]On the one hand, the larger the increase in average wealth the greater the dowry deflation across grooms, however, there also exists a larger number of high quality grooms. In addition, concavity implies that richer grooms are of lower marginal value than those poorer.

Proof of the above is in the appendix. Condition (4.4) ensures that the positive caste effect of modernisation outweighs the negative income effect on equilibrium dowry payments. The condition does not look very intuitive but has a simple interpretation. It suggests that inflation is likely to occur if there exists sufficient income disparity across castes, i.e., if $[Y_i - z\mu] - [Y_{i-1}]$ is sufficiently larger than $[Y_i - z\mu] - [Y_i - (z-1)\mu] = \mu$; and if the benefit to marrying up in caste, independent of the income benefit, is sufficiently large.

For a caste based society, the main conclusion is that the severity of dowry inflation is mitigated by increases in average wealth, especially if they are relatively uniformly spread. In a wealth based society, dowry payments will decline if on average individuals experience an increase in wealth.

5. Conclusion

This paper has attempted to explain why dowry payments are increasing in present-day India while they declined with industrialization in Europe. I argue that the key difference between these two societies is that the early industrial period in Europe saw wealth come to dominate inherited status as the primary determinant of social class. In contrast, the process of modernization in India has lead to virtually no effect on caste's central role in determining status.

When caste breaks down, the model predicts that the forces of modernisation tend to cause a decline in dowry payments. So continued dowry inflation, and its attendant problems in India should decline when endogamy breaks down and caste ceases to be an important determinant of status. This suggests a role for government in attempting to formally weaken the importance of caste. Affirmative Action laws to date have removed customary barriers to educational and occupational opportunities, and property ownership for members of the lower castes. These types of policies should have an effect in the long run since, as the paper demonstrated, endogamy will eventually break down when there is sufficient income equality across caste groups.

In short, where marriage matching places less value on the caste of potential mates, there should be less inflation in dowry payments. A case study of Christians in Madras revealed that increasing dowry payments occurred among those with a caste affiliation whereas among those who were casteless there was no comparable effect (see Caplan 1984). Caplan there concludes that this provides evidence that dowry payments should be seen as a means of "preserving endogamous boundaries in a heterogeneous setting" (p.216). This accords precisely with the present paper's

argument. Here dowry inflation arises as an endogenous response to same-caste matching in the marriage market when there is increased wealth dispersion (or heterogeneity). Although research pertaining to dowry payments in the rest of South Asia is relatively sparse, there are some reports of increasing dowries in Pakistan (see Sathar and Kazi 1988). This may appear to contradict the emphasis on caste in explaining dowry inflation since caste is rooted in Hinduism and is not a component of Islamic religious codes. However, for the purposes here, caste does exist amongst Muslims in Pakistan. That is, there traditionally exists a hierarchical social structure based on occupation, where group membership is inherited and endogamy is practised within the different groups (see, for example, Korson 1971, Dixon 1982, Beall 1995, Ahmad 1977, and Lindholm 1985).

The theoretical finding in this paper is also consistent with other observed instances of dowry inflation. A persistent feature of these previously noted dowry inflations is that they tended to occur in societies where inherited status was an important component of social standing and endogamy was practiced. Molho (1994) establishes a link between high rates of endogamy among high status lineages and dowry inflation in late medieval Florence. Saller (1994) makes the same connection in her analysis of dowry inflation in Roman marriages and so does Stuard (1981) amongst Ragusan noble families during the thirteenth and fifteenth centuries. Moreover, the analysis of this paper predicts dowry inflation when the modernisation process threatens the traditional social hierarchy, i.e., individuals of different status groups have comparable wealth levels. This is exactly in accord with Stone (1965) who notes that dowries in England increased by a third when "daughters of the nobility were faced with growing competition from daughters of the squierarchy". This is similarly argued by Chojnacki (1974) where he links dowry inflation in early Renaissance Venice to competition between the oldest noble clans and newer ones, where the relative newcomers sought status by means of higher dowries and the more ancient families fought to preserve theirs by the same means. This paper argues that why dowry inflation ceased in these once endogamous societies is because endogamy eventually broke down. This occurred with modernisation when lower status individuals gained increasing wealth and the significance of inherited status declined.

6. Appendix

Proof of Proposition 1:

Taking condition (3.8) as given for all i, where $1 \leq i < h$, we can show that it is not worthwhile deviating to marry in a different caste, given equilibrium prices.

Suppose the contrary and that it is worthwhile to marry down in caste for a bride in caste i, i.e.,

$$q(-k; Y_{i-k}) + u(Y_i - d(Y_{i-k}; 0)) > q(0; Y_i) + u(Y_i - d(Y_i; 0)) \tag{6.1}$$

holds for k, where $1 \leq k < i$. The above can be rewritten as:

$$u(Y_i - d(Y_{i-k}; 0)) - u(Y_i - d(Y_i; 0)) > q(0; Y_i) - q(-k; Y_{i-k}): \tag{6.2}$$

Inequality (6.2) can in turn be rewritten as:

$$\sum_{j=1}^{k} \{u(Y_i - d(Y_{i-j}; 0)) - u(Y_i - d(Y_{i-j+1}; 0))\} > q(0; Y_i) - q(-k; Y_{i-k}): \tag{6.3}$$

Concavity of $u(\cdot)$ implies the following must also be true:

$$\sum_{j=1}^{k} \{u(Y_{i-j} - d(Y_{i-j}; 0)) - u(Y_{i-j} - d(Y_{i-j+1}; 0))\} > q(0; Y_i) - q(-k; Y_{i-k}): \tag{6.4}$$

Using equilibrium condition (3.8), the left hand side of (6.4) is equal to:

$$\sum_{j=1}^{k} \{q(1; Y_{i-j+1}) - q(0; Y_{i-j})\}: \tag{6.5}$$

The right hand side of (6.4) is equivalent to:

$$\sum_{j=1}^{k} \{q(-j+1; Y_{i-j+1}) - q(-j; Y_{i-j})\}: \tag{6.6}$$

Concavity of $q(\cdot)$ implies that (6.6) is larger than (6.5) and hence (6.1) is contradicted.

Now suppose it is worthwhile to marry up in caste for a bride in caste i, i.e.,

$$q(k; Y_{i+k}) + u(Y_i - d(Y_{i+k}; 0)) > q(0; Y_i) + u(Y_i - d(Y_i; 0)); \tag{6.7}$$

for $1 \leq k \leq h - i$. The above is rewritten as:

$$u(Y_i - d(Y_i; 0)) - u(Y_i - d(Y_{i+k}; 0)) < q(k; Y_{i+k}) - q(0; Y_i): \tag{6.8}$$

Inequality (6.8) can in turn be rewritten as:

$$\sum_{j=1}^{k} \{u(Y_i - d(Y_{i+j-1}; 0)) - u(Y_i - d(Y_{i+j}; 0))\} < q(k; Y_{i+k}) - q(0; Y_i): \tag{6.9}$$

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Concavity of $u(\cdot)$ implies the following must also be true:

$$\sum_{j=1} \{u(Y_{i+j-1} - d(Y_{i+j-1};0)) - u(Y_{i+j-1} - d(Y_{i+j};0))\} < q(k;Y_{i+k}) - q(0;Y_i). \tag{6.10}$$

Using equilibrium condition (3.8), the left hand side of (6.10) is equal to:

$$\sum_{j=1} \{q(1;Y_{i+j}) - q(0;Y_{i+j-1})\}. \tag{6.11}$$

The right hand side of (6.10) is equivalent to:

$$\sum_{j=1} \{q(j;Y_{i+j}) - q(j-1;Y_{i+j-1})\}. \tag{6.12}$$

Concavity of $q(\cdot)$ implies that (6.12) is smaller than (6.11) and hence (6.7) is contradicted.

Equilibrium condition (3.8) implies that $\overline{d} < d(Y_2;0) < \cdots < d(Y_h;0)$ since $q(1;Y_{i+1}) > q(0;Y_i)$ for all i, where $1 \le i < h$. ¥

Proof of Lemma 1:

With positive assortative matching, the matching pattern of (i) and (ii) will hold in period $t = s_i + 1$, that is, grooms of income $Y_i - 2\mu$ match with bridal fathers of income $Y_i - \mu$ and grooms with income $Y_i - \mu$ match with bridal fathers of income $Y_i - \mu$ and Y_i, if:

$$n^t(Y_i - 2\mu) + n^t(Y_i - \mu) > n^{t-1}(Y_i - \mu) > n^t(Y_i - 2\mu). \tag{6.13}$$

Similarly, the matching pattern of (i) and (ii) will hold in period $t = s_i + 2$ if:

$$n^t(Y_i - 3\mu) + n^t(Y_i - 2\mu) > n^{t-1}(Y_i - 2\mu) > n^t(Y_i - 3\mu) \tag{6.14}$$

and

$$\mu \begin{Bmatrix} [n^t(Y_i - 3\mu) + n^t(Y_i - 2\mu) - n^{t-1}(Y_i - 2\mu)] \\ + n^t(Y_i - \mu) \end{Bmatrix} \begin{array}{l} > n^{t-1}(Y_i - \mu) \\[4pt] > \dfrac{n^t(Y_i - 3\mu) + n^t(Y_i - 2\mu)}{- n^{t-1}(Y_i - 2\mu)} \end{array} \tag{6.15}$$

where $n^t(Y_i - 3\mu) + n^t(Y_i - 2\mu) - n^{t-1}(Y_i - 2\mu)$ reflects the excess supply of grooms of income $Y_i - 2\mu$ who match with bridal fathers of income $Y_i - \mu$ instead of those with income $Y_i - 2\mu$. Inequality (6.15) can be rewritten as:

$$n^t(Y_i - 3\mu) + n^t(Y_i - 2\mu) + n^t(Y_i - \mu) > n^{t-1}(Y_i - 2\mu) + n^{t-1}(Y_i - \mu) > n^t(Y_i - 3\mu) + n^t(Y_i - 2\mu).$$

The matching pattern of (iii) will hold if identical conditions to the above are satisfied for higher income grooms and bridal fathers, i.e., substituting the minus sign for a plus in the income levels of the above inequalities.

More generally the matching pattern (i), (ii), and (iii) ensues if in each period $t = s_i + \iota$, for $\iota \geq 0$, the following hold:

$$\sum_{z=\circledR}^{\iota+1} n^t(Y_i - z\mu) > \sum_{z=\circledR}^{\iota} n^{t-1}(Y_i - z\mu) > \sum_{z=\circledR+1}^{\iota+1} n^t(Y_i - z\mu) \qquad (6.16)$$

$$\sum_{z=\circledR}^{\iota+1} n^t(Y_i + z\mu) > \sum_{z=\circledR}^{\iota} n^{t-1}(Y_i + z\mu) > \sum_{z=\circledR+1}^{\iota+1} n^t(Y_i + z\mu) \qquad (6.17)$$

for $\circledR = 1, 2, 3, \cdots, \iota$. Given (3.11), conditions (6.16) and (6.17) can be rewritten as:

$$(\iota + 1 - \circledR)n^t(y_{ik}) > (\iota - \circledR)n^{t-1}(y_{ik}) > (\iota - \circledR)n^t(y_{ik}): \qquad (6.18)$$

where $y_{ik} \in \{Y_i - (\iota+1)\mu, \cdots, Y_i + (\iota+1)\mu\}$. Given (3.11) and using the assumption that the total supply of grooms within a given caste i is constant across periods t. The number of grooms of each income level in periods $t \geq s_i + \iota$, for $\iota \geq 0$, can be written as,

$$n^t(y_{ik}) = \frac{1}{3 + 2\iota}n^0(Y_i): \qquad (6.19)$$

Using (6.19), (6.18) becomes:

$$\frac{(\iota + 1 - \circledR)}{3 + 2\iota}n^0(Y_i) > \frac{(\iota - \circledR)}{3 + 2(\iota - 1)}n^0(Y_i) > \frac{(\iota - \circledR)}{3 + 2\iota}n^0(Y_i): \qquad (6.20)$$

Since $[3 + 2(\iota - 1)][\iota + 1 - \circledR] > [3 + 2\iota][\iota - \circledR]$, (6.20) implies that (6.18) is satisfied. ¥

Proof of Proposition 3:

From (3.16), we know that $d(Y_i; s_i) > d(Y_i; s_i - 1)$.

Without loss of generality, a given equilibrium condition, (3.14) for example, can be rewritten as:

$$d(Y_i; t) - d(Y_i - \mu; t) = f(q(0; Y_i) - q(0; Y_i - \mu) \mid Y_i)$$

where $f(a - b \mid y)$ is increasing in y and $(a - b)$ and represents that the difference in dowry payments, $d(Y_i; t) - d(Y_i - \mu; t)$, is conditional on bridal father income, Y_i.

For periods $t > s_i + 1$, more general equilibrium incentive conditions hold than those discussed in Section 5. In particular, more general than (3.12), equilibrium incentive compatibility condition at the caste margins is:

$$q(0; Y_{i-1} + \iota\mu) + u(Y_{i-1} + (\iota - 1)\mu - d(Y_{i-1} + \iota\mu; t)) =$$
$$q(1; Y_i - (\iota + 1)\mu) + u(Y_{i-1} + (\iota - 1)\mu - d(Y_i - (\iota + 1)\mu; t)): \qquad (6.21)$$

for periods $t = s_i + \iota$, where $\iota \geq 1$. Similarly, additional to (3.14), within caste equilibrium conditions are:

$$q(0; Y_i - (\iota + 1)\mu) + u(Y_i - \iota\mu - d(Y_i - (\iota + 1)\mu; t)) = q(0; Y_i - \iota\mu) + u(Y_i - \iota\mu - d(Y_i - \iota\mu; t)): \qquad (6.22)$$

for the poorer grooms and

$$q(0; Y_i + (\iota + 1)\mu) + u(Y_i + \iota\mu - d(Y_i + (\iota + 1)\mu; t)) = q(0; Y_i + \iota\mu) + u(Y_i + \iota\mu - d(Y_i + \iota\mu; t)); \qquad (6.23)$$

for those richer. Equilibrium, conditions (3.14), (6.22), (6.23) must hold for all $t \geq s_i + \tau$, where $\tau \geq 1$.

Equilibrium conditions (6.21), (3.14), and (6.22) for caste i, and (3.14) and (6.23) for caste $i-1$ imply that for $\tau \geq 0$:

$$
\begin{aligned}
d(Y_i; s_i + \tau) - d(Y_{i-1}; s_i + \tau) \;=\; & f\left(q(1; Y_i - (\tau+1)\mu) - q(0; Y_{i-1} + \tau\mu) \mid Y_{i-1} + (\tau-1)\mu\right) \\
& + \sum_{k=0}^{X} f\left(q(0; Y_i - k\mu) - q(0; Y_i - (k+1)\mu) \mid Y_i - k\mu\right) \\
& + \sum_{k=1}^{X} f\left(\mu \frac{q(0; Y_{i-1} + k\mu) -}{q(0; Y_{i-1} + (k-1)\mu) \mid Y_{i-1} + (k-1)\mu}\right)^{\P} : \quad (6.24)
\end{aligned}
$$

Using (6.24) defined for periods τ and $\tau + 1$, we have:

$$
\begin{aligned}
d(Y_i; s_i + \tau + 1) - d(Y_i; s_i + \tau) \;=\; & d(Y_{i-1}; s_i + \tau + 1) - d(Y_{i-1}; s_i + \tau) \\
& + f\left(q(1; Y_i - (\tau+2)\mu) - q(0; Y_{i-1} + (\tau+1)\mu) \mid Y_{i-1} + \tau\mu\right) \\
& - f\left(q(1; Y_i - (\tau+1)\mu) - q(0; Y_{i-1} + \tau\mu) \mid Y_{i-1} + (\tau-1)\mu\right) \\
& + f\left(q(0; Y_i - (\tau+1)\mu) - q(0; Y_i - (\tau+2)\mu) \mid Y_i - (\tau+1)\mu\right) \\
& + f\left(q(0; Y_{i-1} + (\tau+1)\mu) - q(0; Y_{i-1} + \tau\mu) \mid Y_{i-1} + \tau\mu\right) :
\end{aligned}
$$

The above implies the following also holds:

$$
\begin{aligned}
d(Y_i; s_i + \tau + 1) - d(Y_i; s_i + \tau) \;>\; & d(Y_{i-1}; s_i + \tau + 1) - d(Y_{i-1}; s_i + \tau) \\
& + f\left(q(1; Y_i - (\tau+2)\mu) - q(0; Y_{i-1} + (\tau+1)\mu) \mid Y_{i-1} + \tau\mu\right) \\
& - f\left(q(1; Y_i - (\tau+1)\mu) - q(0; Y_{i-1} + \tau\mu) \mid Y_{i-1} + \tau\mu\right) \\
& + f\left(q(0; Y_i - (\tau+1)\mu) - q(0; Y_i - (\tau+2)\mu) \mid Y_i - (\tau+1)\mu\right) \\
& + f\left(q(0; Y_{i-1} + (\tau+1)\mu) - q(0; Y_{i-1} + \tau\mu) \mid Y_{i-1} + \tau\mu\right) ;
\end{aligned}
$$

since $Y_{i-1} + (\tau-1)\mu < Y_{i-1} + \tau\mu$. The above can be expressed more simply, without loss of generality, as:

$$
\begin{aligned}
d(Y_i; s_i + \tau + 1) - d(Y_i; s_i + \tau) \;>\; & d(Y_{i-1}; s_i + \tau + 1) - d(Y_{i-1}; s_i + \tau) \\
& + f\left(q(0; Y_i - (\tau+1)\mu) - q(0; Y_i - (\tau+2)\mu) \mid Y_i - (\tau+1)\mu\right) \\
& - f\left(q(1; Y_i - (\tau+2)\mu) - q(1; Y_i - (\tau+1)\mu) \mid Y_{i-1} + \tau\mu\right) \quad (6.25)
\end{aligned}
$$

The final component of the right hand side of (6.25) follows because any two equilibrium conditions: $q(a) - q(b) = u(y - d(b)) - u(y - d(a))$ and $q(b) - q(c) = u(y - d(c)) - u(y - d(b))$ imply that $q(a) - q(c) = u(y - d(c)) - u(y - d(a))$, where a, b, and c represent different grooms.

For $\tau = 0$, i.e., $t = s_i < s_{i-1}$, (3.8) implies that $d(Y_{i-1}; s_i + \tau + 1) = d(Y_{i-1}; s_i + \tau)$ and hence the right hand side of (6.25) is positive given (3.1) and $Y_i - (\tau+1)\mu > Y_{i-1} + \tau\mu$.

Solving (6.25) backwards from payments in the lowest caste, $\overline{d}$, the above difference can be rewritten as:

$$d(Y_i; s_i + \xi) \; \textrm{¡} \; d(Y_i; s_i + \xi \; \textrm{¡} \; 1) >$$

$$\times \textsuperscript{}^{\frac{1}{2}} \qquad \textrm{f}\,(q(0; Y_{i\;\textrm{¡}\;j} \; \textrm{¡} \; (\xi \; \textrm{¡} \; j)\mu) \; \textrm{¡} \; q(0; Y_{i\;\textrm{¡}\;j} \; \textrm{¡} \; (\xi \; \textrm{¡} \; j + 1)\mu) \; \textrm{j} \; Y_{i\;\textrm{¡}\;j} \; \textrm{¡} \; (\xi \; \textrm{¡} \; j)\mu) \qquad \textsuperscript{}^{\frac{3}{4}}$$

$$\textrm{¡}\,\textrm{f}\,(q(1; Y_{i\;\textrm{¡}\;j} \; \textrm{¡} \; (\xi \; \textrm{¡} \; j)\mu) \; \textrm{¡} \; q(1; Y_{i\;\textrm{¡}\;j} \; \textrm{¡} \; (\xi \; \textrm{¡} \; j + 1)\mu) \; \textrm{j} \; Y_{i\;\textrm{¡}\;j\;\textrm{¡}\;1} + (\xi \; \textrm{¡} \; j \; \textrm{¡} \; 1)\mu)$$

(sum $j = 0$)

$$+\textrm{f}\,(q(0; Y_{i\;\textrm{¡}\;\xi}) \; \textrm{¡} \; q(0; Y_{i\;\textrm{¡}\;\xi} \; \textrm{¡} \; \mu) \; \textrm{j} \; Y_{i\;\textrm{¡}\;\xi}) \; \textrm{¡} \; \textrm{f}\,(q(1; Y_{i\;\textrm{¡}\;\xi}) \; \textrm{¡} \; q(1; Y_{i\;\textrm{¡}\;\xi} \; \textrm{¡} \; \mu) \; \textrm{j} \; Y_{i\;\textrm{¡}\;\xi\;\textrm{¡}\;1}) \qquad (6.26)$$

for $\xi \; \textrm{¸} \; 1$. Given (3.1), $Y_{i\;\textrm{¡}\;j} \; \textrm{¡} \; (\xi \; \textrm{¡} \; j)\mu > Y_{i\;\textrm{¡}\;j\;\textrm{¡}\;1} + (\xi \; \textrm{¡} \; j \; \textrm{¡} \; 1)\mu$ for $0 \cdot \; j \cdot \; \xi \; \textrm{¡} \; 1$, and $Y_{i\;\textrm{¡}\;\xi} > Y_{i\;\textrm{¡}\;\xi\;\textrm{¡}\;1}$, the right hand side of (6.26) is positive. ¥

Proof of Proposition 4:

²(a)

The component of the real change in dowry payments, represented by (6.25), caused by within-caste heterogeneity is represented by $\Omega(\xi)$; for $t = s_i + \xi$; where;

$$\Omega(\xi) = \textrm{f}\,(q(0; Y_i \; \textrm{¡} \; \xi\mu) \; \textrm{¡} \; q(0; Y_i \; \textrm{¡} \; (\xi + 1)\mu)) \; \textrm{¡} \; \textrm{f}\,(q(1; Y_i \; \textrm{¡} \; \xi\mu) \; \textrm{¡} \; q(1; Y_i \; \textrm{¡} \; (\xi + 1)\mu)) \qquad (6.27)$$

Therefore,

$$\Omega(\xi + 1) = \textrm{f}\,(q(0; Y_i \; \textrm{¡} \; (\xi + 1)\mu) \; \textrm{¡} \; q(0; Y_i \; \textrm{¡} \; (\xi + 2)\mu)) \; \textrm{¡} \; \textrm{f}\,(q(1; Y_i \; \textrm{¡} \; (\xi + 1)\mu) \; \textrm{¡} \; q(1; Y_i \; \textrm{¡} \; (\xi + 2)\mu)) \qquad (6.28)$$

Due to the restrictions on $q(\mathbb{C})$, $\Omega(\xi + 1) > \Omega(\xi)$. Therefore the degree of dowry inflation increases with within-caste heterogeneity because within-caste heterogeneity increases with ξ: Conditions (3.14), (6.22), and (6.23) imply that the component of real dowry inflation caused by heterogeneity for all $y_{ik} \; 2 \; \textrm{f}Y_i \; \textrm{¡} \; (\xi + 1)\mu; \mathbb{CC}; Y_i + (\xi + 1)\mu\textrm{g}$; where $\xi \; \textrm{¸} \; 0$; is equal to $\Omega(\xi)$ of (6.27). ¥

²(b)

The component of real dowry inflation which reflects heterogeneity in castes below is represented by $d(Y_{i\;\textrm{¡}\;1}; s_i + \xi) \; \textrm{¡} \; d(Y_{i\;\textrm{¡}\;1}; s_i + \xi \; \textrm{¡} \; 1)$ in (6.25). For periods $t < s_{i\;\textrm{¡}\;1}$, this component is equal to zero from (3.8). For periods $t \; \textrm{¸} \; s_{i\;\textrm{¡}\;1}$, this difference is represented by (6.25), where i is replaced by $i \; \textrm{¡} \; 1$ in the notation. Given that $\Omega(\xi + 1) > \Omega(\xi)$, equivalently the dowry difference $d(Y_{i\;\textrm{¡}\;1}; s_i + \xi) \; \textrm{¡} \; d(Y_{i\;\textrm{¡}\;1}; s_i + \xi \; \textrm{¡} \; 1)$ is increasing in ξ as heterogeneity in caste $i \; \textrm{¡} \; 1$ increases, thus increasing the degree of real dowry inflation in payments of caste $i \; \textrm{¡} \; 1$ and caste i. Conditions (3.14), (6.22), and (6.23) imply that the component of real dowry inflation which reflects heterogeneity in castes below is equal to $d(Y_{i\;\textrm{¡}\;1}; s_i + \xi) \; \textrm{¡} \; d(Y_{i\;\textrm{¡}\;1}; s_i + \xi \; \textrm{¡} \; 1)$ for all $y_{ik} \; 2 \; \textrm{f}Y_i \; \textrm{¡} \; (\xi + 1)\mu; \mathbb{CC}; Y_i + (\xi + 1)\mu\textrm{g}$; where $\xi \; \textrm{¸} \; 0$. Expression (6.26) demonstrates that dowry inflation in caste i is increasing in the within-caste heterogeneity of all castes below denoted $i \; \textrm{¡} \; j$ for $1 \cdot \; j \cdot \; \xi$. ¥

²(c)

The change in dowry payments across periods of (6.25) is increasing in $Y_i \; \textrm{¡} \; \xi\mu$ and decreasing in $Y_{i\;\textrm{¡}\;1} + (\xi \; \textrm{¡} \; 1)\mu$. Therefore the degree of dowry inflation is increasing in the difference between $Y_i \; \textrm{¡} \; \xi\mu$ and $Y_{i\;\textrm{¡}\;1} + (\xi \; \textrm{¡} \; 1)\mu$, i.e., between the incomes of the richest bridal father in caste $i \; \textrm{¡} \; 1$ and the poorest bridal father in caste i. The larger this difference the greater the income disparity across castes. Conditions (3.14), (6.22), and (6.23) imply that the component of real dowry inflation due to the income of bridal fathers is equivalent for all $y_{ik} \; 2 \; \textrm{f}Y_i \; \textrm{¡} \; (\xi + 1)\mu; \mathbb{CC}; Y_i + (\xi + 1)\mu\textrm{g}$; where $\xi \; \textrm{¸} \; 0$. Expression (6.26) demonstrates that dowry inflation in caste i is increasing in the income disparity across all castes $i \; \textrm{¡} \; j$ for $1 \cdot \; j \cdot \; \xi$. ¥

Proof of Proposition 5:

Dowry payments are increasing for a groom of quality y_g, matched with a bride whose father's income is equal to y_b in period t, if grooms of quality y_g are matched with bridal fathers of income $y_b + \mu$ in period $t+1$; $y_b + 2\mu$ in period $t+2$, and so on. In other words, a necessary condition for dowry payments to be increasing for such a groom is that the supply of grooms and bridal fathers satisfy the following condition so that such a matching pattern occurs:

$$\sum_{y_{ik} < y_b + \otimes\mu} n^{t+\otimes-1}(y_{ik}) \cdot \sum_{y_{ik} < y_g} n^{t+\otimes}(y_{ik}) < \sum_{y_{ik} \cdot y_b + \otimes\mu} n^{t+\otimes-1}(y_{ik}) \tag{6.29}$$

for $\otimes \geq 0$:

Condition (4.3) implies that

$$\sum_{y_{ik} \cdot y_b + \otimes\mu} n^{t+\otimes}(y_{ik}) > \sum_{y_{ik} \cdot y_b + \otimes\mu} n^{t+\otimes-1}(y_{ik}) \tag{6.30}$$

Using (6.30), condition (6.29) yields:

$$\sum_{y_{ik} < y_g} n^{t+\otimes+1}(y_{ik}) > \sum_{y_{ik} < y_g} n^{t+\otimes}(y_{ik}) \tag{6.31}$$

which can be alternatively expressed as:

$$\sum_{y_{ik} \geq y_g} n^{t+\otimes+1}(y_{ik}) \cdot \sum_{y_{ik} \geq y_g} n^{t+\otimes}(y_{ik}) \tag{6.32}$$

which contradicts (4.2). ¥

Proof of Proposition 6:

In the absence of real wealth effects, as demonstrated in Proposition 3, dowry inflation will ensue due to the across-caste effects. If grooms of a given quality are matched with richer bridal fathers across time then real dowry payments will increase. If grooms of a given quality of income are matched with poorer bridal fathers across time then dowry payments may decline. Since all dowry payments are determined relatively, dowry payments for a given groom with income y_g are more likely to decline if all grooms with income less than y_g are also matching with poorer bridal fathers across time. Consider the extreme case where all grooms are matched with the poorest bridal fathers possible and hence the most likely to exhibit dowry deflation across periods. The within-caste equilibrium conditions imply that for a groom of income $y_{ik} \in \{Y_i - (\iota+1)\mu; \mathcal{C}\mathcal{C}; Y_i + (\iota+1)\mu\}$ where $\iota \geq 0$:

$$\begin{aligned}
d(y_{ik}; s_i + \iota) - d(Y_{i-1}; s_i + \iota) &= f\left(q(1; Y_i - (\iota+1)\mu) - q(0; Y_{i-1} + \iota\mu) \mid Y_{i-1} + (\iota-1)\mu\right) \\
&\quad + f\left(q(0; y_{ik}) - q(0; Y_i - (\iota+1)\mu) \mid Y_i - \iota\mu\right) \\
&\quad + f\left(q(0; Y_{i-1} + \iota\mu) - q(0; Y_{i-1}) \mid Y_{i-1} - (\iota-1)\mu\right)
\end{aligned} \tag{6.33}$$

Using (6.33) and solving backwards:

$$\begin{aligned}
&d(y_{ik}; s_i + \iota) - d(y_{ik}; s_i + \iota - 1) \\
&> \sum_{j=0}^{\iota} \Bigg[f\left(q(0; Y_{i-j} - (\iota-j)\mu) - q(0; Y_{i-j} - (\iota-j+1)\mu) \mid Y_{i-j} - (\iota-j)\mu\right) \\
&\qquad\quad - f\left(q(1; Y_{i-j} - (\iota-j)\mu) - q(1; Y_{i-j} - (\iota-j+1)\mu) \mid Y_{i-j-1}\right) \Bigg]
\end{aligned}$$

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$$
+\sum_{j=1}^{X-1}\left[\frac{f\left(q(0;Y_{i-j})-q(0;Y_{i-j}-(\iota-j)\mu)\right)Y_{i-j}-(\iota-j)\mu)-}{f\left(q(0;Y_{i-j})-q(0;Y_{i-j}-(\iota-j)\mu)\right)Y_{i-j}-(\iota-j-1)\mu)}\right]^{\frac{3}{4}}
$$
$$
+f\left(q(0;y_{ik})-q(0;Y_{i}-\iota\mu)\right)Y_{i}-\iota\mu)-f\left(q(0;y_{ik})-q(0;Y_{i}-\iota\mu)\right)Y_{i}-(\iota-1)\mu)
$$

$$(6.34)$$

where the first component of the right hand side comes from the positive across-caste effect on dowries. The second two component represent the negative income effects on dowries. The above difference is always positive if the across-caste effect outweighs the income effect. This is always true if condition (4.4) holds. If this extreme case holds, then all other possible differences in dowry payments are larger than (6.33). ¥

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