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Indraneel Dasgupta
Pushkar Maitra
Diganta Mukherjee

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# ‘Arranged’ Marriage, Co-Residence and Female Schooling: A Model with Evidence from India


**Indraneel Dasgupta**
*University of Nottingham*
*and IZA*

**Pushkar Maitra**
*Monash University*

**Diganta Mukherjee**
*ICFAI Business School*



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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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# ABSTRACT

## 'Arranged' Marriage, Co-Residence and Female Schooling: A Model with Evidence from India*

We model the consequences of parental control over choice of wives for sons, for parental incentives to educate daughters, when the marriage market exhibits competitive dowry payments and altruistic but paternalistic parents benefit from having married sons live with them. By choosing uneducated brides, some parents can prevent costly household partition. Paternalistic self-interest consequently generates low levels of female schooling in the steady state equilibrium. State payments to parents for educating daughters fail to raise female schooling levels. Policies (such as housing subsidies) that promote nuclear families, interventions against early marriages, and state support to couples who marry against parental wishes, are however all likely to improve female schooling. We offer evidence from India consistent with our theoretical analysis.

JEL Classification: D10, D91, J12, J16

Keywords: arranged marriage, dowry, bride price, female literacy, marriage markets, stable marriage allocation

Corresponding author:

Indraneel Dasgupta
School of Economics
University of Nottingham
University Park
Nottingham NG7 2RD
United Kingdom
E-mail: indraneel.dasgupta@nottingham.ac.uk

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## 1. Introduction

Patrilocal marriage and cultural norms prevalent in most parts of south Asia would seem to imply that her husband's family stands to retain the major part of any additional gain an educated woman would generate. Hence, men would seem to have a strong incentive to prefer educated women as brides, especially since returns to women's schooling are significant (whether directly, from the labour market, or indirectly, within the household, where the schooling of women may have important positive effects on the human capital of both present and future generations).[1] Marriage markets in south Asia also exhibit widespread presence of dowry, i.e., payments from the bride's family to that of the groom.[2] Then, intuition suggests, ceteris paribus, parents of educated women should face lower dowry demands. Thus, competitive adjustments in dowry rates, by allowing parents to internalise the returns, should induce them to educate daughters. Yet, the persistence of low levels of female schooling and available micro evidence on dowry payments both suggest such incentives are neither strong, nor generalized.[3] What explains this apparent market failure?

One clue to the conundrum may lie in the fact that parents in south Asia, especially in the rural areas, typically desire their married sons to live with them in a subordinate capacity. They expect sons, along with their wives, to submit to parental authority in domestic decision-making. Co-residence within such a hierarchical setting can provide significant benefits, both emotional and material, to parents.[4] Marriages are also typically 'arranged': these are contracts negotiated between parents. This suggests, when seeking wives for sons, parents may value characteristics that facilitate the continuation of parental control over sons (and thereby, co-residence) after marriage, i.e., characteristics that reduce the prospect of future intergenerational conflict and consequent household partition.[5] Lack of education on

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[1] See UNDP (1996) and Behrman *et al.* (1999). Basic schooling is likely to improve women's general ability to execute domestic responsibilities. In particular, households with educated wives/mothers typically exhibit better health outcomes for household members and better school performance by children.

[2] See Deolalikar and Rao (1998) and Rao (1993a, 1993b) for India, Lindenbaum (1981) and Esteve-Volart (2004) for Bangladesh. We shall interpret dowry as 'groom-price'. In practice, part of the payment made by the bride's parents may be a pre-mortem bequest, or a ritual gift exchange. These are not relevant to our analysis.

[3] According to Census data, the gender gap in literacy rates in India was 28.84 percentage points in 1991 and 21.70 percentage points ten years later. A 1994 survey of 34,398 rural Indian households spread over 16 states found that the school enrolment rate of males in the 6-16 age range was about 15 percentage points higher than that for females (Cigno and Rosati (2005), pp. 83-84). Analysing data from six villages in south-central India, covering 1923-1978, neither Rao (1993a, 1993b), nor Deolalikar and Rao (1998), nor, indeed, Edlund (2001) could find any evidence that greater schooling of brides is associated with a significant reduction in dowry.

[4] A large anthropological literature documents such benefits. See Dasgupta (1995) and Vera-Sanso (1999).

[5] Caldwell et al. (1983, p.359) indeed find evidence of such strategic thinking on part of parents. Discussing the popular justification for a large age difference between husbands and wives in south India, they put the perception thus. "Where brides are older and closer to the bridegrooms in age, they will probably fit less readily into the extended family, and their emotional bonds with their husbands will probably compete more with the bonds between husbands and their mothers." Dasgupta (1995, p.483) also points out that, in the typical north

part of the bride may constitute such a characteristic. Hence, parents may prefer uneducated brides unless educated brides bring in significantly more dowry. This in turn would reduce parental incentive to educate daughters. Our analysis offers empirical evidence consistent with this basic intuitive hypothesis, formalizes it, and explores its policy implications.

Low levels of female schooling constitute a major policy concern of governments, multilateral aid agencies and NGOs in south Asia. Yet, the impact of the social norm (or institution) of arranged marriage, on parental incentives to educate daughters, has not received much attention.[6] Better understanding of this issue would seem to be of importance in developing policy initiatives to improve female schooling levels. We aim to redress this gap in the literature. In spirit, our analysis complements and extends that of Dasgupta (1995), who has highlighted the negative impact of parental control on health and fertility outcomes of young brides and their children living within the traditional north Indian joint family.[7]

Our intuitive starting point is the idea that, for a significant section of parents, choosing an educated bride entails greater risk of the son separating soon after marriage. We first check for evidence consistent with this hypothesis. Analysing a data-set from India, we find that, for couples where the groom has little or no education, an exogenous increase in the educational attainment of the wife has does not have a statistically significant effect on the probability of subsequent co-residence. However, for the sample of couples where the husband has more than completed primary schooling, an exogenous rise in the educational attainment of the wife has a negative and highly statistically significant effect on the probability of co-residence. This empirical finding provides a priori motivation for our subsequent theoretical analysis.

We proceed to model an economy with overlapping generations and a competitive marriage market, where parents are altruistic but paternalistic. While co-residence confers benefits, parental control over decision-making also imposes costs on married sons if they

Indian joint family, "(M)yriad ways are used to keep the young wife and the husband apart, to delay the growth of a bond between them". Intra-household conflicts after marriage constitute a major cause of household partition in south Asia. See for example Foster (1993).

6 Becker (1981), Zhang and Chan (1999), Edlund (2001), and Botticini and Siow (2002) are primarily concerned with explaining the rationale for dowry. Caldwell et al. (1983), Rao (1993a, 1993b and 2000), Deolalikar and Rao (1998), Bhat and Halli (1999), Edlund (2000), Anderson (2005) and Maitra (2007) focus on 'marriage squeeze' in India, i.e., increased competition for grooms, and its implications for trends in dowry rates. Anderson (2003) explores the connection between caste and dowry inflation. Bloch and Rao (2002) analyse dowry-related violence in India. Gaspart and Platteau (2005) explore the determination of bride price.

7 Dasgupta (1995, p.489) argues that, in such households: "(T)he change that education brings to the balance of power between older and younger women is an important reason for educated women's children having higher survival rates". Our central hypothesis is thus a logical extension of her argument: older women (and, possibly, older men) may seek to avert precisely such a change in the domestic balance of power, and consequent household partition, by choosing uneducated brides for their sons.

live in the parental household. These costs make it rational for couples to form their own households, where they can evade parental control, if their joint income reaches a critical level. Despite their altruism, paternalistic preferences prevent parents from internalising the net gains that accrue to married sons when they separate. Consequently, if possible, parents want to prevent household partition. Education provides an income premium, interpreted broadly as a quantum of resources. However, costs of co-residence vary across households. Some sons would separate from the parental household if, and only if, they have access to the additional resources an educated wife would provide. We call such grooms *flexible* (L). For other grooms, separation is independent of the educational status of their wives. We term such grooms *rigid* (H). It is rational for parents of L grooms to accept educated brides only if such brides bring in higher dowry (as compensation for loss from subsequent household partition). Consequently, some parents acquire the incentive to bring up uneducated daughters, even when schools are free and there are no gains from child labour. H parents, in contrast, will accept uneducated brides only if parents of such women pay higher dowry, since (a) they cannot influence the location decisions of their sons, and (b) they are altruistic. In the steady state competitive equilibrium, all L parents choose uneducated brides, while all H parents choose educated ones. The proportion of educated women in the steady state equilibrium thus turns out to be exactly equal to the proportion of H grooms. In contrast, if grooms themselves were to determine marital partners, all women would be educated in the steady state equilibrium. This happens because grooms benefit from the additional resources educated wives provide. Consequently, they would accept uneducated brides only if such brides compensated them through higher dowry. All parents therefore acquire an incentive to educate daughters in the competitive steady state equilibrium when grooms choose brides.

Our analysis generates a number of policy implications. Parental control over choice of brides turns out to make the level of female schooling unresponsive to state policy. Relatively small payments to parents, for sending daughters to school, are ineffective in raising female schooling levels. This happens because such changes do not provide incentives to L parents to choose educated brides, unless such brides bring in higher dowry. Housing subsidies for newly wed couples can however improve female educational attainments. Our analysis also suggests a case for state or civil society initiatives that challenge parental authority in marriage negotiations.

Section 2 provides our motivating evidence. Section 3 sets up the basic model. Section 4 examines the steady state equilibrium. We conclude with a discussion of some policy implications in Section 5. Proofs are presented in the Appendix.

## 2. Motivating evidence

We start by providing some motivating evidence of our hypothesis that for a significant section of parents, choosing an educated bride entails greater risk of the son separating soon after marriage. To do this we use a unit record data set (collected as a part of a survey on gender, marriage and kinship) from two states in India (Uttar Pradesh (UP) and Karnataka).[8] The survey was conducted using an extensive three-part instrument (for heads of households, women and the elderly) that examined different aspects of household behaviour, social and economic status and issues relating to marriage and old age support. For purposes of estimation we restrict ourselves to couples married after 1965, giving us a sample of 739 married couples.

Table 1 below presents sample means. We report both overall sample averages and state specific averages. There are significant inter-state differences in several cases. Overall approximately 24% of the couples co-reside with at least one parent of the husband. More than 37% of the couples co-reside with at least one parent of the husband in UP compared to 14.8% in Karnataka; the difference is statistically significant. Overall around 30% of the wives have no schooling and the average years of schooling for the wives is 1.7 years. On the other hand 34% of the husbands have attained more than primary schooling. The average years of schooling for the wives and the proportion of wives in the sample who have attained some schooling are both significantly higher in Karnataka compared to UP. However the proportion of husbands attaining more than primary schooling is significantly higher in UP. There is some evidence of positive assortative matching: women with no schooling are more likely to be married to men with little or no education while women with some schooling are more likely to be married to men with more than primary schooling.

**Insert Table 1**

The dependent variable in our regression analysis is co-residence with the husband's parents at the time of the survey (CORESIDENCE), which takes a value of 1 if the couple resides with the husband's parents at the time of the survey and 0 otherwise. Turning to the set of explanatory variables, the primary variable of interest is the educational attainment of the wife. Educational attainment of the wife is defined as a binary variable (WIFESCH), which takes the value of 1 if the wife has any schooling and 0 otherwise. The other

[8] The survey was conducted under the supervision of Sonalde Desai and Vijayendra Rao and the data were collected by the National Council of Applied Economic Research, Delhi. Previous research using this data

explanatory variables include the educational attainment of the husband (HUSBSCH), which takes the value of 1 if he has more than primary schooling (5 years or higher) and 0 otherwise, and a set of other socio-economic characteristics that are likely to affect the probability of co-residence, e.g. the age of the wife at marriage, the sibling composition of the husband, whether the wife or the husband had any choice at the time of marriage, etc. We also include a set of religion and caste dummies and a set of marriage cohort dummies.

Our intuitive argument suggests that the inclusion of the educational attainment of the wife as an explanatory variable in the co-residence regression would lead to an endogeneity problem: we expect this to be correlated with some of the unobserved determinants of co-residence. The standard way of accounting for this problem is to use instrumental variable estimation. We include as instruments variables that are likely to be correlated with the educational attainment of the wife but not correlated with the probability of co-residence. This is generally problematic given that the dataset that we use is not retrospective in nature and the variable WIFESCH is the educational attainment at the time of the survey and not at the time of marriage. However in India, particularly in rural India, very few women continue to attend school after marriage, so the educational attainment of a woman is unlikely to change over the course of the marriage. Thus, the observed educational status of the wife can be quite reasonably thought of as her educational level at the time of marriage. Since pre-marriage education decisions are made by the parents of the girl, we use as instruments educational and occupational characteristics of the wife's mother and father: whether the wife's mother and father had any education and whether the wife's father was a farmer. We also include as instrument a dummy variable that captures societal norms regards inheritance: whether only males in the wife's family inherit property. There is no reason to expect these variables to have a direct effect on the probability of co-residence; indeed, the correlations turn out to be not statistically significantly different from 0.

In Table 2 below we present the marginal effects from the standard (column 1) and instrumental variable (column 2) probit regression on co-residence. We present the marginal effects and not the actual coefficient estimates as the former are more easily interpretable: these are defined as partial derivatives of the probability of co-residence with respect to the individual control variables, holding all dummy variables at zero and all other variables at sample means. Notice first that the null hypothesis of exogeneity of WIFESCH is rejected (p-value = 0.05) and the corresponding Sargan Statistic is 5.155 (p-value = 0.1608) indicating

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(Bloch, Rao and Desai (2004), Rahman and Rao (2004)) has restricted the sample to households residing in that the instruments are valid.[9] The coefficient estimate of WIFESCH is negative and statistically significant in the instrumental variable probit regression (column 2). This implies, in accordance with our intuitive premise that educated wives are significantly less likely to reside with their in-laws. Furthermore, endogeneity of WIFESCH supports our presumption that factors that influence future co-residence are also likely to impact on parental choice of brides. Notice that the coefficient estimate of WIFESCH is negative but not statistically significant in the exogenous probit regression (column 1). A comparison of the coefficient estimates associated with WIFESCH in the two columns indicates that the negative relationship between WIFESCH and CORESIDENCE is significantly under-estimated if we do not take into account the potential endogeneity of WIFESCH. This also suggests that some parents in households that were potentially more fragile may have deliberately chosen uneducated brides in an (unsuccessful) attempt to avert future partition.

**Insert Table 2**

How does the interaction of the wife's education and the husband's education affect co-residence? To examine this issue we re-estimated the co-residence regression, but this time we split the sample on the basis of the educational attainment of the husband. The instrumental variable probit regression results presented in Table 3 below show that for the sample of husbands with little or no education (column 1), educational attainment of the wife does not have a statistically significant effect on the probability of co-residence. However for the sample of educated husbands (column 2), educational attainment of the wife has a negative and highly statistically significant effect on the probability of co-residence.[10]

**Insert Table 3**

Thus, our empirical investigation appears consistent with our intuitive premise that, for many parents, especially those with sons who are relatively high earners, choosing educated brides for sons increases the risk that the sons will leave the parental household soon after marriage. We think of our empirical analysis as elevating this intuitive premise into a stylised fact, whose implications deserve to be analytically developed and empirically tested. The survey questions do not allow us to directly test whether parents do indeed take this factor into account while choosing a bride.[11] However, in light of the large

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Karnataka, as dowry data from UP are suspect. As we do not use dowry data, we use data from both states.

[9] These are computed using a linear probability model. Results are available on request.

[10] Notice that for the sample of couples where the husband has little or no education, the null hypothesis of exogeneity of WIFESCH cannot be rejected. However for the sake of consistency we present the marginal effects from the instrumental variable probit regression. The results from the binary probit regression are available on request.

[11] Nor are we aware of other existing data-sets that would allow one to directly test our hypothesis.

anthropological literature documenting the various other strategies parents adopt to ensure co-residence with married sons (e.g. Caldwell et al. (1983), Dasgupta (1995), Vera-Sanso (1999)), it would be surprising indeed if they did not do so. We therefore proceed to trace out the consequences of doing so by means of a formal model, leaving direct testing of the assumptions and predictions generated by this model for the future.

**3. The Model**

Individuals live for two periods. At the beginning of period 1, each individual is born into a household consisting of parents and one sibling of the opposite sex. The individual reaches adulthood sometime during that period. On reaching adulthood, individuals get married, to persons chosen by their parents, and produce thereafter. We shall interpret 'production' broadly, as including both marketed output and output generated by domestic labour. We therefore think of all individuals as producing, and consuming, a single good. After producing, sons may live with their wives in the parental household, or form separate households before the end of period 1. Individuals lose their parents at the end of the first period, and become parents themselves at the beginning of the second period. Parents produce at the beginning of the period (and thus, before they marry off their progeny).

Individuals may be educated (E) or uneducated (N). Education is acquired through schooling when young. N individuals produce (earn) *w* per period. E individuals produce *s* more than their N counterparts in period 1. Thus, education provides an additional output (income) *s*, which (we assume for convenience) is received entirely in the first period of one's life. A child may or may not be sent to school by parents. Unschooled children grow up to become N adults. To highlight the role of arranged marriage in generating under-investment in female education, we assume (a) schools are free, and (b) parents gain nothing from child labour. The set of all couples belonging to generation $t \in \{\ldots,-1,0,1,\ldots\}$ is $[0,1] \times \{t\}$. By $p_E^t$, we denote the proportion of girls in generation *t* who are sent to school. Thus, $p_E^t$ also denotes the proportion of educated brides in *t*. The corresponding value for boys (grooms) is denoted by $q_E^t$.

Educational status (and thus, earning potential) is common knowledge at marriage. At that time, parents of grooms receive some amount, *d*, as dowry from parents of brides. Consumption takes place after married sons have decided whether to reside with parents or to form separate households. Agents cannot borrow. Parents pay, and retain, all dowry.

Given a family, we shall identify the constituent couples in the older and younger generations by P and S, respectively. Consumption can occur only inside a household. In order to set up a household, a couple has to incur a fixed cost, *a*. Intuitively, they have to acquire an indivisible capital asset, assumed, for simplicity, to depreciate fully at the end of the period. At the beginning of the period, parents set up a household, i.e., acquire the indivisible domestic capital asset by investing *a*. Once the S couple has produced, they have to decide whether to continue to live in the parental household, and thereby take advantage of this prior investment by parents, or to form a separate household by spending *a*.

*Preferences:*

Let $m_P$, $m_S$ be total consumption in the P and S households, respectively, in the period.[12] We assume that for each couple, preferences can be represented by a single utility function, possibly reflective of a prior process of bargaining and negotiations between the husband and the wife. The essential idea we seek to formulate is that conjugal existence directly promotes internalisation of costs and benefits between husbands and wives to an extent *greater* than between parents and married sons. Thus, our focus will be on preference differences *across*, not within, generations. Preferences of the P and S couples, respectively, are given by:

$$u^P = \left[m_P + m_S\right] + g\left(n\right) \tag{3.1}$$

$$u^s = \left[m_S + m_P\left(1 - k_S\right)\right] \tag{3.2}$$

where $0 < \underline{k} \leq k_S \leq \overline{k} < 1$. The function *g* is increasing, with $g\left(0\right) = 0$; *n* measures the type of husband P's daughter acquires. Ceteris paribus, parents prefer educated grooms. Formally: $n = n_E$ if the groom is educated, $n = n_N$ otherwise; $0 < n_N < n_E$. Thus, P is willing to pay up to $g(n_E)$ for an E groom, and at most $g(n_N)$ for an N one.[13]

We interpret this formalization thus. By living with parents in the parental household, the S-couple can economise on household expenses (say by sharing domestic public goods), at the cost of accepting parental control over their behaviour and consumption. Early on, the P couple set up a household, i.e., acquire a house to live in, purchase consumer durables, and organize their activities according to a particular set of preferences. Their son and his wife,

[12] If S live with parents, then $m_S = 0$, while $m_P$ is simply total consumption by the two couples. If S live separately, then $m_P$ is consumption by P, while $m_S$ is consumption by S.

[13] As Caldwell *et al.* (1983, p.357) note, desirable qualities in a groom in rural India are "…defined to an astonishing degree by the extent of modern education….". We assume that P's income is high enough, so that he is not constrained in his willingness to pay. Allowing sons to pay part of their sisters' dowries complicates the exposition without adding any insight.

i.e., the S couple, acquire different preferences. However, S find themselves constrained in acting according to their own preferences if they live with parents, say because of lack of space, or because of the psychic cost from parental objections and consequent domestic friction. Parents may enforce their own traditional norms of behaviour and consumption on the S couple that the latter resent. Social norms may also require S to turn over most of their own earnings to parents, who then decide how that money is going to be spent. The variable $k_S$ measures the marginal loss to the S-couple due to such control, exercised by parents within the parental household. S can rid themselves of parental control, and allocate their resources in a way that best satisfies their own preferences, if they form a separate household organized according to their own preferences. Total gain from doing so is $k_S I_S$, where $I_S$ is the joint earning of the S couple in the period. However, to do so, they have to forgo the use of domestic public goods in the parental household, i.e., they must spend the amount *a* to purchase capital assets, such as a house and some consumer durables, necessary for setting up a household. Thus, it is rational for S to separate if, and only if [$I_S \geq a / k_S$]. We make the natural tie-breaking assumption - S will indeed separate when this holds with equality. Notice that the multiplicative form ($k_S I_S$) assumed for loss from parental control is for algebraic convenience: we only need the S couple's loss to increase with $I_S$. Often, frictions arise in co-resident families because the younger couple are expected to transfer control over a greater quantum of resources if their joint access to resources is higher. Sons who earn more are expected to contribute more towards collective expenses, even though it is the parents who largely determine the composition and magnitude of such expenses. Analogously, parental emphasis on traditional consumption and behaviour is likely to be deemed more irksome when the S-couple can *actually afford* newer goods and lifestyles.[14] It is this connection between greater opportunities and greater inter-generational conflict that we seek to model through the assumption that the loss from parental control increases in $I_{S.}$

Parents in our formulation are altruistic but paternalistic. Parents are altruistic in that they put a positive (indeed, equal) weight on the consumption of married sons, but are paternalistic in that they do not take into account the loss suffered by the S-couple due to parental restrictions and filial obligations when co-resident with parents within a hierarchical relationship. Consequently, ceteris paribus, separation is always costly for parents: if S

[14] See, for example, Vera-Sanso (1999) for a discussion.

separate, parents lose the equivalent of $a$ of their own income. Evidently, it is parental paternalism that generates such a loss for parents.[15]

Intuitively, household-specific characteristics such as the number and composition of siblings, parental assets and education, community norms, etc. may be expected to be important determinants of the extent of inter-generational tensions within the parental household. We model such heterogeneity across families simply by allowing the marginal loss to the S-couple due to co-residence, $k_S$, to vary across families. Thus, the exogenous variable $k_S$ may vary across families according to some distribution defined over $[\underline{k}, \bar{k}]$. We shall assume that $a/2(w+s) \leq \underline{k}$.[16] Within a family, the value of $k_S$ is common knowledge.

**Definition 3.1.** A groom is *flexible* (L) if $a/k_S \in (2w+s, 2w+2s]$, and *rigid* (H) otherwise.

We partition grooms into two categories: flexible and rigid. HE will denote a groom who is both rigid and educated, with HN, LE and LN grooms defined analogously. By Definition 3.1, when the groom is flexible, if at most one member of the S-couple is educated, they will find separation prohibitively expensive. However, if both are educated, they will find separation optimal. Thus, an LE son will find it rational to separate only if parents choose an E bride. An LN son will never separate. Rigid grooms are those whose optimal location, post-marriage, is independent of the educational status of their wives, provided they themselves are educated. Since, by assumption, $a/2(w+s) \leq \underline{k}$, for all H grooms, $a/k_S \leq (2w+s)$. In light of our tie-breaking assumption, Definition 3.1 thus implies that, when the household is H, the S couple will necessarily separate when at least one member is

15 We think of these costs as both emotional and material. The gains that parents make, if adult sons live with them in a dependent relationship, include those from being looked after in old age. It has been noted in other contexts that, as they grow older, parents' desire for children's visits usually exceeds the latter's desire to visit them (Konrad *et al*. (2002)). The assumption that separation imposes only a fixed cost on parents simplifies the algebra but is not crucial. We can generalize (2.1) to $u^P = \left[m_P + (1-k_P)m_S\right] + g(n)$ where $k_P \in [0,1)$, without altering our substantive conclusions. Similarly, reverse paternalism on part of S in (3.2) is only for notational simplicity: the marginal loss from parental control, $k_S$, can apply only to the S couple's own consumption, rather than to the entire consumption in the parental household. Nor is the assumption of equal weights necessary. For convenience of exposition, we rule out the possibility that parents may dissolve their own household and reside in the son's household in a dependent relationship. We conjecture that this largely explains the positive correlation between son's schooling and co-residence in the data (Table 2). However, our data-set does not allow us to distinguish between co-resident households where the parents dominate and those where they are dependent.

16 Thus, we assume *all* S-couples will necessarily separate when both members are educated. This is only for convenience of exposition, and can be easily relaxed without altering our conclusions. See Remark 3.4.

educated. We shall denote, by $h \in [0,1]$, the proportion of H grooms. We shall assume that this proportion, $h$, is invariant over time, i.e., across generations.[17]

We now need to insert the idea that returns to education are significant, but not extremely so, due to lack of complementary inputs such as capital, technology and infrastructure. Formally, then, we assume the following.

**A1.** $a \in (s, 2s)$.

*The marriage market:*

Marriage markets are competitive. A parent with a daughter of type $k \in \{E, N\}$ faces a pair of dowry rates $\langle d_{Ek}, d_{Nk} \rangle$, so that he has to offer parents of, say, an E groom an amount $d_{Ek}$ if he wishes to marry his daughter to that groom. Thus, there's a quadruple $\langle d_{EE}, d_{EN}, d_{NE}, d_{NN} \rangle$ which all parents take as given. A *groom profile* in generation *t* is defined as: $a_g^t = \{(r, s^g(r)) \mid r \in [0,1] \times \{t-1\} \text{ and } s^g : [0,1] \times \{t-1\} \to \{E, N\}\}$. Thus, an individual groom in *t* is characterized by: (a) the couple in the earlier generation he is born to, and (b) his own type. A specific groom profile is just one possible way in which the grooms could be assigned to different types. A *bride profile* in *t* is defined analogously: $a_b^t = \{(r, s^b(r)) \mid r \in [0,1] \times \{t-1\} \text{ and } s^b : r \in [0,1] \times \{t-1\} \to \{E, N\}\}$. A *feasible profile* in *t* is a pair $\langle a_g^t, a_b^t \rangle$. A *marriage allocation for a feasible profile in t,* $\langle a_g^t, a_b^t \rangle$, is a one-to-one and onto mapping from $a_g^t$ to $a_b^t$. Thus, given a collection of grooms and brides, a marriage allocation is just some way of matching every groom with a bride, and vice versa.

Using (3.1)-(3.2), Definition 3.1 and A1 to compare gains to parents from choosing different types of brides, we then get the following.

**Lemma 3.2.** *Let A1 hold. Suppose parents receive dowry payments. Then:*

*(i)* *parents of HE and LN grooms are better off with E brides unless N brides pay at least s more in dowry,*

[17] Notice that the distribution of $k_S$ may vary across generations. Indeed, even the assumption that the proportion of H grooms, *h*, is constant over time is for expositional simplicity. See footnote 19.

*(ii)* *parents of HN and LE grooms are better off with N brides unless E brides pay at least* $\Phi$ *more in dowry, where* $\Phi = [a - s] > 0$.

Recall that, by Definition 3.1, regardless of the educational status of their wives, HE grooms will separate post-marriage, whereas LN grooms will not. Parental altruism then implies parents of such grooms will strongly prefer educated brides unless they bring in significantly less dowry. These parents directly internalise the productivity gain an educated woman generates, and thus have to be compensated by at least that amount, *s*, via higher dowry if they are to accept an uneducated bride. Now recall that, by Definition 3.1, both HN and LE grooms will separate if, and only if, married to educated women. Paternalism generated parental self-interest then dictates that parents of such grooms will find educated brides acceptable *only* if they bring in *higher* dowry. Specifically, these parents suffer a net loss of (a-s) by marrying their sons to E, rather than N, women. Hence, they will accept E brides only if such brides compensate them by at least this amount through higher dowry.

**Remark 3.3.** Suppose grooms chose their own brides, while parents received the dowry payment. From (3.1)-(3.2), Definition 3.1 and A1, it immediately follows that all grooms, regardless of their type, are better off with E brides unless N brides bring in at least *s* more in dowry. Thus, all grooms directly internalise the productivity gains that accrue to an educated wife. Hence, if HN and LE sons were to choose their own brides, while their parents passively received the market determined dowry rate, then, unlike their parents, they would prefer N brides *only* if such brides brought in higher dowry. This observation will provide the key to our claim in Section 4 that it is parental control over choice of wives for sons, and not dowry as such, which generates low levels of female schooling.

**Remark 3.4.** We have assumed $a/2(w+s) \leq \underline{k}$, so that all sons will separate, post-marriage, if both spouses are educated. If this is relaxed, the H class may include grooms who will never separate, regardless of their own, or their wives', educational status, as their preferences are to a very great extent in harmony with those of their parents. Evidently, altruistic parents will find it optimal to marry such H sons to educated women, unless uneducated women bring in s more in dowry. Our basic conclusion, as summarized in Proposition 4.3 below, will not change. We therefore ignore this case in our formal analysis.

Can parents prevent LE (or HN) sons from separating through strategic transfers rather than choice of wives? It is clear from (3.2) that, since sons are altruistic, a dollar transferred from P to S leaves S's utility unchanged, so long as S stays in the parental household. Thus, parents cannot 'bribe' sons not to separate. We can generalize (3.2) to allow bequests to increase S's utility even if S stays in the parental household. However, so long as altruism (and/or preference divergence across generations) leads to a sufficiently low marginal gain from bequests, the transfer required to induce S to stay would be unaffordable for P. It can be seen that, even in the extreme case where S is completely selfish, this would hold if preferences diverge sufficiently across generations, i.e., $k_S$ is sufficiently close to 1. Analogously, since parents are altruistic (recall (3.1)), sons would not be able to compensate parents adequately for household partition through conditional transfers either, even if such contracts were somehow enforceable (which is itself unlikely). On the other hand, pre-marriage commitments by sons not to separate after marriage face obvious enforcement difficulties. An LE or HN son can credibly commit not to separate after marriage to an educated woman only by taking steps *before* marriage to transfer a sufficiently large part of his post-marriage income to P. This is ruled out since agents cannot borrow. Thus, intuitively, sons cannot 'bribe' parents to choose educated brides for them because of credit market constraints. Lastly, an LE or HN son will not separate, even if married to an educated woman, if parents can bring the consumption pattern in the parental household sufficiently close to his preferences (i.e., reduce the value of $k_s$ sufficiently). Parents are unable to give up domestic control to the required extent because it would entail drastic changes in their own values and lifestyle, imposing costs that are unacceptably high.[18]

**4. Steady state equilibrium**

Given dowry rates and a feasible profile, a marriage allocation is stable if no parent strictly prefers a match different from that specified by the allocation. This implies no parent should strictly prefer marrying his son/daughter to a different person. Nor should a parent strictly prefer the person his progeny is actually marrying to be of a *different type*.

[18] Behavioural and consumption rigidities inside the household, which generate this inflexibility, are akin to those suggested by Becker (1981) as an explanation for monetary transfers between spouses.

**Definition 4.1.** Given a quadruple of dowry rates, $T = \{d_{ij} \mid i, j \in \{E, N\}\}$, and a feasible profile $\langle a_g^t, a_b^t \rangle$, a marriage allocation M is a *stable marriage allocation corresponding to* $\langle T, \langle a_g^t, a_b^t \rangle \rangle$ iff: (i) for every $\alpha \in a_g^t$, parents of $\alpha$ are at least as well off, with the match M($\alpha$), as with any match $\beta \in [0,1] \times \{t-1\} \times \{E, N\}$, and (ii) for every $\alpha \in a_b^t$, parents of $\alpha$ are at least as well off, with the match $M^{-1}(\alpha)$, as with any match $\beta \in [0,1] \times \{t-1\} \times \{E, N\}$.

Equilibrium feasible profiles must be such that brides and grooms can be matched in some way that leaves all parents satisfied, at the price vector for alternative types that they are facing. Thus, a feasible profile of grooms and brides will constitute an equilibrium if, given this feasible profile, we can find at least one dowry vector which has a stable marriage allocation corresponding to it.

Lastly, we need to identify equilibrium properties of the marriage market that are *steady state,* i.e., inter-temporally consistent. This is ensured only if no parent has reason to regret educating, or not educating, his progeny. We can think about this in terms of *perfect foresight* on part of parents. Alternatively, if we assume that parents expect past dowry rates to persist, then, if the feasible profile today is such that parents regret their past choices, then parents in the next generation will make different decisions. This will lead to a different feasible profile and, thereby, a different vector of equilibrium dowry rates. Thus, neither the initial feasible profile nor the initial vector of dowry rates would be inter-temporally stable. A steady state feasible profile therefore implies the existence of a marriage allocation whereby no parent could have done better by having a different type of daughter (whether with the same groom or a different groom), at the going dowry rates. The analogous requirement must hold vis-à-vis sons as well.[19]

**Definition 4.2.** A feasible profile $\langle \hat{a}_g^t, \hat{a}_b^t \rangle$ is a *steady state* feasible profile iff, for some quadruple of dowry rates, $T^* = \{d_{ij}^* \mid i, j \in \{E, N\}\}$, there exists a stable marriage allocation,

[19] If *h* changes over time according to some exogenously determined rule (recall footnote 17), instead of being time-invariant, then, evidently, our notion of steady state must intuitively involve perfect foresight. Our conclusions will remain essentially unchanged under this generalization. Similarly, we can generate identical conclusions from a two-period model provided the equilibrium notion assumes perfect foresight. Given *h*, our dynamic framework has an interpretative advantage over such a static framework in that, intuitively, we can

$M^*$, corresponding to $\left\langle T^*, \left\langle \hat{a}_g^t, \hat{a}_b^t \right\rangle \right\rangle$, which has the following property: for every $\alpha \in \left[\hat{a}_g^t \cup \hat{a}_b^t\right]$, there exists no $\beta \in [0,1] \times \{t-1\} \times \{E, N\}$ such that parents of $\alpha$ would be better off if [given $T^*$, $\alpha$ was of a different type and $\alpha$ was married to $\beta$]. $M^*$ will be called a *steady state* marriage allocation.

A steady state feasible profile generates a pattern of schooling choices that allows (i) some dowry vector to persist indefinitely as the equilibrium outcome in every generation, and (ii) that pattern of schooling choices to be reproduced indefinitely, as the aggregate consequence of rational responses by individual parents to that vector of dowry rates.

**Proposition 4.3.** *Suppose parents choose brides for sons, and retain dowry payments. Let* $h \in [0,1]$ *be the proportion of H grooms, and let* $\left\langle \hat{a}_g^t, \hat{a}_b^t \right\rangle$ *constitute a steady state feasible profile. Let* $q_E^*$ *be the proportion of E grooms, and* $p_E^*$ *that of E brides, that is consistent with* $\left\langle \hat{a}_g^t, \hat{a}_b^t \right\rangle$. *Then, given A1: (i)* $q_E^* = 1$, *(ii)* $p_E^* = h$, *and (iii) all E brides must be married to H grooms in a steady state marriage allocation.*

**Proof:** See the Appendix.

By Proposition 4.3, steady state equilibrium vectors of dowry rates generate parental incentives that lead them to educate all sons. Intuitively, this is caused by a combination of parental altruism and the willingness of parents to pay more for educated grooms. However, not all daughters get educated. The proportion of daughters left uneducated is exactly equal to the proportion of L sons. All uneducated daughters are married to educated L grooms when they grow up. Such a match allows parents of grooms to keep the household intact. They could achieve this alternatively by not educating their sons and marrying them to educated women, but choose not to do so because educated grooms command higher dowries. For universal female schooling to be an equilibrium outcome, LE parents would

allow the equilibrium notion to be consistent with *both* forward and backward looking expectations. Our equilibrium can be seen to constitute a point in the core of an assignment game with prior investment.

have to accept educated brides. However, they would do so only if such brides brought in higher dowry, in which case parents would not find it worthwhile to educate daughters.[20]

It is useful to clarify the role played by assumption A1 in generating Proposition 4.3. If $[s \geq a]$, altruistic parents of LE grooms would be willing to accept educated brides even if they did not bring in more dowry than uneducated ones (recall Lemma 3.2(ii)). Consequently, all women would be educated in steady state equilibrium. If $[2s \leq a]$, H parents may (though not necessarily) choose not to educate sons, and marry such uneducated sons to uneducated brides in steady state equilibrium. However, given $[s < a]$, all L parents will educate sons and choose uneducated brides. Thus, allowing $[2s \leq a]$ can only reduce the steady state level of female schooling and thus strengthen our argument.

We have assumed that parents of brides are willing to pay more for educated grooms, but are indifferent as to whether the bride will later co-reside with the groom's parents. We can generalize our analysis to allow brides' parents to have a higher willingness to pay for educated grooms who will subsequently separate. Thus, parents of educated brides may be willing to pay more than those of uneducated brides for an LE groom, since only the former would separate. It is evident that Proposition 4.3 will continue to hold provided such parents' willingness to pay for separation on part of the groom is less than the net cost imposed on the groom's parents from choosing an educated bride, i.e. less than (a-s). Notice further that the S-couple's net gain from separation, $[2k_S(w+s)-a]$, can be less than this amount. Thus, even if the bride's parents know the groom's type (i.e. $k_S$), and they completely internalise the gains to the S-couple from separation, they may still not be willing to pay the dowry premium required to sustain universal female schooling in the steady state. In general, our conclusions will hold even if brides' parents are willing to pay for separation per se, provided such willingness is relatively low.

In our model, all men turn out to be educated. This feature serves two functions. First, it allows us to demarcate our argument from standard assortative matching analysis: educationally identical men receive different matches. Second, it highlights our contention that marriage institutions affect parental incentives to educate sons and daughters in different ways. Parental unwillingness to educate daughters can be (at least partly) explained by marriage institutions and co-residence considerations, but these are unlikely to be important

[20] It is easy to see that steady state feasible profiles must exist. The model generates multiple, including negative, steady state equilibrium vectors of dowry rates. Equilibrium dowry rates must satisfy $d^*_{EE} = d^*_{EN}$.

factors in inhibiting parental investment in the education of sons. Differences in male education levels are to be explained instead by factors external to this paper, e.g. differences in parental credit constraints, schooling costs, labour market distortions, etc. Recall that, in our model, schools are free and there are no gains from child labour. Introduction of such direct schooling costs, along with differential credit constraints, can be immediately seen as capable of generating differences in male schooling levels.[21]

Notice that it is parental control over choice of brides, not dowry *per se*, that prevents universal female schooling. In light of Remark 3.3, it is easy to see that, if sons chose their own brides, while their parents passively received the market determined dowry payment, then universal female schooling would be the only possible steady state equilibrium outcome.[22] This happens since all grooms are better off with educated brides, and would therefore be willing to accept N brides only if such brides brought in higher dowries. Consequently, all parents would acquire an incentive to educate daughters. Notice that our argument is built essentially on the idea that husbands directly internalise gains from their wives' education *more* than their parents, and would therefore choose *better*-educated women. Intuitively, our hypothesis is not that the gender gap in education would necessarily vanish if men chose their marital partners;[23] only that it may be significantly *reduced*.

Peters and Siow (2002) study pre-marital parental investment in children, when children subsequently use these investments to compete for spouses, in a model of assortative matching in a competitive marriage market. In their model, adults choose their own marital partners, and dowry payments are absent. They find that altruistic parents completely internalise the gains to children from their investments, so that any pair of families whose children match on the competitive equilibrium path make investments that are bilaterally efficient. Our results stand in sharp contrast, since they highlight the possibility of sub-optimal investment in children, despite the fact that parents can directly compensate in laws through the dowry mechanism in our model.

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Thus, all parents pay the same dowry in equilibrium, regardless of whether they educate their daughters.

[21] During a 1994 survey of 34,398 rural Indian households, about 30% of girls in the 6-16 age-group were reported as neither attending school, nor working. The corresponding figure for boys was only about 21% (Cigno and Rosati (2005), p. 84). This suggests school costs and gains from child labour explain parental disinclination to educate sons much more adequately than they explain parental reluctance to educate daughters.

[22] Since parents can only choose the educational status of their sons, but not their wives, the formal definition of steady state equilibrium needs to be altered marginally for this case, but the basic idea remains the same.

[23] Strategic considerations abstracted from in our analysis may conceivably lead men to prefer women somewhat less educated than themselves. Greater education would appear to improve the bargaining strength of wives, and thus their share of domestic consumption. However, domestic consumption opportunities would expand as well. Thus, the net effect on husbands appears to be ambiguous. We view this as an open question.

## 5. Policy and concluding remarks

This paper has explored the connection between the institution of 'arranged marriage' and parental incentives for educating daughters, when dowry rates are flexible and parents are altruistic but paternalistic. We have shown that parental control over the choice of brides can play an important causal role in generating under-investment in the education of daughters. Levels of female education may improve if grooms start choosing their own brides. We have provided evidence from India that appears broadly consistent with our theoretical analysis.

Governments often offer direct incentives to parents for sending daughters to school. These can be low fees, subsidised school meals, provision of books, uniforms, health care facilities and welfare benefits contingent on attendance, etc. A simple way of capturing such interventions in our framework is to assume the state provides a cash reward to parents, *b*, if they send daughters to school. It can be shown that, given A1, in steady state, $\left[p_E^* > h\right]$ only if $\left[b \geq \Phi > 0\right]$, where $\Phi = \left(a - s\right)$. Thus, relatively small 'bribes' will be ineffective. This happens because, if parents are to educate daughters who will subsequently marry L men, the state needs to compensate them for the higher dowry the will then have to pay. Hence, our analysis suggests that parental authority in marriage decisions regarding sons may make the level of female schooling 'sticky'. State interventions, whether in the form of increasing direct parental returns from schooling of girls, or of subsidizing female education, may turn out to be ineffective in improving female schooling levels.

Interestingly, housing subsidy for newly wed couples, by making it possible for L grooms to separate even with uneducated brides, can remove the source of their parents' bias against educated brides, and thereby improve female educational levels. Thus, policies that promote nuclear households are likely to have a positive impact on female schooling.

Our analysis also suggests that policy initiatives to contest social norms legitimising parental control over marital decisions may improve female schooling levels. Initiatives to discourage early marriages, and to provide legal/administrative support to individuals who marry against parental opposition, may be especially important in this context.

Parental disinclination to educate daughters is likely to be a multi-causal phenomenon. An effective policy response would accordingly entail multiple dimensions. Our contribution lies in highlighting a hitherto neglected aspect, viz., parental control over bride choice. Our empirical analysis provides a priori grounds for taking this line of investigation seriously, but should be seen as suggestive rather than conclusive. Direct tests of our hypothesis are clearly necessary: we are not aware of data-sets currently available that would allow one to do so in a straightforward and satisfactory fashion. New survey data, specifically examining whether parents consider educated brides a threat to household stability and consequently discriminate against them, would therefore appear to be required. Whether our analysis can be generalized to cover parts of the developing world that exhibit polygamy and payment of bride price remains an important question for future research.

## Appendix

**Proof of Proposition 4.3:**

**(i)** Suppose there exists an N groom in a steady state equilibrium feasible profile. First suppose this N groom is matched with an N bride. Then, since this implies willingness of parents of the N bride to accept an N match, we must have $\left[d_{EN}^{*} > d_{NN}^{*}\right]$. However, in that case the N parent would be better off with an E son, a violation of Definition 4.2, unless the son happens to be H. Hence, if an NN match exists, the groom must be H. Since $(2s > a)$ (by A1), an H parent is better off with an EE outcome rather than an NN outcome unless $\left[d_{NN}^{*} > d_{EE}^{*}\right]$. Hence, if an NN match exists, $\left[d_{NN}^{*} > d_{EE}^{*}\right]$. However, in that case parents of the N bride would be better off if she was educated and married to an E groom instead, a contradiction. Now consider the other possibility that the N groom is matched with an E bride. Then, since, by Definition 4.2, parents of the E bride should not have reason to regret educating their daughter, we must have: $\left[d_{EN}^{*} > d_{NE}^{*}\right]$. However, this implies that parents of the N groom would have done better by (a) educating their son, and (b) then marrying their (E) son to an N bride: a contradiction.

**(ii)** Recall that, from Proposition 4.3(i), grooms can only be type E in a steady state equilibrium feasible profile. Suppose $p_{E}^{*} > h$. Then some parents of L grooms must accept E brides, which, by Lemma 3.1(ii), yields: $\left[d_{EE}^{*} > d_{EN}^{*}\right]$. However, this implies parents of those E brides would have been better off with N daughters: a contradiction. Now suppose $p_{E}^{*} < h$. Then some parents of H grooms must accept N brides, which, by Lemma 3.1(i), yields: $\left[d_{EN}^{*} > d_{EE}^{*}\right]$. This implies parents of those N brides would have been better off with E daughters: a contradiction.

(iii) Part (iii) follows immediately from Lemma 3.1(ii). ◊

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**Table 1: Selected Descriptive Statistics**

| Variable | Description | Full Sample | Karnataka | UP |
|---|---|---|---|---|
| CORESIDENCE | = 1 if couple resides with at least one parent of the husband | 0.2442 | 0.1487 | 0.3704 |
| WIFESCH | = 1 if wife has attained some schooling | 0.2945 | 0.3815 | 0.1795 |
| HUSBSCH | = 1 if husband has completed primary school | 0.3436 | 0.2565 | 0.4587 |
| WSCHLYR | Years of schooling for the wife | 1.6969 | 2.2047 | 1.0256 |
| WFLNDM | = 1 if wife's father had land at marriage | 0.5951 | 0.5409 | 0.6667 |
| HSLNDM | = 1 if husband's family owned land at marriage | 0.6245 | 0.5754 | 0.6895 |
| HINDU | = 1 if Hindu | 0.8761 | 0.8599 | 0.8974 |
| SCSTOBC | = 1 if SC/ST/OBC | 0.4233 | 0.3858 | 0.4729 |
| WFAGEM1 | = 1 if age of wife at marriage less than 15 | 0.2540 | 0.1379 | 0.4074 |
| WFAGEM2 | = 1 if age of wife at marriage in the range 15 – 19 | 0.5755 | 0.6832 | 0.4330 |
| WIFECHOICE | = 1 if wife had choice at marriage | 0.1104 | 0.1013 | 0.1225 |
| HUSBCHOICE | = 1 if husband had choice at marriage | 0.2969 | 0.2522 | 0.3561 |
| MARRCOH1 | = 1 if year of marriage 1965 or before | 0.0933 | 0.0625 | 0.1339 |
| MARRCOH2 | = 1 if year of marriage 1966 – 1975 | 0.3117 | 0.3060 | 0.3191 |
| MARRCOH3 | = 1 if year of marriage 1976 – 1985 | 0.3681 | 0.4030 | 0.3219 |
| MARRCOH4 | = 1 if year of marriage 1986 or later | 0.2270 | 0.2284 | 0.2251 |
| HSNUMELDBR | Husband: Number of Elder Brothers Alive | 0.9239 | 1.0345 | 0.7778 |
| HSNUMYNGBR | Husband: Number of Younger Brothers Alive | 1.1129 | 1.1659 | 1.0427 |
| HSNUMELDSI | Husband: Number of Younger Sisters Alive | 1.0356 | 1.0625 | 1.0000 |
| HSNUMYNGI | Husband: Number of Elder Sisters Alive | 1.0344 | 1.0668 | 0.9915 |
| WFNUMELDBR | Wife: Number of Elder Brothers Alive | 1.0883 | 1.1487 | 1.0085 |
| WFNUMYNGBR | Wife: Number of Younger Brothers Alive | 1.2834 | 1.2694 | 1.3020 |
| WFNUMELDSI | Wife: Number of Younger Sisters Alive | 1.9607 | 2.2328 | 1.6011 |
| WFNUMYNGSI | Wife: Number of Elder Sisters Alive | 0.8638 | 1.0172 | 0.6610 |
| WFMOTHED0 | = 1 if wife's mother is illiterate | 0.8577 | 0.8362 | 0.8860 |
| WFFATHED0 | = 1 if wife's father is illiterate | 0.6982 | 0.7047 | 0.6895 |
| WFFATHFARMER | = 1 if wife's father's main occupation: farming | 0.5693 | 0.5819 | 0.5527 |
| HSMOTHED0 | = 1 if husband's mother is illiterate | 0.9092 | 0.8836 | 0.9430 |
| HSFATHED0 | = 1 if husband's father is illiterate | 0.7951 | 0.8168 | 0.7664 |
| HSFATHLABOURER | = 1 if husband's father's main occupation: labourer | 0.7374 | 0.8039 | 0.6496 |

| | | | | |
|---|---|---|---|---|
| WFMALEPROPSHARE | = 1 of only males get property share in wife's family | 0.8515 | 0.8297 | 0.8803 |
| HSMALEPROPSHARE | = 1 if only males get property share in husband's family | 0.9374 | 0.9353 | 0.9402 |

**Table 2: Probability of Co-residence. Marginal Effects.**

| | Probit | Instrumental Variable Probit |
|---|---|---|
| WIFESCH | -0.0126 | -1.2721** |
| | (0.0366) | (0.5207) |
| HUSBSCH | 0.0721** | 0.6057*** |
| | (0.0364) | (0.1786) |
| WFLNDM | 0.0182 | 0.1496 |
| | (0.0374) | (0.1226) |
| HSLNDM | 0.1168*** | 0.1901 |
| | (0.0371) | (0.1765) |
| HINDU | -0.1329** | -0.4157** |
| | (0.0619) | (0.1660) |
| SCSTOBC | 0.0253 | 0.0188 |
| | (0.0369) | (0.1205) |
| UP | 0.2119*** | 0.2823 |
| | (0.0363) | (0.2495) |
| WFAGEM1 | 0.0610 | 0.1036 |
| | (0.0552) | (0.1793) |
| WFAGEM2 | 0.0533 | 0.1173 |
| | (0.0421) | (0.1510) |
| HSNUMELDBR | -0.0271* | -0.0721* |
| | (0.0143) | (0.0421) |
| HSNUMYNGBR | -0.0014 | 0.0014 |
| | (0.0123) | (0.0336) |
| HSNUMELDSI | 0.0093 | 0.0222 |
| | (0.0132) | (0.0378) |
| HSNUMYNGSI | -0.0308** | -0.0836* |
| | (0.0140) | (0.0475) |
| WIFECHOICE | -0.0752* | -0.0933 |
| | (0.0401) | (0.1925) |
| HUSBCHOICE | -0.0421 | -0.0996 |
| | (0.0330) | (0.1154) |
| MARRCOH3 | 0.1316*** | 0.3975*** |
| | (0.0413) | (0.1313) |
| MARRCOH4 | 0.3101*** | 0.8217*** |
| | (0.0520) | (0.1805) |
| Sargan Statistic ($\chi^2(3)$) | | 5.155 |
| Wald Test for Exogeneity ($\chi^2(1)$) | | 3.82** |
| Observations | 739 | 739 |

Correlation between CORESIDENCE and:
WMOTHED0: -0.0203
WFATHED0: 0.0228
WFATHFARMER: 0.0396
WFMALEPROPSHARE: 0.0253

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors in parentheses

**Table 3: Probability of Co-residence. Instrumental Variable Probit Regression. Sample Classified by Educational Attainment of the Husband. Marginal Effects Presented.**

| | Low Educational Attainment of Husband | High Educational Attainment of Husband |
|---|---|---|
| WIFESCH | -1.5686 | -1.1052** |
| | (1.9477) | (0.5261) |
| WFLNDM | 0.1008 | 0.3126 |
| | (0.2135) | (0.2104) |
| HSLNDM | 0.1791 | 0.1344 |
| | (0.4853) | (0.2710) |
| HINDU | -0.3256 | -0.9040*** |
| | (0.2047) | (0.3449) |
| SCSTOBC | 0.0459 | -0.0093 |
| | (0.1605) | (0.2109) |
| UP | 0.3307 | 0.3449 |
| | (0.7811) | (0.3384) |
| WFAGEM1 | -0.0344 | 0.5082 |
| | (0.2266) | (0.3291) |
| WFAGEM2 | -0.0456 | 0.6026** |
| | (0.2003) | (0.2792) |
| HSNUMELDBR | -0.2102** | -0.0516 |
| | (0.0911) | (0.0596) |
| HSNUMYNGBR | -0.0380 | -0.0019 |
| | (0.0556) | (0.0494) |
| HSNUMELDSI | -0.0234 | 0.0475 |
| | (0.0790) | (0.0512) |
| HSNUMYNGSI | -0.1561 | -0.0280 |
| | (0.1314) | (0.0536) |
| WIFECHOICE | -0.3170 | 0.2811 |
| | (0.4796) | (0.2961) |
| HUSBCHOICE | -0.2552 | 0.1056 |
| | (0.2116) | (0.1764) |
| MARRCOH3 | 0.4004* | 0.3688* |
| | (0.2329) | (0.2106) |
| MARRCOH4 | 0.6164** | 1.2440*** |
| | (0.3137) | (0.3198) |
| Sargan Statistic ($\chi^2(3)$) | 10.408** | 2.055 |
| Wald Test for Exogeneity ($\chi^2(1)$) | 0.6145 | 4.22** |
| Observations | 474 | 265 |

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors in parentheses