Groom Price-Female Human Capital: Some Empirical Evidence

Amarendra Sharma
(Elmira College)

Paul Frijters
(Queensland University of Technology)

Abstract

This paper examines the effect of female human capital endowment on the groom price or dowry by using a newly available data set that was created by surveying the middle-class residents of Patna, Bihar. The estimates based on the OLS and 2SLS suggest the existence of positive association between the two variables for the sample under study. The result can be viewed as a positive; albeit, a small step towards settling the issue as to whether or not dowry is an obstacle to female human capital formation.

Keywords: Dowry

JEL Classifications: J12, J16, O12

I. Introduction

The main objective of this paper is to examine the association between female dowry and her level of human capital endowment by using a newly created data set from Patna, the capital city of the state of Bihar in North India.

Dowry is an ancient practice where bride's family voluntarily gives gifts to the groom's family at the time of marriage. In the modern context, however, dowry is invariably treated as a groom's price for agreeing to marry the bride (see for example, Rao 2006). There are several papers that theoretically discuss how dowry or groom price is determined (See for example Rao, 1993, Sen, 1998; Anderson, 2003; Mukherjee and

Mondal, 2006). A number of these papers underscore the importance of human capital in determining the amount of dowry. For instance, Sen (98) in her theoretical paper argues that "the differences in gains from marriage for men and women that lead to dowry arise primarily from differences in patterns of acquisition of human capital".

Empirically, the effect of bride's human capital endowment on the amount of dowry has been estimated by Rao (1993) among others. Rao uses schooling difference (wife's education minus husband's education) as one of the determinants of the amount of dowry and finds a negative association. Using the same data set, Edlund (2003) by regressing the net amount of dowry on the husband and wife's individual traits including educational attainments confirms a positive association to exist between the two variables. However, the relationship is not statistically significant at the conventional levels in either study.

This paper, also, confirms the existence of a positive association; albeit, in a statistically significant manner, by using a newly available data set on dowry from the residents of Patna. This study should be considered an improvement over the previous studies, as it relies on a much more informative household level data, and is also able to control for the endogeneity biases associated with some of the explanatory variables in the estimation of dowry present in the previous studies.

The remainder of this paper is organized as follows. Section 2 constructs a simple model of dowry to generate a hypothesis pertaining to the association between female dowry and the level of her human capital acquisition. Section 3 outlines the econometric strategy. Section 4 describes the data and presents summary statistics. Section 5 presents the results of the OLS model. Section 6 conducts various robustness checks including endogeneity and sample selection biases and presents the results of the 2 SLS model. Section 7 discusses the limitations of the paper. Section 8 concludes the paper.

II. The Model

II.1 **Capturing a Good Groom**

Two utility functions need to be modelled: that of the parents deciding on the education and dowry of the bride, and the utility of the groom household that accepts or rejects the offers of bride human capital and dowry combinations.

The utility function of the parents, U_B, is given by:

$$U_B = u_1(W - D - E) + q$$

where, *W* is the initial bride household wealth, *D* is the dowry paid to the groom household, *E* is the human capital acquisition cost pertaining to the bride (presumed linear in the level of education, implying that *E* can also be interpreted as the bride's level of educational attainment) and *q* is the quality of the groom. We envisage u_1 to be the usual convex function and bride households to be differentiated by their initial levels of wealth, *W*. There are N bride households, whom we order from low wealth to high wealth, with $W_1 > 0$ implying that the household wealth is bounded from below. Note that the default level of utility if the household decides not to marry the female offspring at all, would be $u_1(W)$.

On the side of the grooms, their utility function, U_G, equals

$$U_G = u_2(D) + u_3(E)$$

with $u_2(.)$ and $u_3(.)$ being a convex function of its argument. To avoid corner solutions, we presume $\lim_{x \to 0} u_2^{'}(x) = +\infty$ and $\lim_{x \to 0} u_3^{'}(x) = +\infty$. This captures decreasing marginal utility of dowry and the education level of the bride. Grooms differ with respect to quality *q*. There are $M < N$ groom households, ordered by quality which is bounded from below, such that $q_0 > 0$. The outside option of a groom would be to get nothing, i.e. $u_2(0) + u_3(0) = 0$.

The matching process is assumed to consist of the bride households offering the groom households a particular package of dowry and education. The offer of the i'^{th} bride household to the j'^{th} groom household is denoted as (E_{ij}, D_{ij}). Groom households either accept or reject the offer. Bride households can make sequential offers as often as they like, but cannot again make a different offer to the same groom household. There is perfect information regarding the important parameters on both sides of the marriage market. The solution concept is that of Nash equilibrium: no household in equilibrium should be able to gain by switching with another household, or having made a different offer.

II.2 The solution

The solution is characterised by the following theorem:

Theorem 1: *In the marriage market described above, groom household j matches with bride household* $i = N - M + j$. *Bride households* $i = 1,...,i = N - M - 1$ *are unmatched. The total transfer* $D_j + E_j$ *is given iteratively by*

$$q_j - q_{j-1} = u_1\left(W_{i-1} - \left(D_{j-1} + E_{j-1}\right)\right) - u_1\left(W_{i-1} - \left(D_j + E_j\right)\right)$$

where $D_{-1} = 0$ *and* $E_{-1} = 0$, *and the division between* D_j *and* E_j *is given by the pair* $\left(D_j^*, E_j^*\right)$ *that solves the unique solution equation*

$$u_2'\left(D_j^*\right) = u_3'\left(D_j + E_j - D_j^*\right).$$

Proof: The proof of this theorem is standard once we recognise that we have set up a classic Bertrand price-posting model of competition with an oversupply of brides, meaning that, all the surplus will go to the grooms[1]. We thus need only discuss the broad lines of the proof.

Note first that the theorem does not uniquely tie down the set of offers made by all households, merely its outcome. This is because bride households can make costless offers that will never be taken up in equilibrium and that are thus not unique. All that is unique is the offer from the bride household to the groom household with which it eventually matches.

With this final allocation, the condition that $q_j - q_{j-1} = u_1(W_{i-1} - (D_{j-1} + E_{j-1})) - u_1(W_{i-1} - (D_j + E_j))$ means that the i'^{th} bride household is not outbid by the household with the wealth just below it, i.e., $i-1$. It is immediate that the i'^{th} household will not be outbid by any other household: those with wealth below W_{i-1} will offer even less, just as those with higher wealth, because of the convexity of the function $u_1(.)$. For the same reason, household *i* cannot benefit from offering more for the grooms above *j*. Given this set of equilibrium offers, no groom household could improve its outcome by refusing an offer. Note that if the i'^{th} bride household would offer more, then the offer could not be Nash equilibrium, because it could profitably offer less knowing that the groom household below it won't outbid it. The division between D_j and E_j minimizes the sum of D_j and E_j given the involved utility benefit to the groom of the marriage and thus minimizes the cost of the transaction for the bride household. Any deviation from this would mean that the bride household could offer less total transfer and thus could not be equilibrium. Uniqueness of the

[1] What the oversupply of brides does is tie down the transfer to the lowest quality groom to be equal to the level of transfer that makes the most wealthy unmatched bride household indifferent between making an offer or not. If we alternatively would have assumed an oversupply of grooms (N<M), then the first (N-M) grooms would not be matched, and the first groom to be matched would receive a zero transfer, with all the other results as in the theorem.

equilibrium follows from the fact that no other allocation between households can be efficient because any bride household above $N - M - 1$ can always outbid a lower-wealth bride household that is matched, and can outbid a lower-wealth bride household matched to a higher groom. Also, no other final groom price is a Nash Equilibrium in the sense that any higher groom price is subject to under-cutting by the bride household itself and any lower groom price is subject to overbidding by the bride household below it.

The theorem thus shows that there is going to be complete assortative matching between the wealth of the bride households and the quality of grooms, i.e. the wealthier bride households will match with the highest quality grooms. The least wealthy household is going to end up with groom q_0. Also, since $(D_j + E_j)$ is increasing in *j*, we can also say that both D_j and E_j must be increasing in W_i and thus non-decreasing in *j* (a deviation from this rule cannot solve this equation because both $u_2(.)$ and $u_3(.)$ are convex). Hence we get the empirical predictions that:

1. Dowry and bridal education move together.
2. Dowry and bridal education increase with the wealth of the bride family.
3. Dowry and bridal education increase with the quality of the groom.
4. There is assortative matching between the wealth of the bride family and the quality of the groom.

In the remainder of this paper we primarily focus on examining the empirical prediction 1.Empirical prediction 2 is also verified using the data; however, predictions 3 and 4 cannot be verified as we lack the pertinent data to test them.

III. Empirical Estimation

Ideally, one would estimate the following equation to evaluate the impact of female human capital endowment on the magnitude of her dowry payment, denoted FD:

$$FD = \beta X + \varepsilon \quad (1)$$

where the vector X contains the plausible bride side individual and household specific determinants of a female offspring's dowry, that is, her human capital acquisition, household wealth, parental human capital acquisitions, male siblings' human capital acquisitions, the number of male and female siblings in her household, male siblings' dowries, and her physical attributes in addition to the groom side individual (including a measure of groom quality) and household specific characteristics.

However, the data set does not contain explicit information on several plausible explanatory variables mentioned above. Therefore, the following modified equation is estimated to evaluate the impact of female human capital acquisition on the magnitude of her dowry payment:

$$FD = \alpha_0 X + \alpha_1 MD + \alpha_2 FE + \alpha_3 MSE + \alpha_4 FS + \alpha_5 MS + \varepsilon \quad (1)'$$

where vector X contains the age of household head, self-reported values of annual household income that is used as a proxy for household wealth, self-reported values of the parental educational attainments that are used as proxies for the parental human capital acquisitions. The variable MD represents the male siblings' dowry, FE represents the female offspring's education that is used as a proxy for her human capital acquisition, MSE represents the male siblings' average level of education that is used as a proxy for all of her male siblings' human capital acquisitions, FS represents the number of female siblings in the household and MS represents the number of male siblings in the household. The groom side individual and household attributes in addition to the female attributes such as beauty, complexion, height, etc., which are considered plausible determinants of female dowry, have been relegated to the stochastic error term as the data set does not contain explicit information on these variables. [2]

IV. Data

The data used for this analysis is obtained from a general survey on dowry related issues conducted under the corresponding author's guidance on the residents of Patna, a city in the north-Indian state of Bihar, during the second-half of July 2004. Patna was a natural choice since the incidence of dowry in the state of Bihar of which Patna is the capital is among one of the highest in the country (see for example, Lee & Srinivasan, 2002).

Patna is located between Latitude: 25° 37' North and Longitude: 85° 12' East, and lies on the south bank of the Ganges River. The Patna Municipal Corporation is divided into four circles, which is further sub-divided into 57 wards containing a population of 1,366,444 and 230,618 households as per the census of 2001. The sample was selected from the 38 wards of the following circles: Bankipur, New Capital Circle, and Kankarbagh. Patna city - the fourth circle - was excluded from the sample purely on the grounds of convenience. The household listing operation was carried out in each of the selected ward segment prior to the data collection that provided the necessary frame for selecting the household. The households were selected on a systematic random sampling basis. No replacement was made if the selected household was absent during data

[2] It is worth noting that the female siblings' education and dowries have been excluded as explanatory variables. The reason being that in the estimation framework of this paper each girl is represented by an estimating equation that captures her dowry and education.

collection. The survey yielded a sample of 136 households of which only 110 households identified themselves as having at least one female offspring.[3]

Dependent Variable

Female Dowry (*FD*): To obtain data on this variable, a use has been made of the following two questions that the interviewees were asked in the survey: First, do you expect to pay dowry at the time of the marriage of each of your female children? And second, if yes above, how much? All the responses to the second query were in the Indian Rupees. The variable ranged from zero to Rs. 1.5 Million. The average dowry amounted to Rs. 241, 846.20 with a standard deviation of Rs. 299, 453.50. This variable also includes *ex-post* responses.

Explanatory Variables

Female Education (*FE*): To obtain data on the variable of interest, we rely on the following question that was posed to the respondents in the survey: What level(s) of education are you planning to make available to your female children? (Please list their names and the associated levels of education). A total of 170 observations were obtained for this variable from the 110 households. The mean level of schooling is 15.15. The standard deviation for this variable is 3.44 years. This variable ranged from a low of zero years of schooling to a high of 22 years of schooling and contains both *ex-ante* and *ex-post* information. The average years of schooling may seem unduly high for the sample. In our opinion three possible explanations can be offered to rationalize these numbers. First, the sample under study largely represents the middle-class residents of Patna. Second, a greater proportion of these responses are the planned levels of education and not the actual levels of educational attainments. What the parents are planning to provide

[3] A total of 170 households were approached out of which only 136 responded to the queries.

and what a female child actually attains may differ substantially due to such factors as resource constraints, child's ability, and social constraints. Thirdly, since the data comes from Bihar where the requisite environment to promote entrepreneurship is lacking due to the widespread lawlessness in the state, the only descent escape route to poverty is to have a good education, thus current generation parents are likely to provide a higher level of education to its offspring in general.

Household Income (*HINC*): To obtain data on this variable, we rely on the following question that the interviewees were asked: What is your annual income (on average)? The responses were in the Indian Rupees. The mean income for the sample amounted to Rs. 104,447.10 with a standard deviation of Rs. 73,476.40. The household income ranged from a low of Rs. 10,000 to a high of Rs. 500,000.

Father's Education (*FEDUC*): The male interviewees were asked the following question: What is your current level of education? On average, a girl's father had attained 14.39 years of schooling. The standard deviation of this variable is 3.93 years of schooling. This variable ranged from a low of zero years of schooling to a high of 23 years of schooling.

Mother's Education (*MEDUC*): The male-interviewees were asked the following question: What is your wife's current level of education? On average, a girl's mother had attained 11.28 years of schooling. The standard deviation of this variable is 5.16 years of schooling. This variable ranged from a low of zero years of schooling to a high of 20 years of schooling.[4]

[4] Out of 136 respondents only one was female. In her case, the interviewers asked the questions pertaining to her husband.

Male Siblings' Average Level of Education (*MSE*): The information on this variable is obtained from the following question that the interviewees were asked: What level(s) of education are you planning to make available to your male children? (Please list their names and the associated levels of education). Responses from households with more than one male offspring were averaged, and contain both the *ex- ante* and *ex-post* information. On average, a girl's male siblings were expected to receive 12.08 years of schooling. The standard deviation for this variable is 6.93 years of schooling. The variable ranged from a low of zero years of schooling to a high of 20 years of schooling. The reason that the average level of education is higher for the female offspring than it is for the male offspring is that the later are younger on average than the former in this sample.

Number of Male Siblings (*MS*): To obtain information on this variable, we rely on the following question that each respondent was asked: How many male children do you have? The tabulation reveals that 22.22% of the sampled girls had no male sibling, 42.11% had one male sibling, 21.64% had two male siblings, 13.45% had three male siblings, and 0.58% had four male siblings.

Number of Female Siblings (*FS)*: To obtain information on this variable, we rely on the following question that each respondent was asked: How many female children do you have? The tabulation indicates that 37.43% of the sampled girls had no female sibling, 40.94% had one female sibling, 12.28% had two female siblings, and 9.36% had three female siblings.

Male Siblings' Dowry (*MD*): To obtain information on this variable, we rely on the following question that the respondents were asked: Would you ask for a dowry payment at the time of the marriage of each of your male children? The respondents had two options: 'yes' and 'no'. Only 42.69% of the girl's families said 'yes' to the above question, and 57.31% said 'no'. A 'no' includes all those families with no male offspring as well. As usual, the responses include both the *ex-ante* and *ex-post* information.

Age of Household Head (*AGE*): The average age of a girl's father is 43.64 years. The standard deviation of the variable is 10.44 years. The variable ranged from a low of 24 years to a high of 65 years.

Caste: To obtain data on this variable, we rely on the following question that the respondents were asked: What caste do you belong to? Since there were several reported castes, we elected to group them into two categories. All those who identified themselves as belonging to one of the following castes: *Brahmin*, *Bhumihar*, *Rajput*, and *Kayastha* were identified as the members of 'high caste'. All other types of responses including 'Muslim' and 'no response' were identified as 'otherwise'. The reason Muslims have been clubbed together in the 'otherwise' category in this study is that scholars believe that the forefathers of the majority of Muslims in India were mostly lower caste Hindus who chose to convert to Islam in order to avoid caste slavery (see for example, Encyclopædia Britannica 2006). For this sample, 52.05% of the girl's families identified themselves as a member of high caste. The caste of a household, a pre-determined variable, is used to identify the effect of male education on the female dowry in the main estimating equation.

Father's Age at the Time of his Marriage (*AGEMAR*): To obtain information on this variable, a use has been made of the following two questions that were posed to the respondents: (1) What is the year of your (first) marriage? (2) What is your age? Using these two queries, each father's age at the time of his marriage is computed. The average age at which a girl's father achieved the marital status is 22.47 years. The standard deviation for this variable is 5.36 years. The variable ranged from a low of seven years to a high of 34 years. This pre-determined variable is used to identify the effect of sample selection on the female dowry in the main estimating equation.

Years Passed Since Parents' Marriage (*YPAM*): The queries discussed in the context of the previous variable yield information on this variable as well. The average number of years passed since a girl's parents achieved marital status is 21.16 years. The standard deviation of the variable is 12.53 years. The variable ranged from a low of two years to a high of 55 years. This pre-determined variable is used to identify the effect of the number of male siblings on the female dowry in the main estimating equation.

Father's Dowry (*DOWFT*): To obtain information on this variable, a use has been made of the following question that each respondent was asked: Did you take dowry? The respondents had two options to choose from - yes and no. The tabulation interestingly reveals that the 32.94 % of the sampled girl's fathers received dowry at the time of their own marriages. This pre-determined variable is used to identify the effect of male dowry on the female dowry in the main estimating equation.

Father a Government Employee (FOC): To obtain information on this variable, we rely on the following question that was posed to each respondent: What is your occupation? From the responses, an indicator variable is constructed where the value one implies a girl's father is a government employee, and the value zero implies otherwise. It turns out that the 41.42 % of the sampled girls' fathers were government employees. This pre-determined variable is used to identify the effect of the number of female siblings on the female dowry in the main estimating equation.

Housewife Mother (MOC): To obtain information on this variable, we rely on the following question that was posed to each respondent: Does your wife work outside the home? Each respondent had two options to choose from - yes and no. The value one implies a girl's mother works at home, and therefore is a housewife, and the value zero implies she works outside.[5] The tabulation reveals that the 89.35 % of the girls' mothers were housewives. This pre-determined variable is used to identify the effect of female education on her dowry in the main estimating equation.

Table-1 below presents the summary statistics of variables used in the analysis.

Table-1: Summary Statistics

Variables	Mean	Standard Deviation	Min	Max
HINC	104447.1	73476.4	10,000	500,000
MD	.4235294	.4955774	0	1
FE	15.15294	3.445281	0	22
FEDUC	14.39412	3.936323	0	23
MEDUC	11.28994	5.167891	0	20
MSE	12.08024	6.935219	0	20
MS	1.276471	.9790887	0	4
FS	.9294118	.9394476	0	3
CASTE	.5176471	.5011647	0	1

[5] This inference was arrived at by cross-checking another question in the survey that asked each respondent if your income is the only source of income for the household.

AGE	43.64118	10.44147	24	65
YPAM	21.16471	12.53289	2	55
AGEMAR	22.47647	5.365023	7	34
FOC	.4142012	.4940474	0	1
MOC	.8934911	.3094046	0	1
DOWFT	.3294118	.4713881	0	1
FD	241846.2	299453.5	0	1500,000

V. OLS Results

Even a simple regression of female offspring's dowry on the female education reveals a positive relationship between the two variables, as can be seen from the scatter plot of the fitted regression line in figure-1 below.

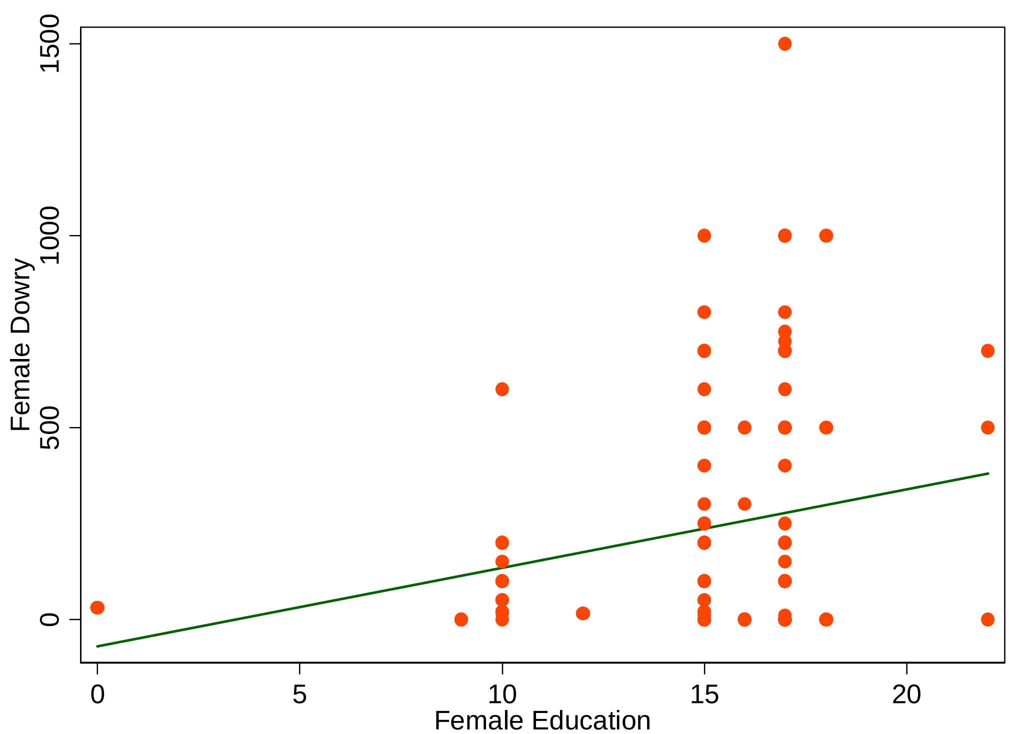

Figure-1

Table 2 presents the standard OLS estimates for equation (1). Approximately 34 % of the variation in the dependent variable 'FD' is explained by the explanatory variables. The explanatory variables are jointly significant at the 1% level ($F_{9, 156}$ = 10.76). According to the results in table 2, the coefficient of the variable of interest 'FE' is positive and statistically significant at the 1% level, implying that, *ceteris paribus*, one additional year of schooling is expected to increase her dowry amount by approximately Rs. 18,610; even when the age of household head, household income, the parental educational attainments, male sibling's average levels of education, male siblings' dowries, and the number of male and female siblings in the household are controlled for. The coefficient of MD is positive and highly significant. Those households that are expected to and/or have already demanded dowries for their male offspring are also expected to pay or have already paid approximately Rs. 286,562.60 more in dowry for each of their female offspring as opposed to the households that do not expect to seek or have not sought dowries for their male offspring, Household income has a positive and significant effect on the female dowry. Mother's education has a positive and significant effect on the female dowry. The coefficients of the remaining explanatory variables are not significant at the conventional levels.

Table-2: OLS Result of FD

Variable	Coefficient	Variable	Coefficient
AGE	1.440524	MD	286.5626
	(2.149299)		(45.04615)***
HINC	1.163762	FS	15.60706

	(.504513)**		(22.59996)
FEDUC	3.156214	MS	-11.316
	(6.428847)		(22.76447)
MEDUC	9.958655	FE	18.60963
	(5.258606)*		(64.32831)***
MSE	.5219519	INTERCEPT	-511.1932
	(4.227241)		(131.5551)***
		R^2	0.3359
		N	166

The top entry in each cell represents the coefficient estimate of the corresponding variable. The values in the parentheses are the White's heteroscedasticity corrected (robust) standard errors.

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

VI. Robustness Checks

Endogeneity

The plausible determinants of a female offspring's dowry in the above equation are not necessarily exogenous. In particular, male siblings' dowries, male siblings' average level of education, the number of male and female siblings, and the level of female offspring's education are perceived to be potential endogenous variables.

First, we address the potential endogeneity of female offspring's education and her dowry. Anderson (2004) suggests that a female offspring's amount of dowry and her level of educational attainment should be simultaneously determined. 'Since parents of girls plausibly must decide, when their daughters are young, whether to invest more in their daughter's education, or to save for her dowry. The two variables are then simultaneously determined; although, the investment in education occurs prior to the dowry payment.'

Secondly, one can argue that a female offspring's dowry and her male siblings' dowry ought to be determined simultaneously as well. Since on the one hand, parents that expect to pay dowry for their female offspring are more likely to recover it by demanding dowry for their male offspring; and on the other hand, parents that expect to receive dowry for their male offspring are more likely to pay higher amounts in dowry for their female offspring. Ostensibly, one would suspect a two-way causality between these two variables.

The fertility and the dowry decisions are also perceived to be determined simultaneously within a household. If parents expect to pay dowry for each of their daughters, they may choose to have fewer female offspring. Inversely, having fewer female offspring implies a higher magnitude of dowry for each of them. The gender of the offspring as a choice variable for parents has become tenable as modern medical technologies such as Ultrasound scanning allow pre-natal determination of the gender of the unborn baby and may induce mothers to abort the female fetus. Before the advent of the modern medical technologies, female infanticide was the modus-operandi in the case of undesired female child (see for example, Clark 2000). In passing, it should be noted that recently, the government of India banned the use of Ultrasound imaging technique to determine the gender of the pre-natal baby; however, the efficacy of this legal measure remains to be seen.

Additionally, if parents expect to pay dowry for their daughters, on the one hand, they may choose to have fewer male offspring, as it may result in savings that could be used toward paying dowry, thus resulting in a higher amount in dowry for each female offspring. On the other hand, a higher number of male offspring implies a higher amount in dowry for each female offspring, since parents can demand dowry for their male offspring and use it to supplement the female offspring's dowry.

Finally, one would suspect that the male offspring's level of education not only affects the amount of female offspring's dowry; but it in turn, is also influenced by the magnitude of the female offspring's dowry.

To address these potential endogeneity issues, regressions in which the male offspring's dowry, female education, male siblings' average level of education, the number of female offspring, and the number of male offspring are treated as dependent variables, are estimated prior to the female offspring's dowry equation.

Thus, the first-stage reduced form equation representing the female education, denoted FE, is given by the following equation:

$$FE = \beta_{FE} X_{FE} + \varepsilon_{FE} \tag{2}$$

where the vector X_{FE} contains the plausible determinants of female education, that is, the age of household head, household income, the parental educational attainments, and a binary variable to indicate if mother is a housewife, which is used to identify the effect of female offspring's education in the structural equation. A priori it is hard to predict the sign of the coefficient of the identifying variable, since a housewife mother, on one hand, drawing from her own experiences as a housewife, a disenchanting one; may encourage her daughter to acquire more education and discourage her from becoming a housewife after marriage. And, on the other hand, again drawing from her own experiences, this time a fulfilling one; may discourage her daughter from attaining higher levels of schooling, as she may have found it to be detrimental to the marital harmony and/or the virtues of being a housewife far exceeded its opportunity cost for her. In any case, this exogenous variable is hypothesized to be a significant determinant of the female offspring's education.

The first-stage reduced form equation representing the male offspring's dowry, denoted MD, is given by the following equation:

$$MD = \beta_{MD} X_{MD} + \varepsilon_{MD} \quad (3)$$

where the variable MD is equal to one if parents expect to seek or have sought dowry for their male offspring and equal to zero otherwise. The vector X_{MD} contains the plausible determinants of MD, that is, the age of household head, household income, the parental educational attainments, and father's dowry. Father's dowry (whether father received dowry for his own marriage), a binary variable, is used to identify the effect of male offspring's dowry in the structural equation. As mentioned earlier, dowry in the modern context is mostly an outcome of the demand emanating from the groom side rather than it being offered voluntarily by the bride side; then it is not a stretch of imagination to postulate that those fathers that received dowry at the time of their own marriages are less likely to see faults in being supportive of dowry-seeking, as they may perceive it to be a continuation of their family traditions, and thus are also more likely to demand dowry for their own sons. However, when it comes to giving dowry for their female offspring, it is assumed that this variable does not have a significant effect primarily due the belief that in most cases dowry demand and its magnitude originates from the groom side, whereas the bride side simply tends to oblige after some negotiations. Thus, it is hypothesized that this variable is not correlated with the unobserved effect in the structural equation that includes a measure of beauty, height, and complexion among others, after the other observed effects have been accounted for.

The first-stage reduced form equation representing the average level of male siblings' education; denoted MSE, is given by the following equation:

$$MSE = \beta_{ME} X_{ME} + \varepsilon_{ME} \tag{4}$$

where the vector X_{ME} contains the plausible determinants of the average level of male siblings' education, that is, the age of household head, household income, the parental educational attainments, and a binary variable indicating if the household belongs to one of the four higher castes to identify the effect of the planned average level of male offspring's education in the structural equation. Historically, men from the higher castes have dominated the socio-economic and political landscape of Bihar. The almost exclusive nature of the access to the institutions of learning for higher castes' males in the past can be considered as one of the explanatory factors behind their dominance of the state. In this context, it is not unrealistic to surmise that the higher caste male children are more likely to receive higher levels of education relative to their counterparts from the rest of the society, as parents from the higher castes strive to pass on the status-quo to the next generation. A recent study highlights the importance of caste as a determining factor by examining its role in the male and female educational attainments in the rural-Indian context (see, Borooah & Iyer, 2005).

The first-stage reduced form equation representing the number of female siblings; denoted FS, is given by the following equation:

$$FS = \beta_{FS} X_{FS} + \varepsilon_{FS} \tag{5}$$

where the vector X_{FS} contains the plausible determinants of the number of female siblings for a girl; that is, the age of household head, household income, the parental educational attainments, and a binary variable indicating whether father is a government-employee to identify the effect of the number of female siblings in the structural equation. It is hypothesized that the government-employees are more likely to have a higher number of female offspring relative to the rest of the population in Bihar. We offer a plausible explanation to justify this stand. If having a female offspring is considered a choice variable then it is a luxury for most of the households in Bihar. Since a female offspring results in an inevitable net loss in income for parents due to the investments in her education, her upbringing, and her dowry as she leaves their home after marriage; whereas, sons continue to stay with parents and are supposed to look after them in their old ages. Given a choice, most rational parents would substitute a female child with a male child. The contention is that rearing a female child requires not only a stable stream of income, but also the levels of earnings that exceed the levels required for an all male offspring household. The above argument can be thought of as a derivative of the much more famous hypothesis that contends: The poor discriminate more against their daughters than the rich – the hypothesis being that sharper resource constraints force the poor to allocate resources to the more valued males (see for examples, Miller, 1981; Das Gupta, 1987; Das Gupta & Shuzhuo, 1999). In this context, it is not unrealistic to assume that the government-employees in Bihar are more likely to have a higher number of female offspring than the rest of the society, because they have stable jobs, implying a guaranteed continuous flow of income. Additionally, they have another potential source of income in bribery. In a state where corruption has become a social norm, the public's perception that a government employee would be caught red-handed while accepting the bribe is not very high. Whereas, for the rest in Bihar, a continuous flow of income is subject to the usual risks such as vicissitudes of weather (for instance, a farmer's income), lawlessness (for instance, an entrepreneur's income), market risks (for instance, a private sector employee's income), and so forth. It should also be noted that the government employees form the bulk of the middle-class or haves in the state. On comparison, one can postulate that a government employee, on average, is likely to have a more stable and substantial stream of income than somebody randomly selected from the rest of the society in Bihar. Thus, the binary variable 'whether father is a government employee' is hypothesized to positively and statistically significantly affect the number of female offspring in the household, and is not correlated with the unobserved effects such as beauty, complexion, height, etc, once the other regressors including the household income have been partialed out in the structural equation.

The first-stage reduced form equation representing the number of male siblings; denoted MS, is given by the following equation:

$$MS = \beta_{MS} X_{MS} + \varepsilon_{MS} \qquad (6)$$

where the vector X_{MS} contains the plausible determinants of the number of male siblings for a girl; that is, the age of household head, household income, the parental educational attainments, and the number of years passed after parents' marriage. The last variable is used to identify the effect of the number of male siblings in the structural equation. It is a well-known fact that Indian families have a higher preference for sons relative to daughters (see for example, Clark, 2000; Das Gupta, 2003). This preference should manifest itself through the variable 'the number of years passed after parent's marriage'.

It is worth noting at this juncture that the choice of identifying instrumental variables should meet two criteria: (1) the *p*-value of the coefficients of the identifying instruments should be statistically significant in the first stage regressions, and (2) the identifying instrumental variables should be exogenous in the structural equation; i.e., they should not be correlated with the unobserved explanatory variables in the structural equations such as beauty, complexion, height, etc. of the female offspring. The first condition is testable and has been discussed below in the paper; whereas, the second condition cannot be tested fully. However, it is plausible to think that none of the identifying instrumental variables discussed above are correlated with the unobserved explanatory variables of the structural equation.

Sample Selection

In this study only those households have been included that have at least one female offspring so that a response on the dependent variable can be observed. In other words, the households without female offspring have been excluded from this study. This creates a potential sample selection problem, since the number of female offspring is a potential endogenous variable, implying that having no female offspring plausibly may have been a consequence of a conscious choice made by the parents to avoid paying dowry for them. Clearly, sample selection based on this variable would bias the estimates.

To address the potential sample selection issue, the following Probit selection equation on the full sample is estimated:

$$FC = \beta_{FC} X_{FC} + \varepsilon_{FC} \tag{7}$$

where FC is an index function such that FC =1 if a household has at least one female offspring and FC = 0 otherwise. The vector X_{FC} contains the plausible determinants of the selection rule, that is, the age of household head, household income, the parental educational attainments, and the father's age at the time of his marriage. The last variable is used to identify the selection rule in the structural equation. This variable is used as a proxy for the pragmatism of father. It is contended that pragmatic fathers are less likely to elect to reproduce female children due to the reason mentioned previously (the socio-economic norms that dictate higher preference for son). The inverse Mills' ratio is obtained from the above selection equation, which then is used as selectivity control in the structural equation.

As a result of the above discussion, the second-step main estimating equation (1)' is now represented by the following:

$$FD = \alpha_0 X + \alpha_1 \hat{MD} + \alpha_2 \hat{FSD} + \alpha_3 \hat{FE} + \alpha_4 \hat{MSE} + \alpha_5 \hat{FS} + \alpha_6 \hat{MS} + \alpha_7 \lambda + \varepsilon \qquad (1)''$$

where the vector X in the above equation contains the exogenous explanatory variables; namely, the age of household head, household income, and the parental educational attainments. The variable $\hat{FE}$ represents the predicted values from the estimation of equation (2), $\hat{MD}$ is the predicted probability of a positive-outcome from the estimation of equation (3), $\hat{MSE}$ represents the predicted values from the estimation of equation (4), $\hat{FS}$ represents the predicted values from the estimation of equation (5), $\hat{MS}$ represents the predicted values from the estimation of equation (6), and λ represents the inverse Mills' ratio estimated from equation (7).

2 SLS Results

The results that address the issues of simultaneity biases of the selected explanatory variables and the sample selection are presented first; i.e., the results of the reduced form estimations for equations (2)-(7). The estimates of equation (2) are presented in table 3, column 1. Approximately 52 % of the variation in the dependent variable is explained by the exogenous explanatory variables. The explanatory variables are jointly significant at the 1% level ($F_{5,\ 163}$ = 16.92). The identifying variable MOC (whether mother is a housewife) is positive and significant at the 5 % level. The predicted values generated from this step are used in lieu of 'FE' in the main estimating equation (1)' to control for the simultaneity bias of this variable.

The estimates of equation (3) are presented in table 3, column 2 below. Approximately 28% of the variation in the dependent variable is explained by the exogenous explanatory variables. The explanatory variables are jointly significant at the 1% level (Wald χ^2(5) = 57.14). The identifying variable 'DOWFT' (whether father received dowry) is positive and significant at the 1% level. The predicted probabilities of the positive outcomes are obtained from this regression, which is used in lieu of 'DOWFT' in the main estimating equation (1)'.

The estimates of equation (4) are presented in table 3, column 3. Approximately 12% of the variation in the dependent variable is explained by the exogenous explanatory variables. The explanatory variables are jointly significant at the 1% level ($F_{5,\ 160}$ = 5.39). The identifying variable CASTE (whether a household identified itself as a member of one of the four higher castes) is positive and significant at the 10 % level. The predicted values generated from this step are used in lieu of ‘MSE’ in the main estimating equation (1)’ to control for the endogeneity bias due to this variable.

The estimates of equation (5) are presented in table 3, column 4. Approximately 28% of the variation in the dependent variable is explained by the exogenous explanatory variables. The explanatory variables are jointly significant at the 1% level ($F_{5,\ 162}$ = 12.45). The identifying variable ‘FOC’ (whether father is a government employee) is positive and significant at the 5 % level. The predicted values generated from this step are used in lieu of ‘FS’ in the structural equation (1)’ to control for the endogeneity bias due to this variable.

The estimates of equation (6) are reported in table 3, column 5. Approximately 30 % of the variation in the dependent variable is explained by the exogenous explanatory variables. The explanatory variables are jointly significant at the 1% level ($F_{5,\ 163}$ = 13.19). The identifying variable ‘YPAM’ (years passed after father’s marriage) is positive and significant at the 1% level. The predicted values generated from this step are used in lieu of ‘MS’ in the structural equation (1)’ to correct for the endogeneity bias due to this variable.

The estimates of equation (7) are presented in table 3, column 6. Approximately 19 % of the variation in the dependent variable is explained by the explanatory variables. The explanatory variables are jointly significant at the 10% level (Wald χ^2 (5) = 10.42). The identifying variable AGEMAR (father’s age at the time of his marriage) is negative and significant at the 1 % level. The inverse Mills’ ratios are computed from this step and later used in the structural equation (1)’ to control for sample selection.

Table-3 First Stage Estimations

Variables	(1)	(2)	(3)
	FE	MD	MSE
AGE	-.0792674	-.0087484	.1738601
	(.0230398)***	(.0110246)	(.044488)***
HINC	.000375	.0005923	.0100334
	(.0021992)	(.0015142)	(.0098992)
FEDUC	.3275041	.0149391	-.1028867
	(.1073397)***	(.0419976)	(.1757942)
MEDUC	.231534	-.1194864	-.1382965
	(.0421136)***	(.0342023)***	(.1342081)
DOWFT		1.3539	
		(.2376635)***	
MOC	.868616		
	(.4145419)**		
CASTE			2.160311
			(1.103276)**
INTERCEPT	10.46542	.8018703	5.380837
	(1.915188)***	(.7153619)	(2.365165)*
R^2	0.5247	0.2759	0.1151
N	169	169	166

Table-3 (Contnd.)

Variable	(4)	(5)	(6)
	FS	MS	FC
AGE	.0406589	-.0242055	.0623302
	(.0072565)***	(.0161809)	(.0269555)**
HINC	-.0008784	.0000644	.000581
	(.0008083)	(.000852)	(.0019585)
FEDUC	-.0231769	-.0466131	.0065303
	(.0242764)	(.0287879)	(.0477756)
MEDUC	-.0131269	.0117822	.018166
	(.0174491)	(.0196096)	(.0401703)
CASTE			
FOC	.2934008		
	(.122512)**		
YPAM		. 0569155	
		(.0137451)***	
AGEMAR			-.0970478
			(.0344106)***
INTERCEPT	-.3743125	1.67432	.7125664
	(.3885774)	(.4727389)***	(1.087387)
R^2	0.2761	0.2973	0.1856
N	168	169	192

The top entry in each cell represents the coefficient estimate of the corresponding variable. The values in the parentheses are the White's heteroscedasticity corrected (robust) standard errors. Column 1 & 6 show Pseudo- R^2 values.

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

The estimates of the structural model (equation 1') are presented in table 4. Approximately 30% of the variation in female dowry (FD) is explained by the explanatory variables. The explanatory variables are jointly significant at the 1% level ($F_{10, 157} = 7.66$).

The sign of the inverse Mills' ratio term (lambda) is negative and significant at the 1% level, implying that some households have chosen not to reproduce any female offspring simply because it entails dowry payment. This is not surprising at all, as Patna district according to the 2001 census had the least favorable sex-ratio among all districts in Bihar: 873 females per 1000 males, and according to the 1991 census it was 867 females per 1000 males (ranked third last from the bottom). These figures clearly suggest a strong preference for sons in Patna.[6] How this unfavorable sex ratio was achieved is hardly a guess. Adithi, a non-governmental organization carried out a study in 1995 in Bihar to examine the role of Dais (traditional midwives) in carrying out female infanticide. Adithi's findings suggest that the increase in female infanticide, which was a relatively new phenomenon in the erstwhile Bihar considering that it had a favorable sex

[6] http://gov.bih.nic.in/Profile/CensusStats-02.htm

ratio till 1961, can be attributed to the increase in dowry, poverty, and destitution over the last decade and a half (see Murthy 1996).

The Hausman exogeneity tests reveal that the number of male siblings, male siblings' average level of education, female education, and male offspring's dowry can be considered as endogenous variables. The residuals associated with the first three variables are significant at the 5%, 5%, and 10% levels respectively in the main estimating equation. The residual of the variable, number of female siblings, is not significant at the conventional levels in the structural equation. The results also provide evidence to suggest that male offspring's dowry is an endogenous variable. This conclusion is derived from conducting the exogeneity test *ala* Hausman. First, the R^2 statistic is obtained from an unrestricted model where equation (1)' is estimated on all the predetermined variables and the predicted values of FE, ME, MS, FS, MD, inverse Mills' ratios, in addition to the actual values of MD. Next, the R^2 statistic is obtained from a restricted model where the predicted probability of MD is excluded from the above estimation. Subsequently, the F statistic is computed with one restriction that equals to 4.1, which exceeds the critical value at the 5% level. Thus, the coefficient of the predicted MD is significantly different from zero, implying that the male offspring's expected dowry (MD) is not an exogenous variable.

Table-4: Second-Step Regression result of FD

Variable	Coefficient	Variable	Coefficient
AGE	35.18058	MD	414.0036
	(10.57527)***		(109.1403)***

HINC	1.468849	FE	21.22563
	(.525151)***		(105.2092)**
FEDUC	-77.42428	LAMBDA	-1778.123
	(36.45824)**		(734.0341)**
MEDUC	-35.86412	INTERCEPT	-1673.622
	(24.79619)		(1210.78)
MSE	-55.34157	R^2	0.3053
	(21.55963)***		
FS	-120.4619	N	168
	(155.4144)		
MS	-219.034		
	(83.14297)***		

The top entry in each cell represents the coefficient estimate of the corresponding variable. The values in the parentheses are standard errors. Since the correction factor is 0.98, the standard errors are not adjusted for the endogeneity biases.

*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Next, we discuss the results from the structural equation. The results show that the coefficient of the variable of interest, namely, the female offspring's education continues to be positive and is significant at the 5% level, even after controlling for the selectivity and endogeneity biases of a select group of explanatory variables. Comparatively, the magnitude of the coefficient obtained from the 2SLS estimation is slightly larger than the one obtained from the OLS estimation and is significant at the 5% level. A one-year increase in schooling increases female dowry by Rs. 21,200. The male offspring's dowry (MD) continues to be positive as hypothesized and remains significant at the 1% level. Thus, the households that are expected to demand dowries or have already done so for their male offspring are also expected to pay or have already paid approximately Rs. 413,484.50 more in dowry for each of their female offspring as opposed to the households that do not expect to seek or have not sought dowries for their male offspring.

As hypothesized, the level of the educational attainments of both the parents has negative effects on the female dowry; however, only the father's educational attainment has been found to be significant at the conventional levels (5%).

As hypothesized, the male siblings' average level of education has a negative and highly significant effect on the female dowry.

Both the number of male and the number of female siblings have negative effects on female dowry, thus confirming the hypothesis, however only the former is significant.

Both the household income and the age of the household head have positive and highly significant effects on the female dowry.

Model Specification

The main conclusion of this paper remains unchanged even when the age of the household head is dropped from all estimations, or when female siblings' average dowry and female siblings' average education are included as explanatory variables. The exclusion of outliers also does not change the main conclusions of this paper. These results will be provided upon request.

VII. Limitations of the Paper

One of the main limitations of this paper is that it relies on a set of instruments to control for the endogeneity biases and sample selection, which if not accounted for would contaminate the estimates. It is plausible that these instruments might have been correlated with the error term in the main estimating equation. However, there is no satisfactory method to ascertain the same. The only reasonable thing that one can do in dealing with this issue is to clearly specify the underlying assumptions involved in the selection of the instruments, which this paper claims to have done. The set of instruments are limited in supply due to the fixed number of queries in the questionnaire, and plausibly may not be the most appropriate instruments to identify the potential endogenous variables. It is worth noting, however, that most empirical studies on dowry also suffer from similar drawbacks. Future surveys on dowry related issues, hopefully, will rectify this shortcoming. In any case, the instruments used in this study are more likely to be correlated with the household income – one of the observed explanatory variables - than the unobserved variables such as beauty, complexion, and groom side characteristics, which in all likelihood will result in multicollinearity.

The second limitation of this study is the smaller sample size that it turns out primarily captures the perceptions of middle-class residents of Patna on dowry related issues. Therefore, a set of pan-Indian conclusions based on this study would be foolhardy to draw. Nonetheless, this study ought to be viewed as one small-step towards a better understanding of the linkage that exists between dowry and female human capital formation. In any case, the small sample size notwithstanding, it still compares well with the one used by Rao (93) and Edlund (00) in their studies.

Thirdly, the study uses variables that contain both ex-ante and ex-post information. The ex-ante and ex-post information pertaining to a variable may have been determined by different forces, which this study treats as the same. The reason being that the bifurcation of variables along the ex-ante and ex-post lines will reduce the number of observations to a level, which for all practical purposes, would render any conclusions based on the estimates meaningless. Additionally, since the dowry data has both ex-ante and ex-post observations, it may result in a measurement bias on the left hand side variable, which plausibly can yield higher variances.

Finally, treating the number of years of schooling as a proxy for "human capital" may not be appropriate, especially if education extends beyond high school. A large number of students may attend colleges simply because they cannot find employment and may learn nothing useful from attending extra years in a college. Many jobs may have upper age limits and higher education may simply indicate repeated failures to get hired. In fact, it is possible to argue that girls who are unsuccessful in marriage markets (possibly because they are not attractive enough) self select themselves to go to college for a longer period of time. So higher schooling may actually signal job market failures AND older (hence unattractive) brides. Higher schooling thus may actually represent a proxy for low marriage-specific human capital. Age and education will be correlated: even if one extra year of schooling adds to human capital, that extra year may reduce marriage-specific human capital in the aggregate.[7]

[7] This is due to an anonymous referee.

VIII. Conclusion

The link between dowry and female human capital formation is considered an important issue in the field of gender and economic development. Unfortunately, due to the lack of pertinent data set, the issue has received little attention from the scholars. This paper examines the issue by employing a newly created data set by surveying the residents of Patna, the capital city of the north-Indian state of Bihar. This study confirms a positive relationship to exist between the magnitude of female dowry and her level of human capital acquisition. The main result of this paper should be viewed as a positive contribution towards settling a very important issue, namely, whether or not dowry is an obstacle to female human capital formation.

References

Anderson, Siwan. 2004. “Dowry and Property Rights”. Working Paper. University of British Columbia.

Anderson, Siwan. 2003. “Why Dowry Payments Declined with Modernization in Europe but are Rising in India”. Journal of political Economy, Volume 111, #2, Pp 269-310.

Becker, Gary S. 1981. “A Treatise on the Family”. Cambridge, MA: Harvard University Press.

Behrman, J., N. Birdsall, and A. Deolalikar (1995): “Marriage Markets, Labor Markets, and Unobserved Human Capital: An Empirical Exploration for south-Central India,” Economic Development and Cultural Change, 43(3), 585-601.

Bloch, Francis, and Vijayendra Rao, 2002. “Terror as a Bargaining Instrument: A Case Study of Dowry Violence in Rural India”. American Economic Review, Vol 92, # 4, Pp 1029-1043.

Behrman, J., A. D. Foster, M.R. Rosenzweig, and P. Vashishtha (1999): “Women’s Schooling, Home Teaching, and Economic Growth,” Journal of Political Economy, 107(4), 682-714, 0022-3808.

Borooah, Vani K., and Sriya Iyer, 2005, 'Vidya, Veda, and Varna: The Influence of Religion and Caste on Education in Rural India, Journal of Development Studies, Vol. 41, iss. 8, pp 1369-1404.

Boulier, Bryan. L. and Mark R. Rosenzweig. 1984. "Schooling, Search, and Spouse Selection: Testing Economic Theories of Marriage and Household Behavior". Journal of Political Economy Vol 92 No. 11 (August) :712-32.

Chunduri, Mridula. 2005. Dowry Market: It is Money, Honey. December 11, Times News Network.

Das Gupta, Monica, 1987, 'Selective Discrimination against Female Children in Punjab, India', Population and Development Review, Vol. 13, No. 1, pp 77-100.

Das Gupta, Monica, 2003, 'Why is Son Preference So Persistent in East and South Asia? A Cross-Country Study of China, India and the Republic of Korea', Journal of Development Studies, Vol. 40, iss. 2, pp 153-87.

Das Gupta, Monica and Li Shuzhuo, 1999, 'Gender Bias in China, South Korea and India 1920-1990: The Effects of War, Famine and Fertility Decline', Development and Change, Vol. 30, No.3, pp. 619-52, Special Issue on Gendered poverty and Wellbeing (ed. Shahra Razavi).

Deolalikar, A. B., and V. Rao (1998): "The Demand for Dowries and Bride Characteristics in Marriage: Empirical Estimates for Rural South-Central India, "in Gender, Population and Development, ed. By M. Krishnaraj, R. M. Sudarshan, and A. Shaiff, pp. 122-140. Oxford University Press, Delhi; Oxford and New York.

Duraisamy, P (1988). An Econometric Analysis of Fertility, Child Schooling and Labor Force Participation of women in Rural Indian Households, Journal of Quantitative Economics, 4(2), 293-316.

Edlund, Lena, "The Marriage Squeeze Interpretation of Dowry Inflation: A Comment", Journal of Political Economy, December 2000, v. 108, iss. 6, pp. 1327-33.

Evenson, Robert E. and Mark R. Rosenzweig. 1977. "Fertility, Schooling, and the Economic Contribution of Children of Rural India: An Econometric Analysis". Econometrica Vol. 45 No. 5 (July): 1065-1079.

Foster, A.D., and M. R. Rosenzweig (2001): "Missing Women, the Marriage Market and Economic Growth," Manuscript, Brown University.

Islamic caste, Encyclopædia Britannica. 2006. Encyclopædia Britannica Online. 18 Oct. 2006

Kingdon, Geeta Gandhi (1998), Does the Labor Market Explain Lower Female Schooling in India, Journal of development Studies, 35(1), 39-65.

Kingdon, Geeta Gandhi (1997), Labor Force Participation, Returns to Education, and Sex Discrimination in India, Indian Journal of Labor Economics, 40(3), 507-26.

Lee, Gary R. and Padma Srinivasan. 2002. "The Dowry System in India: Women's Attitudes and Social Change". Working Paper Series 02-15. Bowling Green State University, Center for Family and Demographic Research.

Mathur, Ashok, (1994), Work Participation, Gender, and Economic Development: A quantitative Anatomy of the Indian Scenario, Journal of Development Studies, 30, 466-504.

Miller, Barbara, 1981, 'The Endangered Sex: Neglect of Female Children in Rural North India, Ithaca, NY: Cornell University Press.

Mukherjee, Diganta and Shamim S. Mondal. 2006. "Dowry Revisited: A Human Capital Approach", in Premananda Bharati and Manoranjan Pal, eds., Gender Disparity: Manifestations, Causes and Implications, New Delhi: Anmol Publications, pp. 278–297.

Murthy, Ranjani, K. (1996), Fighting Female Infanticide by Working with Midwives: An Indian Case Study, in Women and the Family by Caroline Sweetman, Oxfam.

Nirmala, V, K Bhatt, M Mohsin, and B Kamaiah (1992), Work Participation Behavior of Married Women with Living Husbands: A Case of Pondicherry, Artha Vijnana, 34, 315-336.

Pitt, M. M., M.R. Rosenzweig, and M.N. Hassan (1990): "Productivity, Health, and Inequality in the Intra household Distribution of Food in Low-Income Countries," American Economic Review, 80(5), 1139-56.

Rajlakshmi, T.K. (2002): "Taking on Dowry", Frontline, 19 (23).

Rao, Vijayendra.1993. "The Rising Price of Husbands: A Hedonic Analysis of Dowry Increases in Rural India". Journal of Political Economy Vol. 101 iss. 4 (August): 666-77.

Rao, Vijayendra, 2000. "The Marriage Squeeze Interpretation of Dowry Inflation: Response". Journal of Political Economy, Vol 108, # 6.

Rao, Vijayendra, 2006. "The Economics of Dowries in India". Forthcoming in Oxford Companion to Economics (Kaushik Basu, Editor), Oxford University Press.

Sen, Bisakha. 1998. "Why Does Dowry Still Persist in India? An Economic Analysis using Human Capital". in South Asians and the dowry problem, pp. 75-95, With a preface by Himendra Thakur. GEMS, no. 6. Stoke on Trent, U.K.: Trentham Books; London: University of London, School of Oriental and African Studies.

Sheel, Ranjana, "The political Economy of Dowry", New Delhi: Manohar Publishers and Distributors, 1999.

Shelley Clark, 2000. Son Preference and Sex Composition of Children: Evidence from India, *Demography*, Vol. 37, No. 1, pp. 95-108

Wooldridge, Jeffrey M. 2002. Econometric Analysis of Cross Section and Panel Data. MIT Press, Cambridge: MA.