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Groom price-female human capital: Some empirical evidence

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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.
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1. 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, 2007). 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 (1998) 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 (2000) 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 2SLS model. Section 7 discusses the limitations of the paper. Section 8 concludes the paper.

2. The model

2.1. 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

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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.

2.2. 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 $i = 1, \ldots, i = N - M - 1$ are unmatched. The total transfer $D_j + E_j$ is given iteratively by*

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

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

$$u'_2(D_j^*) = u'_3(D_j + E_j - D_j^*)$$

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 ith bride household is not outbid by the household with the wealth just below it, i.e., $i - 1$. It is immediate that the ith 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 ith 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 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.

3. 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:

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

[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.

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