TITLE: FEMALE EDUCATION AND DOWRY: A THEORETICAL EVALUATION

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ABSTRACT

The paper attempts to explore analytically the interrelationship between dowry and female education, and other factors affecting this interlinkage using an intertemporal utility maximizing framework for both bride's and groom's household. A case of multiple equilibria is obtained in terms of a bad equilibrium with higher dowry and lower female education, and another good equilibrium with lower dowry and higher education. Effect of education subsidy is obtained as a only measure that improves female education and lowers the incidence of dowry. Another paradoxical outcome resulting from a social consequence in terms of lower propensity to offer dowry is obtained for which a possible explanation based on choice variable of the bride's family within the underlying decision making process is provided.

Keywords: Dowry, female education, gender wage disparity, unemployment.

1. INTRODUCTION

The practice of dowry has a long historical perspective. In most of the societies, the payment in time of marriage goes hand in hand by parents of groom and bride. This type of payments can be classified into two broad groups. When a payment is given to the groom from the bride's family is known as "dowry". On the other hand, when payment is given form the bride side to the groom's family then it is known as "brideprice" (Anderson, 2007). Some studies asserted that dowry is a large phenomenon in the South Asian Counties (SAC) and the dowry system is also expanding in countries such as, India (see Anderson, 2007; Rao, 1993). Srinivasan and Lee (2004) shown that nearly two-third of married women in Bihar where the pace of modernization is slow do not favour dowry. Botticini and Siow (2003) explained dowry as the mechanism to mitigate the free-riding problems between siblings by altruistic parents. Dowry can also be linked with the bride's quality which could be found in Dalmia and Lawrence (2005) which explains dowry as the price of the groom, since more educated grooms are worth more in the marriage market in India. Gierbo and Imam (2006) found that a large demand for dowry is an indicator of one's status. The higher the quality of the groom, the higher is the dowry that bride's parent are willing to pay as it is a claim to take a position on the higher social ladder. They also argued that as parents spend more on son's education (to capable him looking after a family) they taking dowry as the reimbursement of the son's education investment. Although, Srinivasan (2005) explain it as the payment incurred by the parents to buy their daughters security, happiness and a timely marriage, it also determined by the social status, caste structure of the families (Anderson 2007; Rao 1993; Dalmia and Lawrence 2005; Srinivasan and Lee 2004). Zhang and Chan (1999) define dowry as beneficial as it may strengthen the bargaining power of the female in a family. Brown (2003) argued in a case study on China that dowry also has a different perspective i.e. it can be treated as a proxy for wife's bargaining power in the household. So, it was found in the paper that dowry has a positive effect on wife's share of leisure time in total couple time and wife's share of commodity consupmtion in total household expenditure; besides this dowry also strengthen the wife's position in a family. On the other hand, this custom creates some negative consequences like dowry violence, bride burning, wife murder, etc. which creates a concern about it. The practice of dowry also results in some social evil policy like child marriage. The study of Chowdhury (2004) indicates that in Bangladesh the groom's family demands a lower level of dowry if the bride is underage, as a result of that child marriage is the best solution for the bride's family. The practice of dowry may result in lower education

for female as any additional income a female is earned is become the part of groom's family after marriage, the parents of the female have a little direct effect to educate the female (Dasgupta and Mukherjee 2003). Lahiri and Self (2004) argue that the lack of coordination between families and less valuation of educated bride's contribution to the groom's family results in bias against female school education. The paper put forward the importance of human capital formation in abolishing dowry. The idea is developed from the Becker's price model which states a higher-quality groom (measured by their income-earning ability) may increase the dowry amount. By similar logic, the higher quality bride can reduce the dowry amount (Makino, 2017). The empirical analysis of Makino (2017) asserted that women labour force participation leads to a fall in dowry. It also found that the increase in the returns to education is the key determinants to rule out dowry practices. Anukiti, Kwon and Prakash (2019) argues that the returns to female education in marriage and labour market plays an important role in parents decision making. If an educated bride is more valuable to the groom's family due to her earning potential or improvements in the grandchild quality then there is a possibility that she has to pay a lower dowry. So, it creates a favourable effect on investment in female education and lowers the saving for dowry. On the other hand, Krishnaswamy (1995) found from an empirical study based on Dharwad city that increasing education level has a favourable effect on the attitude towards dowry. This attitude can be explained by the fact that they considered dowry as a means to buy a groom with same or higher educational qualification.

The literature linking female education and dowry are mostly based on empirical findings, however there is dearth of any theoretical explanations. The paper attempts to explore theoretically the role of female education in determining the demand for and supply of dowry, and determination of equilibrium dowry level. This is probably the distinct of this kind of theoretical work which attempts to explore the effect of some unnoticed economic impacts on the equilibrium dowry level, such as gender-based wage inequality and unemployment rate. Few counterproductive outcomes are obtained, and a paradoxical result is discussed which occurred out of household's specific behavioural pattern.

The rest of the paper is organized as follows. Section 2 discusses the basic model of determination of equilibrium level of dowry and female education. Few comparative statics pertaining to our analysis are carried out in section 4. Finally section 5 concludes the paper.

2. THE MODEL

To provide a theoretically tractable framework, we consider two heterogeneous groups of families, the first group represents the bride's families and the second group represents the groom's families. All bride's and groom's families are homogenous within their group. Each representative family belonging to either group faces an intertemporal utility maximization problem where the trade off lies between choice of female education (skill level) that determines her earning potential and dowry which determines matching equilibrium for given skill level of male and female.

The bride's family

In this two period optimization framework, the representative bride's family utility is assumed to be positive function of their household consumption in period 1 (C_1) and consumption in period 2 (C_2) which is discounted by the factor $0 < \beta < 1$. Thus, the utility function is represented by

$$U = logC_1 + \beta\, logC_2\,;\, C_1, C_2 > 1\,;\, \beta \in (0,1);\, U_i > 0\,^{1} \qquad (1)$$

This is a two member household, one adult member (guardian) and one girl child, each endowed with one hour of total time.[2] The adult always work in period 1 and earns wage W_O. The guardian takes decision about the time allocation of the girl child fraction of which is spent either at school (l_F^S) or at doing unskilled female-specific work $(1 - l_F^S)$. The family receives a net subsidy $(s - b)$ for education of the girl child, where $'s'$ is the rate of girl child specific education subsidy for per unit time spent in school and $'b'$ is the direct cost of schooling. If the girl child spent her time in doing unskilled work then she earns unskilled female wage (W_F) which is also the opportunity cost of having education. Besides this, in

[1] The more general form is the constant intertemporal elasticity of substitution (CIES) utility function given by $U = \frac{C_1^{1-\gamma}}{1-\gamma} + \beta \frac{C_2^{1-\gamma}}{1-\gamma}$, by taking logarithm transformation of the utility function and assuming $\gamma = 0$ yields the simplified form of this function as represented in Eq. (1).

[2] Alternatively, if the household has two adult member then the number of adult members can be normalized to unity, or both adult member have total one unit of time. This, holds for 'n' number of adult members in the household without any qualitative change in the model. Similarly, l_f^s can be thought as number of girls in a family attending school and 1-l_f^s = l_f^u as the number of girls out of school where total number of girls is taken as numeraire.

period 1 the family saves an amount (S_1) for the future consumption and dowry payments in period 2[3]. This is represented by the following equation

$$C_1 + S_1 = W_0 + W_F - (W_F + \mathrm{b} - \mathrm{s}) l_F^S \quad (2)$$

In period 2, the guardian is retired and no longer earns any wage income, however, he survives out of his saving net of dowry payment. The girl child becomes adult and gets married in this period. The skill endowment of the female (bride) is equivalent to her time spent in schooling in period 1. Her earning potential in this period is $(W_F^S\ l_F^S)$, where W_F^S is the female skilled wage rate. Any earning by the skilled female in this period is owed to the potential groom's family. The guardian offers $'\delta'$ fraction of the saving as dowry where $\delta = k\frac{W_M^S}{W_F^S\ l_F^S}$, $k > 0$.[4] δ is proportional to the ratio of male (groom's) potential income to female (bride's) potential income, an increase in this ratio implies higher fraction out of saving is to be paid as dowry.[5] This ratio also represents gender-based income inequality.[6] Another direct implication of this is that an increase in gender-based income disparity escalate the incidence of dowry at least from the supply side from the bride's family, its detailed implication has been analyzed in further sections. This is represented by the following equation

$$C_2 = (1 - \delta)\, S_1 \quad (3)$$

The dowry offer by the bride's family is

$$D_S = \delta\, S_1 \quad (4)$$

The household in this model do not target to choose female schooling (skill) directly, however, for a given level of female (education) skill the guardian chooses the level of saving that presents a crucial trade off in the form of sacrifice of present education, or an increase in

[3] Here we assume that saving earns no interest and serves in period 2 to allow for consumption and other expenses. The assumption simplifies algebra; however, in case of perfect credit market incorporation of interest earning will not change the result. There exist another possibility of credit market imperfection and borrowing constraint which has some interesting implication for those families which borrows from moneylender to pay for dowry and girl's education, this aspect is left for further research.

[4] The parameter 'k' can be interpreted as social stigma associated with dowry payment from the perspective of brie's family.

[5] $'\delta'$ can also be interpreted as propensity to pay dowry by the bride's family.

[6] Alternatively it can be explained as compensation from the bride's family that will ensure social parity (matching) between the groom and the bride ,whenever, $\frac{W_M^S}{W_F^S\ l_F^S} > 1$.

ability to pay dowry and consumption of the guardian in period 2. On the other hand, if the family target to save higher in the present by reducing educational expenditure in period 1, then it would lead to a lower skill set of female and hence a lower potential of earning, thus a higher δ would lead to higher dowry payment. Thus, the household solves the following problem

$$\underset{\{C_1, C_2, S_1\}}{Max,} \quad U = \log C_1 + \beta \, logC_2; \quad C_1, C_2 > 1; \quad \beta \in (0,1)$$

Subject to, $C_1 + S_1 = W_0 + W_F - (W_F + \mathrm{b} - \mathrm{s}) l_F^S$

$$C_2 = (1 - \delta) \, S_1$$

$$l_f^u + l_f^s = 1$$

The optimization yields

$$S_1^* = \frac{\beta}{1 + \beta} \{W_O + (s - b - W_F) \, l_F^S + W_F\}$$

Thus, the dowry supply function is given by

$$D_S = \; k \frac{W_M^S}{W_F^S \, l_F^S} \left(\frac{\beta}{1 + \beta}\right) \{W_0 + W_F + (s - b - W_F) \, l_F^S\} \qquad (5)$$

The properties of dowry supply function are as follows. First, D_S is conditional on the level of female education (skill), this implies the household (guardian) offers dowry according to the level of female education. What follows is the second property, D_S is negatively related to female skill level (l_F^S). This can be explained as follows. With an increase in female skill level the bride's family social status improves, thus they are less willing to offer dowry as compensation towards achieving social parity. Third, an increase in male wage rate (W_M^S) escalates the dowry supply since a higher amount of dowry could compensate for the loss in social status of the bride's family relative to the groom's family. Fourth, an increase in education subsidy net of opportunity cost of education raises the supply of dowry. This is an interesting property to note which is observed for most families in rural area, especially for those whose guardians are themselves illiterate, or do not values education. This is due to the fact that an increase in subsidy level would increase income in period 1 which the parent reallocates towards dowry offer for the daughter. Thus, education subsidy which is directed

towards education by policymakers, is then redirected towards dowry payment by the households.

The groom's family

The representative groom's family objects to maximize their intertemporal utility which is a positive function of consumption in period 1 and period 2. Thus, the utility function is given as

$$V = logZ_1 + \tilde{\beta}\, logZ_2 \; ; \; Z_1, Z_2 > 1 \; ; 0 < \tilde{\beta} < 1 \tag{6}$$

There are $\bar{S}$ number of homogenous groom families. This aggregate group of families are assumed to be capital owners, where each family supplies one unit of capital and the return accruing to each family from capital investment is $\frac{R\,\overline{K_D}}{\bar{S}}$. In period 1 the guardian spends his entire time in wage earning activities, while the male child is engaged completely in acquiring skills (education). There is no male-specific education subsidy, however, a cost of education is incurred by the household $(C > 0)$.[7] Unlike the bride's family, the groom's family do not save due to presence of three main income sources in period 2, i.e. income from adult skilled male, the bride's income from skilled jobs, and the dowry transfer from the bride's family to the groom's family. Thus, period 1 consumption is determined by the following equation

$$Z_1 = W_0 + \frac{R\,\overline{K_D}}{\bar{S}} - C \tag{7}$$

In period 2, the guardian is retired, however, the male child grows up to be adult male and participates in skilled wage earning activity and earns W_M^S . In this period, the adult male gets married and the skilled income of the bride $(W_F^S\, l_F^S)$ is entirely contributed towards consumption in period 2 by the groom's family. The other additional source of income is from the dowry transfer by the bride's family to the groom's family. Thus, this period's consumption is determined by

$$Z_2 = W_M^S + W_F^S\, l_F^S + D_d \tag{8}$$

[7] The variable C can be thought as not only representing cost of education, but aggregate of all other cost incurred on the male child such that he can participate in economic activity and possess all other characteristics to get married. Basically, C represents investment in male child to get him a perfect match, otherwise, no girl would like to marry a below average skilled male without desired social characteristics.

The household's desired level of dowry is proportion to the cost of investment on male child in period 1 and is represented by

$D_d = \gamma\, C\ ;\ \gamma > 0$[8]

The household faces trade off in terms of the cost component *C* . An increase in C would increase household's present expenditure thus lowering consumption in this period, however, the proportion of *C* can be recovered in the form of dowry in period 2. Thus, the groom's household problem can be stated as

$$\underset{\{Z_1, Z_2, C\}}{Max,} \quad V = logZ_1 + \tilde{\beta}\, logZ_2\ ;\quad Z_1, Z_2 > 1\ ;\quad \tilde{\beta} \in (0,1)$$

Subject to, $Z_1 = W_0 - \mathrm{C}$

$$Z_2 = W_M^S + W_F^S\, l_F^S + D_d$$

The solution to the optimization is obtained as

$$D_d = \frac{\gamma\tilde{\beta}\left(W_0 + \frac{R\,\overline{K_D}}{\bar{S}}\right) - (W_M^S + W_F^S\, l_F^S)}{\left(1 + \tilde{\beta}\right)} \qquad (9)$$

Let us now discuss the properties of the demand function for dowry. First, an increase in female level of education (skill) would lower the desired level of dowry demand by the groom's household. The logic behind this is as follows. An increase in l_F^S improves the earning potential of the bride, thus consumption in period 2 can be more easily sustained by this increment in female's income thus the need for dowry to cover cost is now less. In, other words with an increased female potential earning the bride's value as an asset improves. In the similar line, an increase in W_F^S lowers the dowry requirement since for given skill level of the bride her earning potential improves due to wage effect.

[8] $'\gamma'$ represents social stigma associated with the groom's family to take dowry. In other words, it represents the propensity to take dowry from the bride's family.

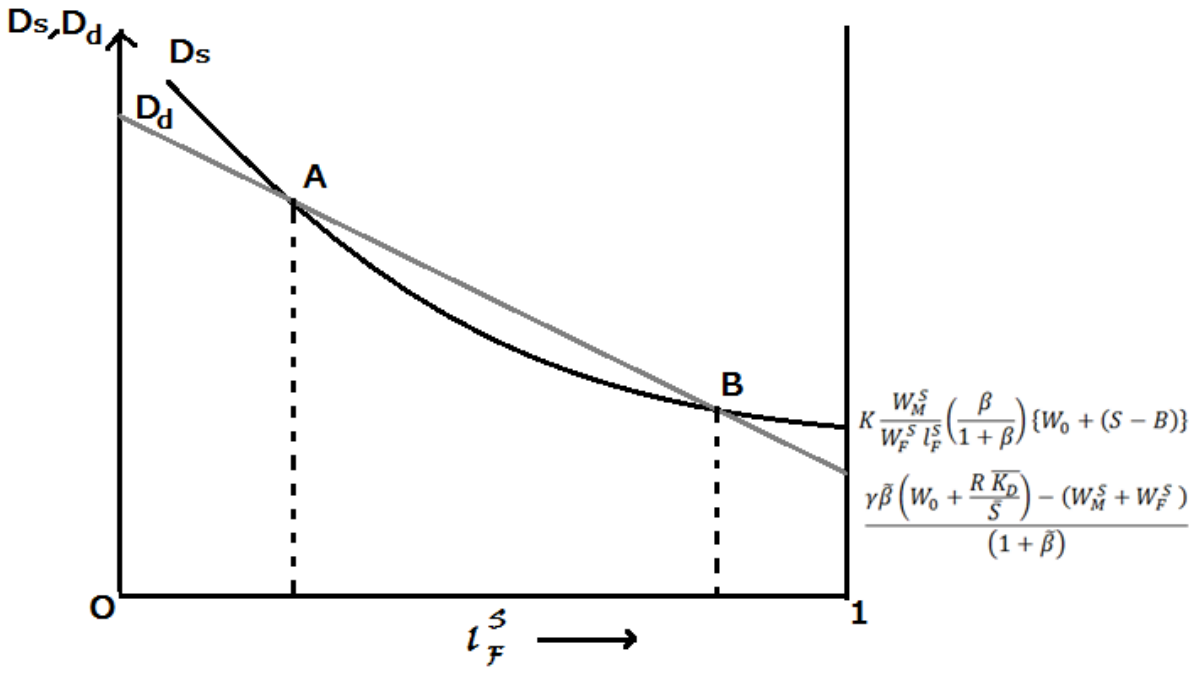

Figure 1 The case for multiple equilibria

On simultaneously solving eq. (5) and eq. (12) the equilibrium dowry and equilibrium female education level are determined. The possible solution for the specific form of utility function assumed is shown in fig. (1). In this case both demand and supply curve are downward sloping. This can be explained as follows. An increase in female level of education in period 1 would accentuate the corresponding level of skill in period 2, thus at this higher female skill level the bride's family would be willing to pay less dowry, on the other hand this raises potential higher skilled income by the bride, thus groom's family will be willing to accept less dowry for higher skilled bride. Thus, $D_S and\ D_d$ represents the bride's offer of dowry and groom's demand for dowry respectively. Possibility of multiple equilibria arises at point A and B. Any equilibrium such as B with higher level of education and lower dowry is preferred over A with lower level of education and higher dowry. In case of this multiple equilibria, equilibrium at point A is stable and at point B is unstable. Consider any point to the left of A, for a given level of dowry, the groom's family demands a bride with skill level lower than the skill level possessed by the bride, thus the demand for dowry and the supply of dowry falls and reaches at A. Any point to the right of A, implies for a given level of dowry the desire skill level of bride by the groom's family is higher than the bride's actual skill level, thus the dowry level rises until it reaches at equilibrium. Using the similar logic B is found to be an unstable equilibrium. Thus, for stability of equilibrium the demand curve for dowry must be flatter than the supply curve of dowry.

For stability of equilibrium assuming demand curve to be flatter than the supply curve for the entire range of female education three distinct equilibrium can be obtained.

Lemma 1: $l_F^{S*} = 1 \; and \; D^* > 0$ under the following sufficient condition

$$\frac{\gamma\tilde{\beta}\left(W_0 + \frac{R\,\overline{K_D}}{\bar{S}}\right) - (W_M^S + W_F^S)}{(1+\tilde{\beta})} = k\frac{W_M^S}{W_F^S\, l_F^S}\left(\frac{\beta}{1+\beta}\right)\{W_0 + (s-b)\}$$

Lemma 1 implies that at matching equilibrium female are completely skilled[9] (entire time spent for education in period 1), however, the dowry level remains positive, provided that the groom's family income net of earning potential of the bride and the groom is equal to the excess of guardian's income of the bride net of education cost adjusted for the discounting rate and the associated social stigma. Since at this equilibrium female is completely educated (skilled) which is desirable, however, the incidence of dowry remains, thus it can be termed as a good equilibrium although not socially optimum.

Lemma 2: $|l_F^{S*} - 0| < \varepsilon \; for \; some \; small \; \varepsilon > 0$ ($\varepsilon \approx 0$) and $D^* \gg 0$ when

$$\frac{\gamma\tilde{\beta}\left(W_0 + \frac{R\,\overline{K_D}}{\bar{S}}\right) - (W_M^S + W_F^S)}{(1+\tilde{\beta})} > k\frac{W_M^S}{W_F^S\, l_F^S}\left(\frac{\beta}{1+\beta}\right)\{W_0 + (s-b)\}$$

In this case the equilibrium dowry level is much higher (much closer to the vertical axis as in fig. 1) and equilibrium level of female skill is almost near to zero, this holds when the excess of expenditure on groom in period 1 is sufficiently higher. Clearly, it is socially undesirable and hence it can be termed as a bad equilibrium.

Lemma 3: $l_F^{S*} = 1 \; and \; D^* = 0$ leads to a socially optimum outcome when

$$\gamma\tilde{\beta}\left(W_0 + \frac{R\,\overline{K_D}}{\bar{S}}\right) = (W_M^S + W_F^S)$$

$$W_0 = b - s$$

A socially desirable outcome occurs when female are completely educated and will posses the highest level of skill, and there is perfect matching equilibrium with complete absence of

[9] Since, in this model female skill level in period 2 is equivalent to female time spent in education, thus if the equilibrium skill level of the adult female is to be maximum, then the corresponding level of education in period 1 must be equal to unity.

the incidence of dowry.[10] This occurs only when the expenditure undertaken for the groom by his family is exactly balanced from the aggregate income of the groom and the bride adjusted for the discounting factor.

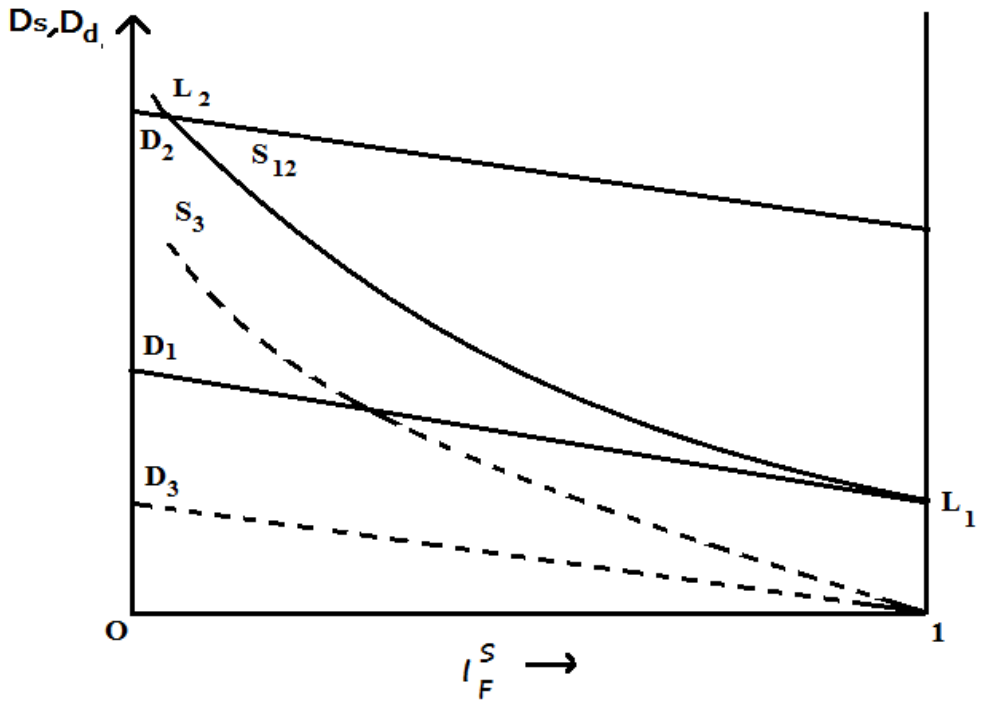

Figure 2 Three different equilibrium solutions

Fig. (2) summarizes the three lemmas corresponding to three different conditions. S_{12} and S_3 corresponds to the supply curve in lemma 1, lemma 2 and lemma 3 respectively. D_1 , D_2 and D_3 corresponds to three different lemmas respectively. The equilibrium at L_1 is good equilibrium, however not socially desirable due to positive level of dowry, equilibrium at L_2 is bad equilibrium due to high dowry and low level of female education, and equilibrium at L_3 is socially desirable where female education is complete in complete absence of dowry.

[10] At this equilibrium although the utility of bride's family is higher, however, utility of the groom's family is ambiguous since there is a loss due to no dowry and gain from higher earning potential of the bride. Aggregate social welfare strictly improves under the following parametric restrictions $\left(1-\frac{KW_M^S}{W_F^S}\right)^{\beta} > (\gamma C)^{\tilde{\beta}}$.

3. COMPARATIVE STATICS

In this section, effect of various parametric changes are analyzed for female sill level and equilibrium dowry payment.

Increase in education subsidy

Government in developing nations initiates targeted education subsidy towards encouraging female education among economically backward section of the society. However, this policy has positively influences not only by encouraging female participation in skill acquisition activities, but also lowers the incidence of dowry. An increase in education subsidy lowers the net opportunity cost of schooling, thus for any given level of dowry the supply curve shifts rightward. In case of multiple equilibria, the point of stable equilibrium at A shifts in the southeast direction, thus improving the education level and lowering the incidence od dowry payment, however, the point of unstable equilibrium at B shifts in the northwest direction, thereby deteriorating both female education and the incidence of dowry (see Fig.1). There will be no change in equilibrium values if the matching equilibrium is initially at the good equilibrium (at L_1), or at the socially desirable equilibrium where both demand and supply meets at the corner point 1 (see Fig.2). This phenomenon of no change at this equilibrium can be termed as acquired morality as defined in Basu and Van (1998). The following proposition is immediate.

Proposition 1: An increase in education subsidy improves female education and lowers the incidence of dowry, however, it may produce counterproductive outcome if the matching is equilibrium is trapped in the unstable equilibrium.

Increase in gender-based wage disparity

An increase in gender based wage inequality is implied by an increase in relative male wage to female wage rate, thus widening gender-based disparity. In presence of social stigma of the bride's family, this would incentivize for higher dowry payment thus shifting the supply curve upward. On, the other hand, if increase in wage disparity is due to absolute increase in male wage at a higher rate than an increase in female wage rate, then the potential income of the groom's family increases in period 2, thus lowering the demand for dowry, and hence the demand curve shifts downward. In case of multiple equilibria, female education improves and equilibrium dowry falls if the matching is at stable equilibrium, however, the unstable equilibrium may get vanish. This is the case of vanishing equilibrium. Now, suppose gender-

based wage disparity accentuates due to an increase in male wage rate and a decrease in female skilled wage rate. If the decline in female skilled wage rate dominates the increase in male wage rate then demand for dowry for given level of groom's skill rises. In this case, the incidence of dowry worsen and equilibrium level of female skill may move in either direction. The result is summarized in the following proposition.

Proposition 2: Gender-based wage disparity may lower the incidence of dowry provided the disparity is result of an increase in both male and female wage rate, however, it may escalate the incidence of dowry if the disparity is due to fall in female skilled wage rate.

Regularizing social stigma

As a more direct policy intervention, the social stigma associated with desire to pay dowry and desire to have dowry could be lowered directly by public campaigning, moral persuasion etc. In the model, the desire to pay dowry is reflected by the parameter k, and the desire to have dowry is reflected by the parameter γ. A fall in k would lead to fall in propensity to pay dowry, thus supply curve would shift downward for given level of female education. Given unchanged demand for dowry the matching equilibrium will hold only at higher level of equilibrium dowry and lower level of female education. This result is counterintuitive and seems to be paradoxical. However, this paradox can be explained as follows. In this model the bride's household do not directly chooses the female education level to maximize utility, but it chooses education level as a determinant to offer lower dowry. Hence, a lower k would induce families to have lower sensitivity of paying dowry, thus family would choose a lower level of female education. To get a matching equilibrium the demand for dowry corresponding to lower female education (lower earning potential) increases, which ultimately ends up at higher equilibrium dowry level.

Next, consider an effect of reduced social stigma in terms of a fall in γ . This shifts the demand curve lower thus improving both education and lowering the incidence of dowry.

Proposition 3: A reduced social stigma to pay dowry may produce counterproductive result unless otherwise the family choose female education altruistically, and not as a means to pay dowry. However, a reduced desire to have dowry by groom's family unambiguously lowers the incidence of dowry and improves female education.

Case of male skilled unemployment:

So far the analysis proceeds on the assumption that full employment prevails in the economy, however, unemployment[11] is a crucial feature of a developing economy. Let us consider presence of male unemployment in the skilled sector. Thus, Eq. (8) is modified as

$$Z_2{}^N = W_M^S(1-u) + W_F^S\, l_F^S + D_d \tag{10}$$

Where 'u' is the rate of unemployment and (1-u) is the effective time in production net of unemployment. The desire for dowry is thus given by

$$D_d{}^N = \frac{\gamma\tilde{\beta}\left(W_0 + \frac{R\,\overline{K_D}}{\bar{S}}\right) - \{W_M^S(1-u) + W_F^S\, l_F^S\}}{\left(1+\tilde{\beta}\right)} \tag{11}$$

An increase in male unemployment rate that directly affects the groom's earning potential[12] causes the demand curve for dowry to shift outward, thus raising the level of equilibrium dowry exchange and lowering the female education. The following proposition explains the result.

Proposition 4: An increase in male unemployment hurts the bride's family by lowering female education and increasing dowry exchange.

Dowry Regularization

Consider a direct policy by the government in terms of ceiling in dowry level below the equilibrium level of dowry. At this ceiling level, the demand for skilled bride exceeds the supply of skilled brides, thus there will be few families for whom matching equilibrium is not feasible. This pool of unmarried female would push the dowry level higher than the government regulated level, however, would still be lower than the equilibrium level. This high level for dowry would be exchanged illegally among families thus worsening the situation. The policy is partially effective since by generating a signal against dowry it causes

[11] Male unemployment in developing economy can be explained due to skill premium, or as instrument against shirking. The relevant literatures that discuss such unemployment includes Shapiro and Stiglitz (1984) ; Diamond (1982). In this model, this can be reflected by a fixed male skilled wage rate, however, would not alter the result thin the household takes wage rate as datum while framing their decision.

[12] Groom's earning potential in period 2 falls not due to fall in male wgae rate, but due an increased unemployment that lowers male labour effective work hours.

the level of dowry to fall, however due to illegal exchange of dowry that is higher than the government regulated would reduce the effectiveness of the policy.

Proposition 5: A policy of dowry regulation is partially effective, however, in the long run due to acquired morality the incidence of dowry may ultimately fall.

4. CONCLUSION

Gender studies had been a wide area of research which in the recent past is extended further in several directions**.** With the advent of globalization various interrelationships within the domain of gender based studies has become much complex and conditioning. Given this backdrop, the paper attempted to explore analytically few varying economic aspects on the choice of female education and the incidence of dowry. In so doing, a model based on intertemporal utility maximization is developed for both the representative bride's family and the groom's family. The bride's family offers dowry which is conditional on bride's skill level, on the other hand the groom's family demands dowry which is conditional on the level of expenditure on groom before reaching his adulthood that is spent by his guardian, and on the earning potential of the bride. The determination of equilibrium dowry and equilibrium level of female education leads occurrence of multiple equilibria, which are termed as good equilibrium with lower level of dowry and higher female education, and another bad equilibrium with higher level of dowry and lower female education.

Effect of various economic and social policy has been analyzed. It was obtained that an increase in subsidy targeted specifically to encourage female education unambiguously lowers the incidence of dowry and raises female skill level. On the other hand, a higher gender-based wage disparity lowers the incidence of dowry and improves female skill level only if the inequality is a consequence of rising male wage proportionately more than rising female skilled wage, however, the incidence of dowry worsens if the inequality is result of lowered female skilled wage rate. Implications for male unemployment is also discussed which is a crucial feature of any developing economy. It was obtained that an increase in unemployment lowers the earning potential of the groom thus escalating the demand for dowry by the groom's family. Social-based reform policies which are direct in terms of its impact on dowry level leads to some significant results. Thus, this aspect has been explored in terms of fall in propensity to offer dowry by groom's family and a lower propensity to take dowry by the groom's family. A paradoxical result is obtained in terms of an increased level of equilibrium dowry and a lower educational attainment by female. This paradox can be

offered a possible explanation based on objective of the bride's family. Bride's family educates girl not as an objective to increase family utility directly, but as a means to offer lower dowry. Due to presence of this effect there occurs a negative repercussion resulting from lower family propensity to offer dowry that turns into higher equilibrium level of dowry and lower education. On the other hand, a fall in propensity to take dowry by the groom's family unambiguously lowers the incidence of dowry and escalates female education level.

In closing remarks, it can be concluded that instead of adopting any single direct policy to hammer on the incidence of dowry and to pull up the female skill level, a policy mix would result in more effective curbing of dowry and improve female status in the society. Such policy mix adopted according to the prevailing condition helps in effectively bringing down the contradictions existing in gender-based issues in an developing economy.

REFERENCES

Anderson, S. (2007). The Economics of Dowry and Brideprice. *Journal of Economic Perspectives , 21* (4), 151-174.

Anukriti, S., Kwon, S., & Prakash, N. (2019). Dowry: Household Responses to Expected Marriage Payments. *Retrived from https://www2.bc.edu/s-anukriti/* .

Basu, K., & Van, P. H. (1998). The Economics of Child Labor. *The American Economic Review , 88* (3), 412-427.

Botticini, M., & Siow, A. (2003). Why Dowries? *The American Economic Review , 93* (4), 1385-1398.

Brown, P. H. (2003). Dowry and Intrahousehold Bargaining: Evidence from China. *William Davidson Institute Working Paper Number 608* .

Chowdhury, F. D. (2004). The socio-cultural context of child marriage in a Bangladeshi village. *International Journal of Social Welfare , 13*, 244–253.

Dalmia, S., & Lawrence, P. G. (2005). The Institution of Dowry in India: Why It Continues to Prevail. *The Journal of Developing Areas , 38* (2), 71-93.

Dasgupta, I., & Mukherjee, D. (2003). 'Arranged' Marriage, Dowry and Female Literacy in a Transitional Society. *CREDIT Research Paper No. 03/12* .

Diamond, P. A. (1982). Wage Determination and Efficiency in Search Equilibrium. *The Review of Economic Studies , 49* (2), 217-227.

Geirbo, H. C., & Imam, N. (2006). The Motivations Behind Giving and Taking Dowry. *Research Monograph Series No. 28* .

Krishnaswamy, S. (1995). Dynamics Of personal and social factors influencing the attitude of married and unmarried working women towards dowry. *International Journal of Sociology of the Family , 25* (1), 31-42.

Lahiri, S., & Self, S. (2004). *Gender Bias in Education: the Role of Inter-household Externality, Dowry and Other Social Institutions*. Retrieved from http://opensiuc.lib.siu.edu/econ_dp/15

Makino, M. (2017). Female labor force participation and dowries in Pakistan. *PAA 2017 Annual Meeting* .

Rao, V. (1993). The Rising Price of Husbands: A Hedonic Analysis of Dowry Increases in Rural India. *Journal of Political Economy , 101* (4), 666-677.

Shapiro, C., & Stiglitz, J. E. (1984). Equilibrium Unemployment as a Worker Discipline Device. *The American Economic Review , 74* (3), 433-444.

Srinivasan, P., & Lee, G. R. (2004). The Dowry System in Northern India: Women's Attitudes and Social Change. *Journal of Marriage and Family , 66*, 1108–1117.

Srinivasan, S. (2005). Daughters or Dowries? The Changing Nature of Dowry Practices in South India. *World Development , 33* (4), 593–615.

Zhang, J., & Chan, W. (1999). Dowry and Wife's Welfare: A Theotrical and Empirical Analysis. *Journal of Political Economy , 107* (4), 786-808.

APPENDIX

A. Stability Condition:

The Marshalian stability requires, $\frac{\partial\left(l_F^{S^D}-l_F^{S^S}\right)}{\partial D}<0$; where $l_F^{S^D}$ and $l_F^{S^S}$ the desirable level of female education from the male and female family respectively. This condition is satisfied under the sufficient condition

$$(W_0+W_F)\left(\frac{\beta}{1+\beta}\right)\frac{W_F^S}{K\,W_M^S}<\frac{\left(1+\tilde{\beta}\right)}{W_F^S}\left\{\frac{DW_F^S}{K\,W_M^S}\left(\frac{1+\beta}{\beta}\right)-(S-B-W_F)\right\}^2$$

B. Social desirability:

If $l_F^S=1$ and $K=0$ $i.e.D^S=0$

$$\text{then } U^P=log(W_0+S-B-S_1)+\beta log(S_1)$$

And

If $l_F^S=1$ and $K>0$

$$\text{then } U^G=log(W_0+S-B-S_1)+\beta log\left\{\left(1-\frac{KW_M^S}{W_F^S}\right)S_1\right\}$$

$$Now,\qquad U^P-U^G=\beta\left[logS_1-log\left\{\left(1-\frac{KW_M^S}{W_F^S}\right)S_1\right\}\right]>0 \text{ i.e. } U^P>U^G$$

If $l_F^S=1$, $D^F=0$ and $C>0$

$$V^P=log\left(W_0+\frac{R\,\overline{K_D}}{\bar{S}}-C\right)+\tilde{\beta}log(W_M^S+W_F^S)$$

$$V^G=log\left(W_0+\frac{R\,\overline{K_D}}{\bar{S}}-C\right)+\tilde{\beta}log(W_M^S+W_F^S+\gamma C)$$

It is observed that, $V^G-V^P=\tilde{\beta}\log(\gamma C)>0$ i.e. $V^G>V^P$

Social welfare (S_W) is defined as

$$S_W=(U^P-U^G)+(V^P-V^G)$$

$$S_W = \beta\left[logS_1 - log\left\{\left(1 - \frac{KW_M^S}{W_F^S}\right)S_1\right\}\right] - \tilde{\beta}\log(\gamma C) > 0 \quad \text{iff } \left(1 - \frac{KW_M^S}{W_F^S}\right)^{\beta} > (\gamma C)^{\tilde{\beta}}$$

C. Comparative static:

- **Subsidy increases ($S \uparrow$)**

  From equation 5 and 11 respectively we get,

$$\frac{\partial D_S}{\partial S} = \frac{KW_M^S}{W_F^S\, l_F^{S^2}}\left(\frac{\beta}{1+\beta}\right) l_F^S > 0\,, \qquad \frac{\partial D_d}{\partial S} = 0$$

- **Increase in relative wage rate of male and female $\left(\frac{W_M^S}{W_F^S} \uparrow\right)$**

  In this scenario W_M^S and W_F^S both increases but increase in W_M^S is more than increase in W_F^S i.e. income distribution worsen between male and female.

  So, differentiating equation 5 and 11 with respect to W_F^S and allow W_M^S changing,

$$\frac{\partial D_s}{\partial W_F^S} = \frac{K}{l_F^S}\left(\frac{\beta}{1+\beta}\right)\{W_0 + W_F + (S - B - W_F)l_F^S\} > 0$$

$$\frac{\partial D_d}{\partial W_F^S} = -\frac{\left\{\left(\frac{1+\tilde{\beta}}{W_F^S}\right) + \left(\frac{1+\tilde{\beta}}{W_F^{S^2}}\right)\left(\frac{W_M^S}{W_F^S} + l_F^S\right)\right\}}{\left(\frac{1+\tilde{\beta}}{W_F^S}\right)^2} < 0$$