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Determinants of Migration and Remittance in India: Empirical Evidence

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DETERMINANTS OF MIGRATION AND REMITTANCE IN INDIA: EMPIRICAL EVIDENCE

Jajati Keshari Parida[1] **and S Madheswaran**[2]

Abstract

This paper attempts to study the migration behaviour of Indian internal migrants combining both Todaro's individual utility maximising behaviour and Stark's household approach. The theoretical model presented here is based on the joint utility maximisation principle in which there are two agents, the migrant and his family members, who maximise their utility in two different situations i.e., first, when the migrant stays out of the home (in migration situation) and second, when the migrant stays in the home (or returns). This model is empirically estimated to study the determinants of both migration and remittance using the National Sample Survey data for 2007-08. The results suggested that individual characteristics like age, marital status and human capital endowments, and household characteristics like the size of the household, caste and land possession have immense influence on both the decision to migrate and sending remittance.

Introduction

In recent years, the focus of attention of migration studies has shifted from the individual to the family and maximisation of family welfare. The family as a unit has been recognised and due importance has been assigned to family considerations while taking the decision to migrate. The economic studies of Mincer (1978), Stark (1978, 1979, 1991, 1998, 2000), Stark and Levhari (1982), Banerjee (1986), Hoddinott (1992), Stark and Fan (2007) and Kleinwechter (2010) have discussed migration in the context of the family in contrast to that of Todaro (1969) which assumes migration as an outcome of individual utility maximising behaviour. Migrants from rural areas residing in the city exhibit a particular behavioural pattern through the links with their origin. Remittance is the most important link used for the maximisation of family welfare. Remittances are financial flows into households. The private financial aid that flows directly into the households is an important source of income besides providing consumption smoothing strategies for vulnerable poor and non-poor households. Russell *et al*., (1990), Taylor (1996) Findley and Sow (1998) and Stark (2009) stated that after satisfying subsistence needs, migrant remittances are used for investment purposes such as education, livestock, farming and small-scale enterprise. It is evident from the data of the 64th round (2007-08) of the National Sample Survey (NSS) that on an average the annual household consumer expenditure was nearly Rs 38,000 for all rural households compared to nearly Rs 41,000 for rural households receiving remittances in India. Here, in this paper it is attempted to construct a migration model as the outcome of joint utility maximisation by the migrant and his household members. This approach encompasses the Todaro (1969) and Stark (1991) household model as special cases and provides a theoretical rationale for the inclusion of more explanatory variables in an economic model of migration. It also permits derivation of the remittance

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function and the economic specification of the determinants of remittances accounts for migrant selectivity in India.

The paper is organised in the following fashion. Section 2 outlines a broad picture of remittance received from internal migration and the different ways in which the remittance is used by the households in India. A theoretical model of migration and remittance for India is presented in Section 3, while Section 4 provides the empirical results. Sub-section 1 comprises the determinants of migration, drawing on data collected by the NSS in its 64th round (2007-08) and in Sub-section 2, this analysis is extended to migrants' remittances. Section 5 comprises the conclusions.

An Over-view of Out-migration and Remittance in India

The present section provides a background for the development of the theoretical model in the next section. A household member whose last usual place of residence (UPR) anytime in the past is different from the present place of enumeration is considered as a migrant member in a household (NSS). The out-migrants are members of a household who left any time in the past to stay outside the village/town (provided he/she was alive on the date of the survey in 2007-08). In Table 1 the percentage of households reporting out-migrants, receiving remittance and average amount of remittances (in Rs) received have been presented for the different monthly per capita expenditure (MPCE) decile classes in India. It is observed that nearly 30 per cent of rural and around 19 per cent of urban households have reported out-migration of its former members. The incidence of out-migration of the household members from the rural households is seen to be increasing with the increase in MPCE. Comparing the MPCE decile classes, nearly 21 per cent of the rural households have reported out-migration of its members in the bottom decile as against nearly 42 per cent of the households in the top MPCE class. However, in the urban areas, the percentage of households reporting out-migration of its members does not vary much with the MPCE. It is nearly 19 per cent in the case of the households in the bottom decile class and nearly 22 per cent in the top decile class. In case of remittance, starting from the rural areas, the percentage of households reporting receipt of remittance does not vary much with the increase in MPCE. Nearly 36 per cent of the households in the bottom MPCE decile class and about 39 per cent of the households in the top MPCE decile class have received remittances during 2007-08. The percentage of rural households receiving remittances in other MPCE decile classes also does not show any significant differences. In contrast, the percentage of households that receive remittances has increased significantly with the increase in MPCE (19 per cent in the case of households in the bottom MPCE decile class and nearly 31 per cent for the top MPCE decile class) in urban areas. It is found in Column 3 of Table 1 that there is a significant difference between the amount of remittances received by the households in rural and urban areas. In the rural areas, on an average the households received nearly Rs 21,000 as remittances, while in the urban areas the households received nearly double of that amount (Rs 44,000). Again, it is observed that the households in lower MPCE decile classes received significantly smaller remittances compared to the households in the higher MPCE decile classes. The average remittances received by the rural households in the bottom MPCE decile class is nearly Rs 9,000, while for the households in the top MPCE decile class it is more than four-fold (Rs. 40,000). Similarly, in the urban areas, the average amount of remittances received by the households in the bottom MPCE classes is nearly Rs 15,000 where as for the households in the top MPCE decile classes it is nearly six-fold (Rs 85,000).

Table 1: Distribution of Households Reporting Out -migrants, Receipt of Remittance and Average Remittance Received during 2007-08 in India

MPCE Decile classes	% of households reporting out - migrant	% of households received remittance those reporting out -migrant	Average amount of remittance received (` 100) per reporting household
Rural Sector			
0-10	20.8	36.2	93
10-20	23.5	36.8	113
20-30	26.5	35.1	122
30-40	27.4	37.3	126
40-50	27.7	39.2	148
50-60	29.0	35.5	165
60-70	29.6	35.4	170
70-80	33.4	34.9	179
80-90	34.8	35.0	228
90-100	41.7	38.5	403
All	30.4	36.5	207
Urban Sector			
0-10	18..9	19.1	146
10-20	19.2	18.7	132
20-30	18.4	20.9	225
30-40	18.9	18.5	214
40-50	18.8	22.4	269
50-60	17.8	20.8	270
60-70	18.0	25.7	359
70-80	19.2	21.9	411
80-90	20.1	29.3	498
90-100	21.9	31.4	850
All	19.3	24.0	436

Source: Compiled from NSS 64th Round (2007-08) Report No. 533.

Table 2: Distribution of Households According to the Use of Remittance Received during 2007-08

(figures in %)

Use of Remittance	Sector		
	Rural	**Urban**	**Total**
Household consumer expenditure			
Food	26.16	24.71	25.69
Education of household members	11.80	14.34	12.62
Household durables	9.57	9.46	9.53
Marriage and other ceremonies	1.77	1.45	1.67
Health care	15.86	15.45	15.73
Other items of household consumer expenditure	21.66	21.73	21.69
Sub-total	86.82	87.14	86.93
For improving housing condition	3.57	2.57	3.25
Debt repayment	3.38	2.30	3.03
Financing working capital	0.51	0.30	0.44
Initiating new entrepreneurial activity	0.10	0.11	0.11
Saving/investment	3.01	5.04	3.68
Others	2.59	2.52	2.57
Total	**100.00**	**100.00**	**100.00**

Source: Calculated from NSS 64th Round (2007-08) unit level data.

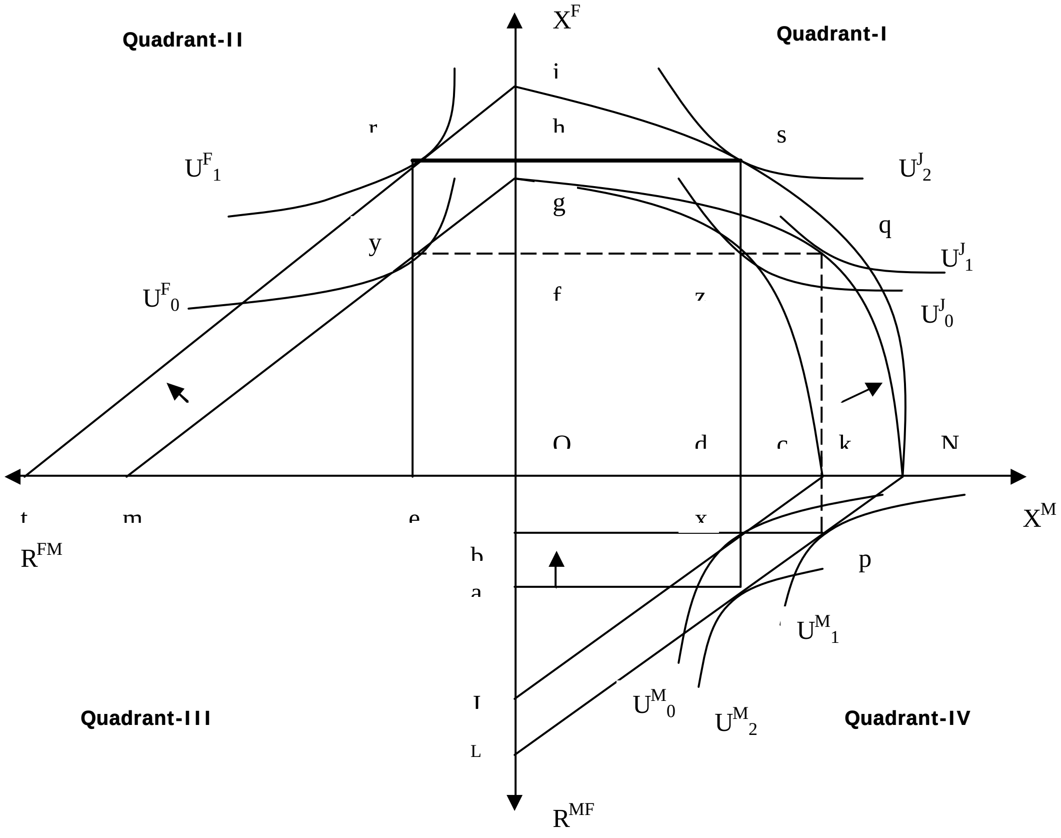
In addition to Table 1, the information on the purposes for which the remittance is used by the recipient household is presented in Table 2. There are 12 purposes for which a household uses the remittance according to the information available in the NSS (2007-08) survey. It is observed from Table 2 that household consumer expenditure is the prime use of the remittances in both rural and urban areas, with nearly 95 per cent of the households in the rural areas and 93 per cent of the households in the urban areas reporting use of the remittances for household consumer expenditure. Again, within the household consumer expenditure a very higher proportion of the households (76 per cent in the rural areas and 71 per cent in the urban areas) have reported spending on food items. A significant proportion of households in both the rural and urban areas used the remittances for health care (38 per cent of the rural households and 36 per cent of the urban households). One of the main uses of remittances by the households was education of household members. Nearly 31 per cent of the rural households and 34 per cent of the urban households reported use of remittances for education of household members. The next important purpose which remittances serves in rural households is the repayment of debt (10 per cent), while for the urban households it is for saving/investment (nearly 13 per cent).

With this background, a simple model of migration and remittance can be constructed to explain household migration behaviour with respect to the households' objective of maximising utility.

A Theoretical Model for Migration and Remittance

There are two agents in this model, the migrant (M) and his family members (F). Both derive utility exclusively from their own consumption of composite goods. It is assumed that they agree to maximise a joint utility function defined over two situations (i) when the migrant migrates or is in the place of destination (m) and (ii) when the migrant does not migrate or returns to his home (h). The decision to migrate taken by any member of the household can be regarded as part of a mutual agreement between the migrant and his family members (Stark, 1980; Lucas and Stark 1985; Stark and Bloom 1985; and Stark and Lucas 1988). In the early periods of migration, the family supports the migrant by sending money or investing in the migrant's education. However, once the migrant is settled in the destination place and secures employment, he starts sending remittance to his family. This agreement yields substantial benefits to both parties. It gives farming households access to a source of income unrelated to agriculture, a feature particularly useful in areas where crop income fluctuates (Hoddinott, 1994). It also permits them to overcome imperfections in rural capital markets (Stark 1980; and Cain 1981). The migrant gains financial and moral support from his household while he establishes himself in an urban area and during his job search (Hoddinott, 1992). Again, the household provides a form of unemployment and old age insurance by allowing the migrant to return home. This could be done by purchasing land and other assets or paying premiums for insurance schemes etc., in the migrant's name.

Figure 1



The joint utility maximising behaviour of the migrant and his family is explained with the help of Figure 1. The utility maximising behaviour and joint utility maximisation of the migrant and his family are explained in the fourth, second and first quadrants respectively. The migrant attains his equilibrium at point 'X', where his budget constraint 'JK' is tangent to the indifference curve (utility function) 'U_0^{M}' and 'U_0^{M}' is also convex to the origin at this point (it satisfied both necessary and sufficient conditions for equilibrium). At this point, the migrant consumes 'od' amount of the composite goods (X^M) and 'ob' amount of money he sends home as remittance. The migrant's family attains equilibrium at point 'Y' with 'of' amount of composite goods (X^F) and 'oe' amount of transfers. As a result, the joint utility of the migrant and family members is maximum (U_0^J) at 'Z'. Now let us complicate the present analysis a bit by introducing a comparative static analysis with respect to a change in migrant's income. The sole objective is to study the migration and remittance behaviour of migrants and his family in a comprehensive way. Now if the migrant's income increases from 'JK' to 'LN', he will have two choices viz., send the additional income to his home as remittance or consume more composite goods. It is clear that the joint utility of the migrant and his family is maximised (at U_2^J) only if the migrant sends the additional money to his home. The limitation of the diagrammatic representation is that it fails to explain the procedure through which the equilibrium solutions are derived.

In addition to the diagrammatic exposition, the model is explained with help of simple calculus in order to derive both the migration function and remittance function from the equilibrium solutions assuming that both the parties always prefer maximising the joint utility function to 'going on their own'. The formal presentation of the model begins with consideration of the migrant's (M) and Family's (F) utility functions, which are assumed to be strictly quasi-concave, and defined over two goods (a composite commodity (X) and transfers (R)) in two situations).

$$U_{ij} = \Phi(X_{ij}, R_{ij}) \text{.............(1)}$$

Where i = M, F; and j = m, h

$$U_M = g_1 \log X^M + g_2 \log R^M \text{...................(2)}$$

$$U_F = d_1 \log X^F + d_2 \log R^F \text{.....................(3)}$$

Here ?s and δs are the expenditure of the migrant and his family on composite goods and transfers, respectively. Now the joint utility functions of the migrant and his family members are written in the Stone-Geary[3] additive form as:

[3] The Stone-Geary preferences were originally developed by Geary (1951). Stone (1954) utilised them in empirical work. A consumer with the Stone-Geary preferences gets utility from that part of consumption, which exceeds the subsistence level.

$$Z = a \log[U_{Mm} - U_{Mh}] + b \log[U_{Fm} - U_{Fh}]$$

$$= a \log[U_M - U_M^*] + b \log[U_F - U_F^*]$$

$$= a \log[\{g_1 \log X^M + g_2 \log R^M\} - U_M^*] + b \log[\{d_1 \log X^F + d_2 \log R^F\} - U_F^*] \ldots\ldots\ldots\ldots\ldots(4)$$

Where a and ß are the weights attached to the migrants and his family utility functions respectively and a + ß = 1 and $[U_M - U_M^*]$ and $[U_F - U_F^*] > 0$. Because U_M^* and U_F^* are the minimum subsistence levels of utility, assumed to be constant.

In equation 5 and 6 the migrant's budget constraints in two situations are given:

$$W_m.T_M + R_m^{FM} = R_m^{MF} + X_m^M \ldots\ldots\ldots\ldots\ldots(5)$$

$$W_h.T_M + R_h^{FM} = R_h^{MF} + X_h^M \ldots\ldots\ldots\ldots\ldots(6)$$

Where T_M is total time spent on work by the migrant, R_m^{FM} is the value of transfers he receives from his family as a migrant whereas R_m^{MF} is the value of transfers he makes to his family as a migrant. W_m is the returns (wage) he receives for his work as a migrant, which itself is a function of his age, education and other earning characteristics. On the other hand, in equation 6, W_h is the (implicit) return of the migrant's labour when he remains at home. R_h^{MF} is the value of transfers the parents receive from the migrant when he is at home.

Now the budget constraints of the migrant's family members are given in equation 7 and 8 respectively:

$$W_F.T_F + R_m^{MF} + OT = R_m^{FM} + X_m^F \ldots\ldots\ldots\ldots\ldots(7)$$

$$W_F.T_F + R_h^{MF} + OT = R_h^{FM} + X_h^F \ldots\ldots\ldots\ldots\ldots(8)$$

Where T_F is total time available to the family for economic activities (all other members of the family except the migrant) and W_F is the (implicit) return to the family's labour and 'OT' is the net value of transfers received from other sources (particularly non-labour incomes) is assumed to be a function of land and other assets the household currently owns. Now in order to get the full income constraint for the migrant and his family we have to combine 5 and 6 and 7 and 8, respectively. The full income budget constraint of the migrant and his family are given below:

$$R^F + W_m.T_m + W_h.T_h = R^M + X^M \ldots\ldots\ldots\ldots\ldots\ldots(9)$$

$$R^M + W_F.T_F + OT = R^F + X^F \ldots\ldots\ldots\ldots\ldots\ldots(10)$$

Where, T_h is the migrant's supply of labour when he is in the home, while T_m is his supply of labour as a migrant. X^M and X^F are the consumption of a composite commodity by migrants and his family (where $X^M = X_h^M + X_m^M$ and $X^F = X_h^F + X_m^F$); and R^F and R^M are the transfers from the family to migrant and from migrant to family respectively. Finally, the full income budget constraint for both migrant and his family can be written as:

$$W_m.T_m + W_h.T_h + W_F.T_F + OT = X^M + X^F + R^M + R^F \text{.......................}(11)$$

Now let us maximise the joint utility function (Equation 4) subject to the full income budget constraint equation 11, using the Lagrange's technique. Lagrange's joint function is written as:

$$L = a \log\{(g_1 \log X^M + g_2 \log R^M) - U_M^*\} + b \log\{(d_1 \log X^F + d_2 \log R^F) - U_F^*\}$$

$$+ l (W_m.T_m + W_h.T_h + W_F.T_F + OT - X^M - X^F - R^M - R^F) \text{..................}(12)$$

The first order condition for maximum is to set the first order differentials equal to zero:

$$\frac{\partial L}{\partial X^M} = \frac{a \cdot g_1}{X^M \cdot \{(g_1 \log X^M + g_2 \log R^M) - U_M^*\}} = l \text{......................}(i)$$

$$\frac{\partial L}{\partial R^M} = \frac{a \cdot g_2}{R^M \cdot \{(g_1 \log X^M + g_2 \log R^M) - U_M^*\}} = l \text{.......................}(ii)$$

$$\frac{\partial L}{\partial X^F} = \frac{b \cdot d_1}{X^F \cdot \{(d_1 \log X^F + d_2 \log R^F) - U_F^*\}} = l \text{.......................}(iii)$$

$$\frac{\partial L}{\partial R^F} = \frac{b \cdot d_2}{X^F \cdot \{(d_1 \log X^F + d_2 \log R^F) - U_F^*\}} = l \text{...........................}(iv)$$

and $\frac{\partial L}{\partial l} = (W_m.T_m + W_h.T_h + W_F.T_F + OT - X^M - X^F - R^M - R^F) = 0\text{........}(v)$

Now from (i) and (ii) we will have

$$\frac{a g_1}{X^M} = \frac{a g_2}{R^M} \Rightarrow X^M = \left(\frac{g_1}{g_2}\right) \cdot R^M$$

or

$$\Rightarrow R^M = \left(\frac{g_2}{g_1}\right) \cdot X^M$$

Similarly, from (iii) and (iv) we will have

$$\frac{b d_1}{X^F} = \frac{b d_2}{R^F} \Rightarrow X^F = \left(\frac{d_1}{d_2}\right) \cdot R^F$$

or

$$\Rightarrow R^F = \left(\frac{d_2}{d_1}\right) \cdot X^F$$

Now putting $R^F = \left(\frac{d_2}{d_1}\right) \cdot X^F$ and $R^M = \left(\frac{g_2}{g_1}\right) \cdot X^M$ in equation (v) and setting T_h=0 we will get:

$$W_m.T_m = W_F.T_F + OT - X^M - X^F - \left(\frac{g_2}{g_1}\right) \cdot X^M - \left(\frac{d_2}{d_1}\right) \cdot X^F$$
$$= \frac{g_1 d_1 (W_F.T) + g_1 d_1 (OT) - d_1 (g_1 - g_2) \cdot X^M - g_1 (d_1 - d_2) \cdot X^F}{g_1 d_1}$$
$$\Rightarrow T_m = \frac{g_1 d_1 (W_F.T) + g_1 d_1 (OT) - d_1 (g_1 - g_2) \cdot X^M - g_1 (d_1 - d_2) \cdot X^F}{(g_1 d_1) \cdot W_m}$$

Similarly if we set T_m=0, we will have

$$W_h.T_h = W_F.T_F + OT - X^M - X^F - \left(\frac{g_2}{g_1}\right) \cdot X^M - \left(\frac{d_2}{d_1}\right) \cdot X_F$$
$$= \frac{g_1 d_1 (W_F.T) + g_1 d_1 (OT) - d_1 (g_1 - g_2) \cdot X^M - g_1 (d_1 - d_2) \cdot X^F}{g_1 d_1}$$
$$\Rightarrow T_h = \frac{g_1 d_1 (W_F.T) + g_1 d_1 (OT) - d_1 (g_1 - g_2) \cdot X^M - g_1 (d_1 - d_2) \cdot X^F}{(g_1 d_1) \cdot W_h}$$

Now both T_m and $_h$ can be written as:

$$T_m = y\ (W_M, W_F, OT, X^M, X^F) \text{..............(13)}$$
$$T_h = y\ (W_h, W_F, OT, X^M, X^F) \text{..............(14)}$$

Since T_m and T_h represent the time spent on work by the migrant during his migration and stay at home. As in Hoddinott (1994), the migration function can be derived from the above labour supply functions. Applying the Hoddinott (1994) method, the following restrictions are imposed $T_m, T_h \in \{0,1\}$: T_m = 1 if any member of the household had participated in labour force outside the usual place of residence and T_m = 0 otherwise. Similarly, T_h = 1 if any member of the household had participated in labour force within the usual place of residence T_h = 0 otherwise. Hence, T_m + T_h =1. Again, combining Equations 13 and 14 we will get Equation 15. Where M = 1 if T_m = 1 (any member of the household is a migrant); and M = 0 if T_h = 1 (none of the household members is a migrant).

$$M = y\ (W_M, W_h, W_F, OT, X^M, X^F) \text{..............(15)}$$

The most important implication of using the Stone-Geary utility function (Equation 2) in the present analysis is that both Todaro and household models can be treated as special cases. In Equation 4, a and ß (0 < a< 1 and 0 < ß< 1) indicate how the gains from the migration decision are to be weighted. In that equation if a = 0 and ß = 1, the household maximises its utility function. This is similar to the models developed by Low (1986) and Rempel (1981). On the other hand, if a = 1 and ß = 0, we will end up with individual migrant's utility maximising behaviour, as explained in the Todaro (1969) model.

Now in order to get the migrant's remittance function we have to put $X^M = \left(\frac{g_1}{g_2}\right) \cdot R_m$ in the equation (v). By doing so we will have Equation 16:

$$W_m.T_m + W_h.T_h + W_F.T_F + OT - \left(\frac{g_1}{g_2}\right) \cdot R^M - R^M - X^F - R^F = 0$$

$$\Rightarrow R^M = \left(\frac{g_2}{g_1 + g_2}\right) \cdot \left(W_m.T_m + W_h.T_h + W_F.T_F + OT - X^F - R^F\right) \text{..............(16)}$$

Empirical Estimation of the Model

1. Estimation of Migration Function

The migration model developed in Section 3 as presented in Equation 15 is estimated using the NSS (2007-08) data. In this data the information on W_M and W_h are available but not on W_F, and OT. However, recall that W_F is a function of possession of land and other assets and OT (net transfers from other family members) is a function of the households' social and demographic characteristics. Equation 15 can thus be re-written as:

$$M = y\ (Wage, Age, Education, Caste, Landholding, Householdsize, MaritalStatus) \text{........(17)}$$

A probit model is used to estimate the determinants of migration (Equation 17). The probit performs quite well in predicting who will migrate compared to logit for such a large data set, in this context. The theoretical background for the probit model is as follows:

Given $y_i = x_i b + e_i$

Where Y is the dependent variable, X is the data matrix formed out of the explanatory variables, ß is the vector of parameters and e is the stochastic disturbance term. Y is the binary variable that assumes value zero and one.

$$y_i = \begin{cases} 1; y_i^* > 0 \\ 0; y_i^* \leq 0 \end{cases}$$

and

$$\begin{aligned} & P(y_i = 1 \mid x) = P(y_i^* > 0 \mid x) \\ & = P(x_i' b + e_i > 0 \mid x) \\ & = P(e_i > -x_i' b \mid x) \end{aligned}$$

Here, e is commonly assumed to be independent and normally distributed with zero mean and variance one. This leads to the binary probit model with the probability density function as:

$$P(y_i = 1 | x) = \int_{-\infty}^{x_i b} \frac{1}{\sqrt{2p}} \exp(-\frac{t^2}{2}) dt$$

and the cumulative distribution function as:

$$P(y_i = 1 | x) = F(x_i^{'} b)$$

In Table 3, the means and standard deviations of the variables are presented in Columns 2 and 3, while the robust probit coefficients and marginal effects are given columns 4 and 5. Before moving to a discussion on the individual parameter estimates, several general observations are worth noting. The wald chi-squared statistic, testing the null hypothesis that all regressors are jointly zero, is strongly rejected. The discussion begins with the effect of the migrants' age and its square on the migration decision. Age provides a rough proxy for work experience. As such, it gives some indication of the earning potential of the individual. As there are typically diminishing returns to experience, a quadratic formulation is appropriate. Age and age squared also incorporate several demographic features. A younger man may wish to use his home as a base while searching for work. As parents become elderly, they may want their sons living nearby. Sons who migrated in the past may now wish to live in the sub-location, especially if they have sons old enough to migrate. Some may have retired or are about to retire. All these considerations suggest a quadratic formulation for the age variable. They are strongly borne out by the results of the model. Age is positive and highly significant and the quadratic term is negative and also highly significant, a result consistent with the scenario outlined above. The coefficient of wage is positive and highly significant, suggesting the fact that the probability of migration increases with increase in wage. This is one of the most important determinants of internal migration in India. It does not matter whether the migrant is poor or rich; it is the general mindset of the people to move out and work in places where their earnings are more, other things being unchanged. Education also determines the earning potential of the migrant. Completion of below primary education, which corresponds to a minimal level of literacy, positively affects the likelihood of migration (with a high level of statistical significance). As the level of educational increases, the tendency to migrate intensifies. The completion of secondary schooling has a particularly strong effect. It is evident from the coefficient of marriage that the recently married, in NSS data, are more likely to migrate than their unmarried counterparts. Among the social groups, it is seen that members of the Scheduled Tribes, Scheduled Castes and other backward caste are less likely to migrate compared to the members of the general castes. The coefficients of household size and its square implies that a person is more likely to migrate if he belongs to a smaller household but beyond a certain household size, migration is more likely to occur with increase in the household size. In NSS 2007-08 data, the size of landholding is not given directly, but in codes. Using a dummy for landholding classes as marginal, small, semi-medium, medium and large farmer household, it is found that the tendency to migrate is less among the households with smaller land holdings compared to households owning larger holdings. This is diametrically opposite to expectation. It may happen because other characteristics like fertility of the soil, availability of irrigation facility etc., affect the decision to migrate and which are not considered in the present context. However, the interaction dummy coefficients of land holdings with household size provide a better explanation. It is very clear from the interaction coefficients that with the members of same household size owning smaller landholdings are more likely to migrate, especially the small and semi-medium households. It could be argued here that migrants are more likely to come from households with smaller land holdings because they have the greatest need for additional income. The studies by Hay (1980), Nabi (1984) and Singh (1988) provide empirical support for this hypothesis.

Table 3: Determinants of migration Decision in India

Variables	Mean	SD	Probit Results	
			Coefficient	ME (dy/dx)
Intercept	---	---	-0.143 (-0.59)	---
Age	35.41	12.64	0.0431 (15.66)**	0.0129 (15.73)**
Age squared	1414.04	977.89	-0.0005 (-15.54)**	-0.002 (-15.61)**
Monthly Wage	488.61	1308.3	0.00031 (14.81)**	0.0001 (14.73)**
Education (Below Primary)	0.10	0.30	0.1154(5.31)**	0.0357 (5.15)**
Education (Primary)	0.15	0.36	0.1345 (7.08)**	0.0417 (6.87)**
Education (Middle School)	0.18	0.39	0.3013 (16.65)**	0.0965 (15.8)**
Education (Secondary)	0.11	0.32	0.3742 (18.03)**	0.1234 (16.77)**
Education (Higher Secondary)	0.06	0.25	0.3670 (14.54)**	0.1221 (13.43)**
Education (Graduation)	0.09	0.29	0.3045 (11.05)**	0.0992 (10.32)**
Education (P.G & above)	0.03	0.18	0.2989 (7.4)**	0.0984 (6.85)**
Educat ion (Diploma/Certificate course)	0.02	0.15	0.6414 (17.48)**	0.2281 (15.84)**
Married	0.72	0.44	0.1553 (9.17)**	0.0453(9.49)**
Scheduled Tribe	0.13	0.34	-0.3242 (-17.62)**	-0.088 (-19.71)**
Scheduled Caste	0.23	0.42	-0.2994 (-18.96 **	-0.084 (-20.41)**
Other Backward Caste	0.35	0.48	-0.1858 (-13.98)**	-0.055 (-14.31)**
Belong to Marginal Farmer HH	0.94	0.24	-0.4443 (-1.9) †	-0.1505 (-1.73) †
Belong to Small Farmer HH	0.04	0.20	-0.8636 (-3.54)**	-0.1791 (-6.02)**
Belong to Semi-medium Farmer HH	0.02	0.13	-0.85835 (-3.39)**	-0.1743 (-6.04)**
Belong to Medium Farmer HH	0.00	0.06	-0.0532 (-0.17)	-0.0156(-0.17)
Household Size	5.06	2.49	-0.3195 (-8.7)**	-0.0958 (-8.69)**
Household Size Squared	31.82	37.10	0.0103 (13.41)**	0.0031 (13.37)**
(Household Size)* (Marginal Farmer HH)	4.65	2.64	0.0408 (1.16)	0.0123 (1.16)
(Household Size)* (Small Farmer HH)	0.26	1.39	0.0657(1.79) †	0.0197 (1.79) †
(Household Size)* (Semi-medium Farmer HH)	0.11	0.93	0.1016 (2.71)**	0.0305 (2.71)**
(Household Size)* (Medium Farmer HH)	0.03	0.50	0.0061 (0.13)	0.0018 (0.13)
No. of observations (N)	73538			
Wald ?^{2}	7743.93***			
Pseudo R^2	0.1274			
Maximum Log Likelihood	-36143.159			

Note: Absolute value of Z-statistics are given in parentheses and **, * and † implies the level of significant at 1%, 5% and 10% respectively.

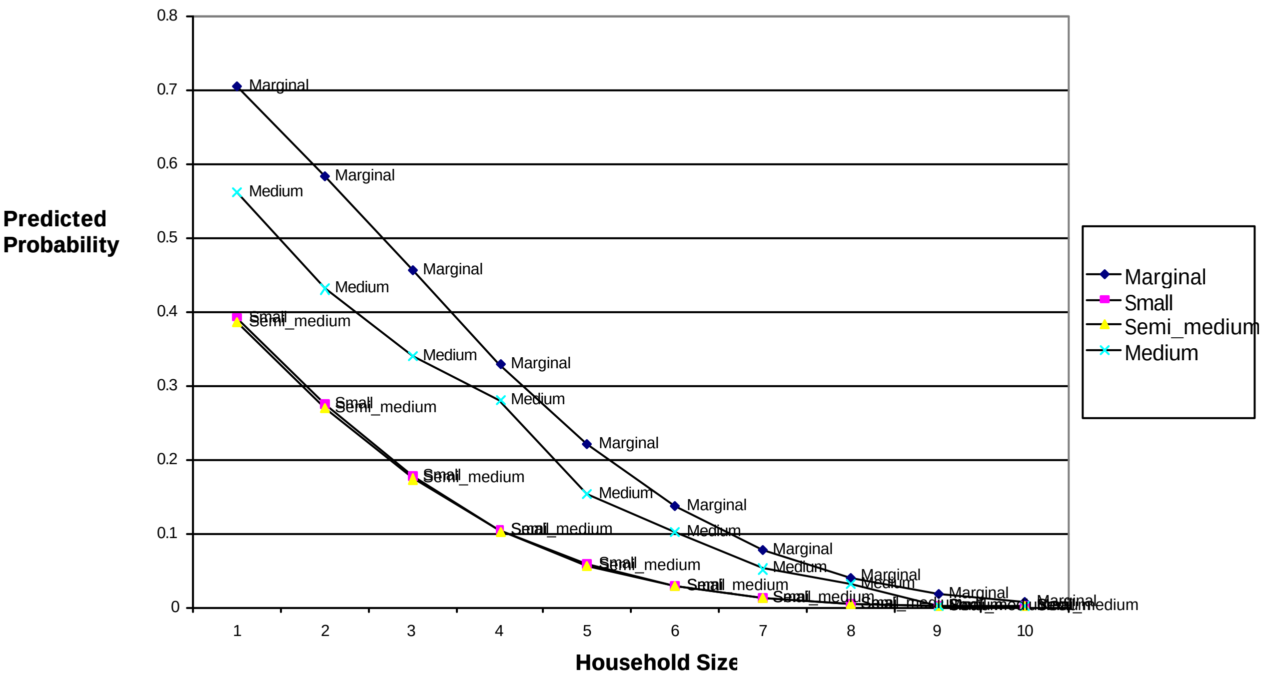
Source: Authors' estimation

Table 4: Predicted Probability of Being a Migrant

Variables	Predicted Probability from Probit Results		
	ST	**SC**	**OBC**
Education (Below Primary)	0.1745	0.1871	0.2187
Education (Primary)	0.1775	0.1903	0.2222
Education (Middle School)	0.2152	0.2294	0.2648
Education (Secondary)	0.2420	0.2572	0.2946
Education (Higher Secondary)	0.2465	0.2619	0.2996
Education (Graduation)	0.2265	0.2412	0.2775
Education (P.G & above)	0.2307	0.2455	0.2821
Education (Diploma/Certificate course)	0.3450	0.3628	0.4056
Marginal Farmer HH	0.1425	0.1536	0.1817
Small Farmer HH	0.0301	0.0335	0.0427
Semi-medium Farmer HH	0.0291	0.0324	0.0414
Medium Farmer HH	0.1361	0.1469	0.1742

Source: Authors' estimation

Figure 2



Source: Authors' estimation

The predicted probabilities computed form the above probit regression is presented in Table 4 and Figure 2. The predicted probabilities of individuals who belong to different social groups, is presented here for different levels of education and household's land holdings in Table 4. Figure 2 gives a clear picture of the predicted probabilities of the individuals according to their household size and land holdings. It is observed that with a given level of education, the probability of being a migrant is higher for the individuals who belong to the relatively higher caste and vice versa. A similar conclusion is drawn for the size of landholdings. This may happen due to the fact that, there are two separate groups of migrants in India, as explained by Dubey *et al* (2004). One group comprise members of the higher castes, who generally migrate to earn higher income and a better standard of living (the aspirants), while the second group comprises the lower castes and whose migration behaviour is often regarded as a struggle for survival (the distressed). The present result states that the individuals belonging to the lower caste households having some land assets are less likely to migrate compared those of the higher castes. Figure 1 argues that within the land holding classes, people with marginal land holdings are more likely to migrate compared to others and with the increase in the household size the predicted probability of migration decreases for a given landholding class. There may be two reasons for this behaviour; firstly, the people having comparatively less land assets may find it difficult to continue to depend on agriculture due to the increasing burden of agriculture in India in recent years and migrated to the urban sector to engage in informal activities. Secondly, some members of the household may migrate to the urban sector for a short period (Seasonally migrants) to supplement the household income. This phenomenon will be very clear in the next section, which studies the determinants of remittance in India.

2. Estimation of Remittance Function

In the theoretical model, it is indicated that remittance is a function (Equation 16 in Section 3) of the migrant's wages and the reward, bequests offered by parents. Taken collectively, these considerations suggest that the migrant's remittance is a function of the migrant's earnings (wage), the level of parental land holdings, migrant's age, marital status of the migrant, and the size of his household. The dependent variable here is the logarithm of monthly remittances. These remittances include money sent back by the migrant (with friends, relatives, or through the post), the value of goods given to parents, money given when visiting the village and money given to parents when they visited the migrant. There are several estimation issues worth noting here before turning to the results. The remittance function presented here is prone to sample selection bias. The bias is due to the fact that a segment of the sample has been dropped because of unavailability of data on migrants' remittance. This source of selective bias is controlled using the Heckman (1979) procedure. The sample is divided into two mutually exclusive sub-samples: first, the migrants and non-migrants, from which only migrants are selected for the present purpose. Again, migrants are divided into two groups: remitter and non-remitter. A probit model is estimated study the decision to remit and from that, an inverse Mill's ratio is calculated. Assuming multivariate normality of the error terms and independence of the selection rules, this procedure ensures consistent parameter estimates for the remittance function. The formal representation of the Heckman's procedure is given below:

Assuming a simple case of two equations model in which there are N number of observations.

$$Y_{1i} = X_{1i} b_1 + e_1 \text{..................} (18)$$

$$Y_{2i} = X_{2i} b_2 + e_2 \text{..................} (19)$$

Where Xs are the data matrices and ßs are the vectors of parameters and e, the stochastic disturbance term, which satisfies the ordinary least square (OLS) assumptions. Suppose we want to estimate Equation 18 but that data are missing on Y_1 for certain observations. If we apply OLS to Equation 18, we will end up with biased parameter estimates. In order to overcome this sample selection bias, we have to use Heckman's procedure. In Equation 18 the population regression function can be written as

$$E(Y_{1i} \mid X_{1i}) = X_{1i} b_1$$

Now, the regression function for the sub-sample of available data is $E(Y_{1i} \mid X_{1i}$, sample selection rule) $= X_{1i} b_1 + E(e_{1i} \mid$sample selection rule); i= 1,2, 3 ... , N, where the convention is adopted that the first N_1 <N observations have data available on Y_{1i}. If the conditional expectation of U_{1i} is zero, the regression function for the selected sub-sample is the same as the population regression function. OLS estimators may be used to estimate $ß_1$ on the selected sub-sample. The only cost of having an incomplete sample is a loss in efficiency. In the general case, the sample selection rule that determines the availability of data has consequences that are more serious. Suppose that data is available on Y_{1i} if $Y_{2i} > 0$ while if $Y_{2i} < 0$, there are no observations on Y_{1i}. The choice of zero as a threshold involves an inessential normalisation. In the general case

$$E(Y_{1i} \mid X_{1i}, \text{ sample selection rule}) = E(Y_{1i} \mid X_{1i}, Y_{2i} \geq 0) = E(e_{1i} \mid X_{1i}, e_{2i} \geq -X_{2i} b_2)$$

In the case of independence between e_{1i} and e_{2i}, so that the data on Y_{1i} is missing randomly, the conditional mean of e_{1i} is zero. In the general case, it is non-zero and the sub-sample regression function is

$$E(Y_{1i} \mid X_{1i}, Y_{2i} \geq 0 = X_{1i} b_1 + E(e_{1i} \mid e_{2i} \geq -X_{2i} b_2)$$

The selected sample regression function depends on X_{1i} and X_{2i}. Regression estimators of the parameters of Equation 18 fit on the selected sample omit the final term of Equation 19 as a regressor, so that the bias that results from using non-randomly selected samples to estimate behavioral relationships is seen to arise from the ordinary problem of omitted variables. An estimate of the omitted variable would solve this problem and hence solve the problem of sample selection bias. Specifically we can model the omitted variable by:

$$E[e_1 \mid e_2 > -X_{2i} b_2] = r_{12} s_1 l_1(-X_{2i} b_2) = b_l\, l_1(-X_{2i} b_2)$$

Where $l_1(-X_{2i} b_2)$ is 'just' the inverse Mill's ratio evaluated at the indicated value and $ß_?$ is unknown parameter ($=?_{12}s_1$)

The estimated results are presented in Table 5. A summary of the variables used here, their means, standard deviations and the estimated coefficients are found in Columns 3, 4 and 5. The discussion begins with the logarithm of monthly wage earnings of the migrant. It is evident that the monthly earning has a positive impact on remittance with a statistically highly significant coefficient. The coefficient of monthly wage is the wage elasticity of remittance, which states that on the average a one percent increase in migrants earning results in 0.09 percent increase of the monthly remittance by the migrant. The monthly per capita expenditure of the household is included to determine whether the migrants' remittances were influenced by household wealth or asset. The estimated parameter has a positive sign and is strongly statistically significant. This is precisely the result predicted by the model.

Table 5: Determinants of the Level of Remittance in India

Variables	Mean	SD	Coefficient 1 (t-values)	Coefficient 2 (t-values)
Log of monthly Remittance (Dependent)	6.659	1.233	---	---
Intercept	---	---	8.788(31.4)**	0.102(0.4)
Log of monthly wage	5.812	0.789	---	0.097(4.64)
Log of monthly per capita expenditure	8.176	0.609	---	0.845(35.46)**
Household Size	1.498	0.526	0.088(9.28)**	-0.02(-2.34)**
Age	35.415	12.643	-0.013(-1.9)*	---
Age squared	1414.4	977.89	0.000(1.4)	---
Education (Below Primary)	0.097	0.296	-0.002(-0.03)	---
Education (Primary)	0.155	0.362	0.067(1.65) †	---
Education (Middle School)	0.182	0.386	0.154(3.50)**	---
Education (Secondary)	0.112	0.316	0.331(6.06)**	---
Education (Higher Secondary)	0.064	0.245	0.350(5.33)**	---
Education (Graduation)	0.092	0.289	0.583(8.93)**	---
Education (P.G & above)	0.032	0.176	0.639(7.52)**	---
Education (Diploma/Certificate course)	0.024	0.152	0.436(4.57)**	---
Scheduled Tribe	0.133	0.339	-0.166(-1.81) †	0.037(-0.41)
Scheduled Caste	0.227	0.419	-0.147(-2.06)*	0.123(0.56)
Other Backward Caste	0.347	0.476	-0.017(-0.28)	-0.020(2.18)*
(Household Size)* (ST)	0.69	1.94	0.042(2.74)**	0.009(0.61)
(Household Size)* (SC)	1.17	2.44	0.045(3.96)**	0.019(1.75) †
(Household Size)* (OBC)	1.77	2.85	0.016(1.68) †	0.001(0.1)
Inverse Mill's Ratio	1.56	0.18	-0.840(-5.95)**	-0.304(-4.94)**
R^2			0.1536	0.2559
Adjusted R^2			0.1521	0.2551
F-statistics			100.33**	328.63**
N			10526	10526

Note: Absolute value of t-statistics are given in parentheses and **, * and † implies the level of significant at 1%, 5% and 10% respectively.

Source: Authors' estimation

Wealthier parents, who can offer a greater reward for remittances above the benchmark level, are better placed to extract a greater share of benefits of migration. In the specification used here, altruistic motives were captured by the inclusion of the household size (proxy for the number of dependants residing in the home). The interaction effect of household size with the caste categories reveals that those who belong to socially backward categories are more altruistic compared to the higher castes. This altruistic behaviour is also evident from the coefficients of age and age squared in Column 4. It is clear that the coefficient of age is negative, while its square term is positive and significant. Here, while estimating the remittance function, both age and the human capital aspects are included in one equation (result in column 4) and not included in the second equation (result in column 5) to examine the migration contract between the migrants and their household. It could be regarded as part of a long-term arrangement between the household and its migrants. Initially, parents agree to educate them and in return, sons agree to make monetary transfers to their parents once they enter the work force. Remittances could be regarded as a repayment of parental investment in their education, an argument also suggested by Rempel and Lobdell (1978) and Lucas and Stark (1985). On the other hand, both household monthly per capita expenditure (MPCE) and migrant's wages have a statistically significant effect on remittances in Equation 2. The coefficient of MPCE suggests the fact that remittance from migration is a return on the previous investment for the same. The wage coefficient indicates the wage elasticity of remittance, remittance is positively related to the monthly wage of the migrants but it is less elastic (0.097).

Conclusion

In light of the above discussion, it can be concluded that the model presented is a generalisation of Todaro and Stark's household approaches to migration. It demonstrates that both individual and household characteristics influence an individual's decision to migrate. Individual characteristics like age, marital status and human capital endowments have immense influence on the decision to migrate. Similarly, household characteristics like the size of the household, caste, land possession have also significant impact on migration decision of the individuals. The empirical evidence from India supports the present model, which incorporates the migrant's remittances into the model of migration. The discussion on remittances suggests that these may be a part of a long-term implicit contract between households and their migrant agents (sons) that includes household consumption and investment behaviour concerning migration. The household investment in human capital in the early periods of migration explains the household behaviour with respect to its inter-generational relations.

Reference

Banerjee, B (1984). The Probability, Size, and Use of Remittances from Urban to Rural Areas in India. *Journal of Development Economics*, 16: 293-311.

Dubey, A, R P Jone and Kunal Sen (2004). Surplus Labour, Social Structure and Rural to Urban Migration: Evidence from Indian Data. Paper presented at the Conference on the 50th anniversary of the Lewis Model, July 6-7.

Hay, M (1980). A Structural Equations Model of Migration in Tunisia. *Economic Development and Cultural Change,* 28: 345-58.

Heckman, J (1979). Sample Selection Bias as a Specification Error. *Econometrica*, 47: 153-61.

Hoddinott, J (1992). Modelling Remittance Flows in Kenya. *Journal of African Economies*, 1: 206-32.

———— (1994). A Model of Migration and Remittance Applied to Western Kenya. *Oxford Economic Paper*, 46 (3): 459-76.

Kleinwechter, U (2010). A utility function based approach towards the modeling of migration in village equilibrium. Paper prepared for presentation at the International Conference on Economic Modeling (Eco Mod 2010) Istanbul, Turkey, July 7-10.

Low, A (1986). Agricultural Development in Southern Africa: Farm Household-Economics and the Food Crisis, James Currey, London.

Lucas, R E and Stark, O (1985). Motivations to Remit: Evidence from Botswana. *Journal of Political Economy*, 93: 901-18.

Lusome, R and R B Bhagat (2006). Trends and Patterns of Internal Migration in India, 1971-2001. Paper presented at the Annual Conference of Indian Association for the Study of Population (IASP) during 7-9 June, 2006, Thiruvananthapuram.

Mincer, J (1978). Family Migration Decisions. *The Journal of Political Economy*, 86 (5): 749-73.

Nabi, I (1984). Village-End Considerations in Rural-Urban Migration. *Journal of Development Economics*, 14: 129-45.

Parida, J K and S Madheswaran (2010). Spatial Heterogeneity and Population Mobility in India. *Working Paper,* No. 234, Institute for Social and Economic Change, Bangalore.

Rele, J R (1969). Trends and Significance of Internal Migration in India. *The Indian Journal of Statistics*, Series B, 31 (3/4): 501-08.

Rempel, H (1981). Rural-Urban Labor Migration and Urban Unemployment in Kenya. International Institute for Applied Systems Analysis, Laxenburg, Austria.

———— and R Lobdell (1978). The Role of Urban-to-Rural Remittances in Rural Development. *Journal of Development Studies*, 14: 324-41

Singh, R (1988). Economics of the Family and Farming Systems in Sub-Saharan Africa. Developmlent Perspectives, Westview, Boulder, Colorado.

Stark, O (1980). On the Role of Urban-to-Rural Remittances in Rural Development. *Journal of Development Studies*, 16: 369-74.

———— (1991). The Migration of Labour, Basil Blackwell, Oxford.

———— (2009). Reasons for Remitting, *World Economics*, 10: 147-157.

Stark, O and Bloom, D (1985). The New Economics of Labour Migration. *American Economic Review*, papers and proceedings, 173-78.

Stark, O and C S Fan (2007). The analytics of Seasonal Migration. *Economic Letters,* 94: 304-312.

Stark, O and D Levhari (1982). On Migration and Risk in LDCs. *Economic Development and Cultural Change,* 31: 191-96.

Stark, O and R E Lucas (1988). Migration, Remittances and the Family. *Economic Development and Cultural Change*, 36: 465-81.

Todaro, M (1969). A Model of Labour Migration and Urban Unemployment in LDCs. *American Economic Review*, 59: 138-48.

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