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Abu S SHONCHOY*

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Keywords: Lean period; Seasonal migration; Micro-credit; Bangladesh.

JEL classification: J62, J64, J65, O15, O18, R23.

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Abstract

This paper investigates the relationship between access to micro-credit and temporary seasonal migration, an issue which is largely ignored in the standard rural-urban migration literature. Seasonal migration due to agricultural downturns is a common phenomenon in developing countries. Using primary data from a cross-sectional household survey from the northwest part of Bangladesh, this study quantifies the factors that influence such migration decisions. Among other results, we find that network effects play a significant role in influencing the migration decision, with the presence of kinsmen at the place of destination having considerable impact. Seasonal migration is a natural choice for individual suffering periodic hardship, however the strict weekly loan repayment rules of Micro-credit Institutes can have an adverse effect on this process, reducing the ability of borrowers to react to a shock. Our result suggests that poor individuals prefer the option of not accessing the Micro-credit and opt for temporal seasonal migration during the lean period. The results have numerous potential policy implications, including the design of typical micro-credit schemes.

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1 Introduction

In the standard rural-urban migration literature, scholars primarily focus on permanent internal migration and its economic, social and demographic significance. Very few studies have discussed temporary internal migration, which is variously known as 'seasonal migration', 'circular migration', or 'oscillatory migration'. Evidence of this phenomenon exists in many regions and particularly in the developing countries.[1] People move from rural areas to nearby cities or towns for a short period of time during lean periods in an attempt to survive and maintain their family in such difficult times. Lean periods can occur as a result of agricultural downturn and temporary migration is an important livelihood strategy for a large number of poor rural people in developing countries.

In the case of seasonal downturns, a person may prefer a temporary move to a permanent one because such a decision offers an opportunity to combine village-based existence with urban opportunities. Faced with highly seasonal labor demand, villagers may see temporary migration to urban areas as a relatively practical and rational strategy to cope with seasonal downturns. The most important factor that results in a temporary move rather than a permanent one, however, is the reversal of the urban-rural wage differential that occurs during the peak labor demand season in the agricultural sector.

Evidence from different countries suggests that the temporary mobilization of labor from rural to urban areas has important socio-economic implications. Migration reduces the inequality in the rural area due to the flow of remittances from the migration destinations. This flow, which is quite regular, is unlikely to occur with permanent rural to urban migration, and such a flow has a large impact on rural families who through this money can afford the necessities of life. Return migrants may also diffuse ideas, information and knowledge which might play a vital role in the rural development process.

Temporary migrants, however, cause congestion and other social problems in urban areas, and policy makers have insufficient information about the number of people migrating temporarily to tackle these problems. Seasonal migrants are very difficult to detect and the definition is not a clear one; hence, they are typically excluded from national surveys. As a result, it is difficult to implement effective policies to accommodate seasonal migrants.

Seasonal migration, which is mainly caused by seasonal hardship, is quite common among the agri-based people of Northwest Bangladesh. The rural life of Bangladesh very much revolves around the agricultural cycle. As a consequence of this cycle, two major seasonal deficits occur, one from late September to early November and the other from late March to early May. With the widespread expansion of Boro cultivation, the incidence of the early summer lean period has significantly declined. However, the au-

[1] For Africa see Elkan (1959, 1967) and Guilmoto (1998); for Asia see Hugo (1982), Stretton (1983), Deshingkar and Start (2003), Rogaly et al. (2002) and Rogaly and Coppard (2003); and for South America see Deutsch et al. (2003).

tumn lean season that comes after the plantation of the Aman crop still affects almost all parts of the country, and especially the northwest part of Bangladesh. Almost no alternative agricultural activity persists in that period, and the non-firm sector is insufficient to absorb the seasonal unemployed labor. In local terms, this lean season is called *Monga* or *Mora Karthik* (Rahman and Hossain 1991). During the lean season, such lack of income and alternative means for earnings limit the purchasing power of the people, which cannot be mitigated by with minuscule amount of assets and savings of poor households. Despite the existence of widespread safety net programs in Bangladesh, the seasonal hardship is still quite robust which seems to indicate that such safety net programs are not adequate to tackle a situation like Monga.[2] Access to credit is another issue that can also amplify the problem of seasonal hardship in this region. As Khandker et al. (2010) point out, most of the northwest region does not have functional credit market and people are sometimes exposed to an informal credit market arrangement which is locally known as 'Dadan' where one has to make an advance sell of labor and crops for immediate access to food and money.

Micro-credit can be another option whereby the poor can access micro-credit to engage in non-firm activities, thereby not suffering from the seasonality of the agricultural sector, but such an option is not adequate for many ultra-poor households for mainly two reasons. Firstly, the non-firm sector in northern Bangladesh is highly dependent on the agricultural sector which is subject to seasonality, and secondly, the micro-credit provided by the Micro-finance Institutes (MFIs) mostly have inflexible contracts, high interest rates and strict loan repayment rules (such as, a weekly payment that starts after one week of loan disbursement and weekly meeting schedules). In situations like lean period shocks, where migration is a natural response, the strict weekly loan repayment rules of MFIs can have an adverse effect on this process, reducing the ability of borrowers to react to a shock.

To address the factors influencing the seasonal migration decision and the impact of micro-credit on seasonal migration, this paper uses a primary dataset collected from the northern part of Bangladesh.[3] The study team chose the Kurigram district of northern Bangladesh because of its distinctive features. Kurigram is mainly an agri-based, severely poverty-stricken area and has micro-credit coverage provided by MFIs. Due to the agricultural cycle, farmers have very little work to do on the farms after the plantation of the Aman in September-October.[4] As a result, a large number of agricultural workers become jobless every year and decide to migrate temporarily. Such migrants tend to get work in the urban informal sector and work mainly as day laborers or street vendors. Although the urban standard of living is typically a bare minimum for these migrants, they prefer this option to staying in the village with no income at all.

[2]Safety net programs that are quite regular in Bangladesh are mainly food-for-work, cash transfer, old-age benefit, food coupons, vulnerable group feeding and public work program.

[3]This random cross-section household survey was conducted in January 2006 by Abu Shonchoy, Abu Z. Shahriar, Sakiba Zeba and Shaila Parveen as part of a project undertaken by the Economics and Social Sciences Research Group (ESSRG) of BRAC University, Bangladesh.

[4]In more than 80% of the farms in the study area, only one (Aman paddy) or two crops (Aman and Boro paddy) are produced annually.

The aim of this paper is to better understand the causes of seasonal migration and to evaluate the characteristics of such migrants during the lean season. In doing so, this paper makes two noteworthy contributions on the existing literature of migration. Firstly, it quantifies the factors influencing the temporary seasonal migration during the lean period in Bangladesh. Secondly it establishes a link between prior access to micro-credit on the seasonal migration decision. This is an issue which has great policy relevance, yet is largely overlooked in the literature.

2 Background

2.1 Seasonal Migration

Seasonal migration can be seen as an effective strategy for consumption-smoothing (Rosenzweig and Stark 1989), risk diversification (Stark and Levhari 1982; Katz and Stark 1986) or as a means to overcome credit constraints for source households (Lucas 1987; Stark 1991). In the model of Todaro (1969), individuals migrate if their expected earnings from migration are higher than staying, but such a decision is dependent on the individual's human capital which might influence their earning capacity and probability of obtaining a job in the migration destination. Modern labor market literature argues that migration could be a family decision in which having a family member migrate elsewhere is a useful strategy to manage uncertainty, relieve liquidity constraint and diversify the income portfolio (Stark 1991) whereas a notable number of papers conceive migration as an individual decision to maximize income (Navratil and Doyle 1977; Nakosteen and Zimmer 1980, among others).

2.2 Reasons for Seasonal Migration

Other than social issues such as family structures, social customs and religious beliefs, economic factors are the most influential reasons for migration in the lean period. Elkan (1959, p. 192) refers to these non-economic factors as 'most unlikely to be the whole story, and...it can never be the most important part of the story.' By contrast, Elkan denoted the economic factors as being 'largely a rationalization of simple economic motives' (p.192). In this section we primarily focus on the economic factors that lead to migration (rural to urban) and reverse migration (urban to rural).

2.2.1 Reasons causing rural to urban migration

During the lean period, the temporary mobility of labor provides some means of livelihood in urban areas. There are four main reasons why families take such decisions in the lean period. Firstly, it is always easier and cheaper to survive in the rural environment than in urban areas, as the prices of food grains and other household essentials are relatively cheaper. In most cases, it is the head or the most capable members of the household, who are mainly men, who migrate to urban areas. Moving away from the

household, a single person can cope better with urban life and typically survives on a bare minimum to enable them to send remittances back to the family.

Secondly, seasonal unemployment in agriculture causes an excess supply of unskilled or semi-skilled workers in rural areas. In combination with this, food grains and other necessary commodities become relatively expensive during this period as the affluent in these regions hoard a large amount of crops in good times to sell in the lean period at a high price; hence, the increase in price reduces the real wage of workers. It becomes almost impossible for an ordinary agricultural worker to maintain general living standards during the lean period in a village and thus they choose to migrate.

In recent years, much public and private investment has been concentrated in urban areas in developing countries. Little or no effort has gone into creating effective non-agricultural sectors in rural areas and few alternative means of earning exist in rural areas other than agriculture and agri-based industries. This pattern of temporary labor movement is purely a response to the lack of alternatives in rural areas (Hugo 1982).

Finally, the cost of the journey to migration destinations is usually very small and unimportant for migrants. As mentioned in Hugo (1982, p. 73) 'travel costs, time taken, and distance traversed between origin and destination generally constitute a minor element in a mover's overall calculus in deciding whether or not to migrate and where'. The recent improvement in communication in third world countries has also significantly reduced the cost of movement (Afsar 1999). Moreover, access to an informal credit market (through micro-credit schemes operated by MFIs) gives migrants the option of borrowing which can reduce their immediate relocation and travel costs. Although MFIs do not run specific programs to provide credit for migration, however, it is possible to use a loan taken by other members of the family and repay the loan once work has been found at the migration destination.

2.2.2 Reasons causing reverse migration

There are some interesting facts which influence migrants to return to the village, causing reverse migration. Once a move to urban areas has taken place, there are some off-setting factors such as forgone skills and income in the normal season, which are quite important for reverse migration (Mendola 2008). Poverty and resource constraints make it extremely difficult for a migrant to devote resources to building or to investing in the skills that are required for formal urban job markets; hence, seasonal migrants end up seeking jobs in the urban informal sector where the wage is typically at a minimum and working conditions are not pleasant. The informal sector is primarily low-skilled and usually involves manual labor (such as the job of rickshaw puller, street vendor or day laborer). The wages are inadequate to support a single man, let alone a family. These people live in the slums or on the pavements of the large train stations or sometimes by the side of street; such living conditions are worse than they have in the villages. Lack of job security, ineffective labor unions and illness-related insecurity also play a role in reverse migration. Seasonal migrants are generally not protected against accidents and do not have provision for retirement benefit (Elkan 1959). If a migrant be-

comes ill or requires money, they can seek help in the village which provides some sort of social security through the widespread network of social relations, which provides an incentive for migrants to return (Hugo 1982).

In the lean period, large numbers of people may leave the village to seek jobs in the urban sector, leading to an excess supply of labor. Employers usually exploit this by decreasing the wage rate below the standard market rate. Moreover, employers know that migrants are temporary workers, hence there is no incentive for them to provide training or invest in this short-term labor force. The lack of formal or skill-based education ensures that most migrant workers remain unskilled, making it extremely difficult for them to seek jobs in the formal urban labor market.

The most important economic factor leading to reverse migration is the reversal of the rural-urban wage difference. For a temporary migrant, the income in the rural sector during the normal time is typically more than the urban sector. As a result, there is an obvious incentive for migrants to return to rural areas in the normal period after the shock.

2.3 Factors Influencing the Migration Decision

A number of studies have analyzed the internal migration pattern in Bangladesh but are mostly qualitative analysis.[5] We also find some studies on circular migration such as Breman (1978), Hugo (1982), Stretton (1983), Chapman and Prothero (1983), Rogaly et al. (2002); Rogaly and Coppard (2003), Deshingkar and Start (2003), and Deutsch et al. (2003). Broadly, these studies focus on issues such as the scale and pattern of migration, the characteristics or selectivity of the migrants, causes of migration, the impacts of internal migration on urbanization and the pattern of resource transfer followed by rural-urban migration. As we could not find sufficient studies on the factors influencing the seasonal migration decision, we have used the variables that are generally used which are found to be significant for internal rural to urban migration studies.

The literature shows that internal migration is most common among younger member of the population (Borjas 2000; Mendola 2008). Demographically, the internal migrants of Bangladesh are mostly young adults (Chowdhury 1978) and temporary migrants are even younger than permanent ones (Afsar 2002) which is perhaps not surprising since the demographic pattern of the population of Bangladesh is quite young in comparison with western countries. Hugo (1982) argued that men have a significantly greater tendency to seasonally migrate than women. Due to limited employment opportunities, family responsibilities and for religious reasons, female members of a family are less likely to migrate than adult male members. Previous empirical works on migration suggested that household size positively influences an individual's migration decision (Deshingkar and Start 2003; Mendola 2008). Hence, a positive influence of household size on migration decision has been hypothesized.

[5]For reference, see for example Chowdhury (1978), Khan (1982), Huq-Hussain (1996), Begum (1999), Islam (2003), Hossain (2001), Barkat and Akhter (2003), Afsar (1999, 2003, 2005), Kuhn (2001, 2005), Shahriar et al. (2006).

Interestingly, the relationship between land holding and the migration decision in empirical studies is inconclusive and ambiguous. For example, Kuhn (2005) argues that the land-holdings of households is a key determinant of rural-urban migration and the tendency to migrate will be greater for those who hold less land. Similarly, the recent work of Mendola (2008) finds a negative and significant relationship between land holding and migration decisions for temporary migrants in Bangladesh. Hossain (2001), in contrast, finds that the tendency to migrate is higher for households with some sort of land holding compared to the landless. Hence, it will be interesting to explore the role of asset holding (in the form of land) in determining the seasonal migration decision of the poor in lean period.

The importance of a strong support network is crucial for the immigrants (Munshi 2003; McKenzie and Rapoport 2007) as well as for the migrants (Afsar 2002; Brauw and Harigaya 2007). Social networks offer support in the provision of accommodation, relocation, learning new skills, better bargaining power and protection against harassment, assault and uncertainties. Afsar (2003) found that 60 percent of the internal migrants who have kinsmen at the place of destination managed to find employment within a week of arrival in Dhaka city. Hence, the presence of kinship at the place of destination is expected to have a higher influence on the tendency toward seasonal migration.

3 Micro-credit and Seasonal Migration

Micro-credit can play an important role as a determinant in making decisions about seasonal migration. Micro-credit provided by micro-finance institutions (MFIs) is a recent policy development in developing countries in relation to poverty alleviation. It is argued that if given access to relatively small credits, entrepreneurs from poor households will find opportunities to engage in viable income-generating activities that are often secondary to their primary occupation, and thus alleviate their poverty by themselves. Micro-credit is accessible in rural areas through MFIs that have expanded quite rapidly in recent years. According to the Micro-credit Summit Campaign, Microfinance institutions had 154,825,825 clients as of December 2007, of which more than 100 million were women. In 2006, Mohammad Yunus and the Grameen Bank were awarded the Nobel Prize for Peace for their contribution to the reduction of poverty, especially in Bangladesh. However, among academics there is so far no consensus on the impact of micro-credit on income improvement and poverty reduction (Banerjee et al. 2009).

Typically, MFIs provide small loans to poor people who are deprived of access to credit offered by regular banks. Through the introduction of 'social collateral', MFIs give individual loans to villagers in groups and hold the group jointly liable for repayment. If any group member defaults, the entire group is punished by being denied future loan applications. This group mechanism creates peer pressure and solidarity, which is reported to work well in societies where social networks and bonding are of vital importance. The repayment success rate of MFIs is quite high and in Bangladesh, for example, the repayment rate has never dropped below 90 percent (Develtere and

Huybrechts 2005).

No specific micro-credit program targeted only to tackle the seasonal hardship during the Monga period; nevertheless individuals could always take micro-credit or access micro-credit during the normal season through their family members, if they could fulfill the eligibility criteria. In this way, individuals can use micro-credit during the productive part of the year and use the increased income to address their consumption and income shortfalls during the lean season. The major drawback of the micro-credit framework is the rigid loan repayment rule whereby almost all contracts are fixed in their repayment schedules, which entails constant equal weekly payments with a high interest rate (usually 20%). The members of MFIs are poor rural people who frequently have uncertain income, making it very difficult for them to maintain such rigid weekly loan repayments. In a lean period especially, when there is no job availability in the rural agricultural sector, it is extremely difficult for the poor to generate income, let alone comply with their loan repayment scheme. Such strict repayment schedules prevent people with prior access to micro-credit from migrating, thus making it very hard for them to repay their weekly installments and survive. Families, however, may bypass such strict loan repayment rules by combining both migration and micro-credit by means of the credit being received by the female member of the household but used by the male member who migrates to the urban areas during the lean season and sends remittances to repay the loan. Not everybody in the population, however, has capable family members to take the loan and there exists a sizable number of female-headed households, elderly people and disabled people who will be restricted to migrate if they have taken credit and may not like to access the micro-credit. Moreover, the amount of loan available through micro-credit is very limited because it is based on the borrower's ability to repay in their worst week (Karlan and Mullainathan 2009). The impact of having prior access to micro-credit on seasonal migration therefore has important policy implications for the poor who are affected by seasonality in the agricultural sector.

4 Data Description

The empirical analysis of this study is based on the primary household survey of 290 households from 17 villages in four selected thanas[6] of the Kurigram district: Chilmari, Ulipur, Rajarhat and Kurigram. The survey team collected the primary data of this study from Kurigram where approximately 46% of the total labor force is involved in agriculture (they work in their own firm); another 30% are agricultural day laborers (Banglapedia 2006). The survey covered 17 villages from the four thanas: four from Chilmari, three from Rajarhat, four from Ulipur and six from the Sadar thana. Although the villages from each thana were selected randomly, the four thanas were selected to capture heterogeneity in income, communication, infrastructure facilities, exposure to catastrophe and other sociocultural factors.

[6]A thana is a unit of police administration. In Bangladesh, 64 districts are divided into 496 thanas. There are ten thanas in the Kurigram district.

The survey showed that people living in Ulipur and Chilmari were relatively poor compared to those living in Rajarhat. The survey team observed that Kurigram Sadar and Rajarhat had better transportation systems compared to Chilmari and Ulipur, so the ability to move is relatively higher in those areas. A char[7] area was also surveyed in the Kurigram Sadar to capture the special characteristics of char livelihood in relation to the migration decision in the lean period. Among the four thanas, the history of these areas suggests that Rajarhat suffers the least during natural disasters. In contrast, Chilmari is the worst affected by both flood and river erosion. River erosion is quite rare in Ulipur, although annual floods ravage the area. The char area is affected by river erosion and floods quite regularly. The Kurigram town is also affected by river erosion.

According to Banglapedia (2006) the population of Kurigram district is 1,782,277, of which 49.62% are male and 50.93% are female. The majority of the population are Muslim; as a result, only minor religious and cultural heterogeneity exists in the survey area and is negligible. The people of this region are largely illiterate, with an average literacy rate of around 22.3%. The survey area consists of 37.02% of the total population of the district.

The survey was conducted among 290 random individuals who are the heads of their representative households. The survey questionnaire was trialed on 30 respondents in Chilmari and Ulipur before being used for the main survey. The final questionnaire consisted of 12 sections and was designed to collect individual information on the migration decision and factors influencing this decision. The survey sought general information such as age, occupation, average income and the number of dependents. The questionnaire also addressed issues of land usage, occupation at destination if they migrated, micro-credit membership and land ownership. The questionnaire collected information on the nature and extent of starvation throughout the year, information on natural disasters, death of earning family members and sudden damage to crops or livestock.

The survey team collected the data at the beginning of the normal period when all the migrants had just returned from urban areas. Of the 290 respondents, 68 percent were identified as seasonal migrants. The variables were categorized into three groups; representing economic factors, ecological vulnerabilities and personal characteristics.

We were not confident that individuals could predict future plans for seasonal migration and we therefore asked respondents about their immediate past migration behavior and income. To capture the seasonal migration behavior of the respondents, we used a dummy variable which has a value of one if the respondent migrated in the last lean period and zero otherwise.

With 1200 micro-credit institutions and 19.3 million members, the micro-credit sector of Bangladesh is one of the largest in the world. According to the Credit and Development Forum Bangladesh (Credit and Development Forum 2006), approximately 37% of all households in Bangladesh have access to micro-credit. Credit does not require any collateral and is given to both individuals and groups. The major types of

[7] A char is a small river island created by silt deposits and estuaries.

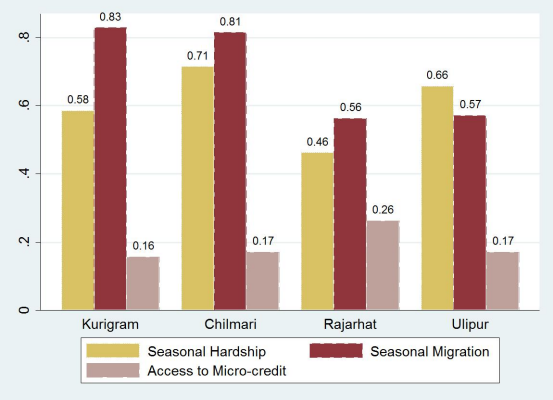

FIGURE 1: Average district specific distribution of seasonal hardship, migration, access to micro-credit (in percentage)

loans include general loans, program loans and housing loans. However, at the time of the survey there was no micro-credit program that was solely designed to tackle the seasonality due to Monga. Furthermore, the Micro-finance Institutes (MFIs) have only moderate coverage in the survey area even though the northern part of Bangladesh is known for its grievous incidence of extreme poverty as well as for the acute seasonality of agricultural downturn. We measured the access to micro-credit through MFIs by a dummy variable, which is coded as one for having access to micro-credit (both directly if the respondent took the credit and indirectly in the case other family members having taken the credit through MFIs) and zero otherwise. In the survey, only 19% of the respondents have access to micro-credit.

The variable used to capture the seasonal starvation during the lean period is termed as seasonal hardship, which is a dummy variable that equals one if the individual has one meal or less on a typical day in the lean period. In the sample, 60 percent of the respondents reported that they had one or less than one meal during the lean period which shows the severity of the seasonal starvation in the survey area. Fig. 1 reports the average seasonal hardship, access to micro-credit and migration by survey thanas.[8] It is evident from the figure that seasonal hardship is higher in the Chilmari and Ulipur district compared with the other two districts. By contrast, people from Kurigram Sadar and Chilmari have more incidents of seasonal migration than other thanas. However, access to micro-credit is the highest in Rajarhat while the other thanas have an almost equal level of response.

[Table 2 about here]

[8]In the Figure 1 Kurigram is used instead of Kurigram Sadar for simplicity

More males than females were interviewed (89 percent versus 11 percent). Patriarchal village societies account for such a small female response rate. Some 70 percent of the respondents reported being married at the time of the survey, which is quite a high number. A simple dummy variable is used to indicate land ownership. An respondent is assigned a value of one if his/her family owns any amount of cultivable land, irrespective of the size. Otherwise, he/she is assigned a value of zero. 43 percent of the respondents reported that they were landless.

A dummy variable was also used to capture information on education. An individual having some reading ability was given a value of one and zero otherwise. In the present sample, 42 percent of the respondents have at least some education. Interestingly, 63 percent of the respondents reported having some prior migration experience, and 52 percent of the respondents had kinsmen at the urban centers at the time of survey.

5 Econometric Models

5.1 Econometric Model of Migration and access to Micro-credit

To model the effect of micro-credit on the determinants of seasonal migration, the issue of endogeneity becomes relevant since individual's decision to take micro-credit is endogenous to the migration decision. The problem lies in the fact that the individuals who have access to micro-credit (treatment) are self selected individuals which is influenced by idiosyncratic and unobserved individual characteristics. Moreover, such unobserved individual characteristics (for example, an individual's entrepreneurial ability or level of risk aversion) may drive both the treatment variable and the outcome (migration decision). Furthermore, there might have some unobserved preference which could affect an individual's decision to take micro-credit and simultaneously her decision to migrate.

Since there is no availability of natural or randomized data, this paper employs a structural model which is estimated by the bivariate endogenous treatment model (otherwise known as recursive bivariate probit; for example see (Maddala 1983, p. 123) and (Greene 2002, p. 823)) in which we jointly estimate the determinants of the access to micro-credit and the micro-credit impact on the determinants of seasonal migration. Such a model belongs to family of the simultaneous equation models with endogenous variable (both discrete and continuous) first introduced by Heckman (1978) and further developed by Maddala (1983). As mentioned in Jones (2007), according to the framework defined in Blundell and Smith (1993), this kind of model is termed as a type II model which is in our case the household's prior access to micro-credit is assumed to influence individual's migration decision during the lean period.[9] In our study, we are more interested in identifying the impact of household's prior access to micro-credit on

[9]The chronology of these events means that the current migration decision cannot have a direct feedback effect on the access to micro-credit in the previous year, since micro-credit is mostly taken by females whereas migration is mostly undertaken by males which rules out the simultaneity bias.

migration rather than the impact of the propensity to have access to micro-credit, hence such endogenous bivariate treatment model seems more appropriate.

Formally, let us denote two simultaneous equations; one for the access to micro-credit and the other for the seasonal migration, with correlated disturbances, which can then be estimated with an endogenous treatment model using FIML methods. Following Angrist and Pischke (2009) the general specification for a two equation model is as follows:

$$C_i = 1[X'_{ic}\gamma_0^* + Z'_i\gamma_1^* > \varepsilon_i], \tag{1}$$

$$M_i = 1[X'_{im}\beta_0^* + C_i\beta_1^* > v_i]. \tag{2}$$

Here C_i is the dummy for access to micro-credit and M_i is the dummy for seasonal migration where the first dependent variable, C_i appears as an independent variable in the second equation, which is a recursive, simultaneous equation model. Suppose that an individual i decides to access micro-credit, directly or indirectly through family members, by comparing the costs and benefits using a net benefit function or latent index expressed in 1. The outcome variable in this context is the seasonal migration decision of the same individual i which is also a latent index that can be seen as arising from a comparison of the costs and benefits of seasonal migration during the lean season expressed in 2. Here, X_i denotes a vector of personal, household and other control variables and Z_i instrumental variables. Finally, ε_i and v_i indicate residuals, which follow $E[\varepsilon_i|X_{ic,}X_{im}] = E[v_i|X_{ic,}X_{im}] = 0$, $Var[\varepsilon_1|X_{ic,}X_{im}] = Var[v_i|X_{ic,}X_{im}] = 1$, and $Cov[\varepsilon_{i,}v_i|X_{ic,}X_{im}] = \rho$, respectively.

The source of omitted variable bias in the bivariate probit is the correlation between ε_i and v_i which means that unmeasured random determinants of access to micro-credit are correlated with unmeasured random determinants of seasonal migration. Such a model is identified by assuming that Z_i is independent of these components. Unless we find evidence that $\rho = 0$, the simple probit analysis without considering this correlation between error terms will give inconsistent parameter estimates and typical two-stage methods will be inapplicable Maddala (1983).

For the instruments, following the seminal paper by Pitt and Khandker (1998), we used landholding-based exclusion restrictions in which households having more than 50 decimal of land are precluded from joining any MFI micro-credit lending program. The fundamental assumption for such an exclusion restriction is that landownership is exogenous; moreover, MFIs mainly use landownership based primary eligible criteria to proxy for unverifiable and difficult to measure income and asset holdings of borrowers. Such a quasi-experimental identification strategy is an example of the regression discontinuity design method of program evaluation which takes advantage of a discontinuity in the program eligibility rule to identify the program treatment effect. This exclusion restriction is used to create a discontinuous household's program choice variable which is then interacted with the household's observable characteristics to instrument for the participation in the micro-credit program. The idea is that these exogenous variables have an effect on the demand for micro-credit which depends on

eligibility and availability but not on the outcomes of interest that is discontinuously affected by the exogenous regressors conditional on credit program participation.

Notwithstanding, such land-based exclusion restriction is not perfect and might not be reliable since such program participation criteria is sometimes not strictly enforced and may not be perfectly observable. Interaction variables based on exclusion restriction may not be efficient instruments (Khandker 2005); however, the dataset used in this paper has only 1.72% of the sample that has accessed micro-finance with more than 50 decimals of land, hence such concern would not be an issue in our analysis. The estimations of such bivariate treatment effects must be interpreted with caution due to the strong distributional assumptions of the error terms; in addition, the results could be sensitive to the choice of explanatory variable and instruments. To check for the robustness of our estimations, we have estimated different models to compare with our findings which do not have such a strict structure for the error terms.

5.2 Estimations

To avoid the identification problems in recursive bivariate probit settings, it is only necessary to have at least one variation in the set of the exogenous regressors which is not included in the base equation. In other words, the set of variables in X_{ic} which is the access to micro-credit equation (in equation 1) is partly common to the sets of regressors in X_{im} but not identical. In our case, we included regional dummies in the second equation along with a dummy variable to denote kinship at the potential place of migration destination, which acts as a proxy for the network effect. It seems reasonable to assume that having a network at the migration destination can influence the migration decision but such a variable does not necessarily influence the micro-credit equation. Similarly, the micro-credit coverage in our study areas were similar among the regions and the regional differences do not play any role in explaining the micro-credit equation. Such regional dummies are nevertheless important for the migration equation due to the regional variation of infrastructure, communication and distance to migration destinations.[10]

Table 4 presents the main findings of the recursive bivariate probit models. To estimate the FIML estimations, we used STATA 11 'biprobit' command which is applicable for the recursive bivariate probit framework when one of the dependent dichotomous variables appears as a regressor for the main probit equation (Fabbri and Monfardini 2008; Park 2009). The marginal effect of a unit change in the explanatory variables on the decision to migrate has also been calculated. Though our preferred specification is model 1, we have used total land holdings, marital status and seasonal hardship variables in model 2, 3 and 4 respectively to check for the robustness of the estimation. These additional variables in model 3 and 4 (marital status and seasonal hardship) could be potentially endogenous hence may not provide efficient estimates. We also tested for the joint hypothesis that all the IVs are zero which has been overwhelmingly

[10]For the purpose of regression authenticity, we tested for the validity of such assumptions and they pass the orthogonality requirement.

rejected by the data.

[Table 4 about here]

The bi-probit estimates of the structural form equation show that among individual characteristics only sex plays a significant role in explaining the migration decision which means that migration propensity is significantly higher among males. This finding is consistent with the previous finding of the literature that men are more likely to temporarily migrate than women.

The role of education in the migration decision has been widely discussed in the literature and several studies have shown that migrants are usually more educated than non-migrants in the same locality (Chowdhury 1978; Kuhn 2005). Educated people are more likely to migrate, because job opportunities for them are higher in the urban centers than in the rural areas; however, our estimation suggests that education has a negative impact on seasonal migration and the estimation is highly statistically significant. Such a result is not surprising since seasonal migration is temporary in nature and, as a result, individuals who have relatively better education will tend to choose permanent over temporary migration. Temporary seasonal migrants tend to seek jobs in the urban informal sector which does not require any formal education. Moreover, individuals with better education who live in the villages mostly work in the non-agricultural sector and are therefore less likely to be affected by the seasonality.

The network effect, captured through the kinship variable, has the strongest positive impact among all the factors influencing the seasonal migration decision and is found to be significant at less than the 1% level. Kinship at the place of destination reduces the cost of migration by minimizing the time for job searching. In the case of seasonal migration, a risk averse individual will reduce his/her risk by having some degree of network at the place of migration destination, otherwise it will be very hard for the individual to get a job in the urban areas. If a person does not find a job in the urban area, s/he will be worse off in the urban area than from the rural area as temporary seasonal migration incurs some economical and social costs. As a result, an individual who takes the decision to seasonally migrate in the lean period will be heavily influenced by the network factor.

All the models reported in Table 4 fit the data well (for example, in model 1, $\chi^2(25) = 699.44$, $p < 0.000$) and all of the statistically significant parameters are consistent and coherent throughout different specifications. The access to micro-credit and migration decision have been jointly determined in which the correlation coefficient of the error terms ρ is statistically different from zero, where the estimate of ρ in model one is -0.85 with a standard error of 0.16. The Wald statistics for the test of the hypothesis that $\rho = 0$ is 4.59. For a single restriction, the chi-squared critical value is 3.84, so the hypothesis that $\rho = 0$ is soundly rejected. The likelihood ratio test for the same hypothesis leads to a similar conclusion, which implies that the error terms of the equations jointly estimated varies together hence the bivariate endogenous dummy model appears to be the appropriate setting for drawing some consistent inference on the impact of prior

access to micro-credit on migration. Moreover, the sign of the ρ is negative which indicates that it is more likely that individuals will consider the option of not accessing micro-credit and opt for temporal seasonal migration during the lean period after the influence of the included factors is accounted for. During the lean period, it is extremely difficult for the poor to generate income, let alone comply with their loan repayment scheme. Such an option therefore becomes less attractive and the negative and significant ρ appears to indicate that not accessing micro-credit and migrating temporarily during the lean period is a preferable strategy for poor households. Alternatively, unexplained migration may partially reflect the behavior of people who did not borrow because of a negative wealth shock in previous lean periods. For these people, borrowing decreases migration by either creating economic opportunities at the origin or because of the strict repayment rules. Since the take up of micro-credit is quite low in this region, the latter explanation seems less plausible than the former one.

The main coefficient of interest β_1^* is found to be positive and highly significant in all the estimations, which implies that, net of observable and unobservable confoundings, people with prior access to micro-credit are more likely to migrate seasonally during the lean period. One possible explanation for this finding could be the fact that poor households are more likely to access micro-credit because of their credit constraints during the productive part of the year, and these households are more likely to migrate seasonally in the lean season to repay the weekly installments of the loan. The existing framework of the micro-credit contract in Bangladesh is such that all the borrowing group members have to be present at each weekly meeting and repay their weekly installments even in the lean season. Individuals can bypass this strict rule by accessing micro-credit through a capable female member of the household; however, the responsible borrowing family member is still liable for repaying the weekly installments even in the lean season when the chief bread-earner is jobless. In this case, one rational option for that head of household is to migrate during the lean season and send remittances to home to repay the loan installments. An alternative explanation for such a positive influence of borrowing on migration could be the unobservable poverty and negative wealth shocks which have affected individuals in previous lean periods. As a LATE (Local Average Treatment Effect), the positive effect of borrowing in the migration equation reflects the effect of borrowing as explained by poverty. At low levels of wealth, additional wealth due to borrowing enables a household to pay the fixed cost of migrating (e.g., the bus ticket). Another explanation could be that borrowers of micro-credit are high ability or risk-loving individuals who would be more likely to access credit from the MFIs during the normal season and would like to migrate during the lean season for better earnings. It could also mean that simply having access to credit is not sufficient to tackle the income shock during the lean season, hence individuals need to migrate to earn extra money for survival.

In the recursive bivariate probit model, the conditional marginal effects are more intuitive than the typical marginal effects. Using model 1, the predicted probability that a person seasonally migrates given that (s)he already has prior access to micro-credit is 46.1 percent at the reference point. STATA estimations of marginal effects are the sum-

mation of the direct and the indirect effects of the regressors. Combining direct and indirect effects, an additional increase of kinship variable from 0 to 1, the conditional predicted probability of migration increases by some 46 percent, holding all other variables constant at their means.

An interesting relationship between a household's access to micro-credit and predicted probabilities of migration is shown in Figure 2. Here, we have created a graph of a representative individual as a base case. The individual is a male, with family size of 5 and mean land holdings, who has no kinship at the destination of migration, has no education and is affected by flood. The figure reflects that migration propensity is observably higher for such an individual who has accessed micro-credit at the lower age level when compared with one who has not accessed micro-credit. However, such observable difference drastically decreases as age progresses. This demonstrates the vulnerability of the aged individuals who become less productive and need to migrate during the lean season for survival.

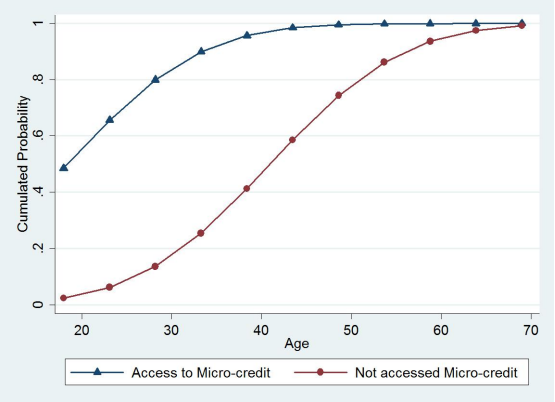

FIGURE 2: Cumulative predicted probabilities based on head of the household's age

5.3 Robustness Check

To test for the robustness of our estimations, this paper employed both linear and non-linear models which are usually estimated by a two-stage process. All the models estimated in table 5 are consistent and show similar results to the main specification in table 4. The first model we estimated is a limited dependent variable model estimated with two-step feasible GMM estimation technique. However, this model is not appropriate in our case since it does not account for the correlation between the two error terms, and as a result the estimates using LDV will be less efficient. Also, for more than 20% of the observations, the predicted probabilities do not range between zero and one. Column 2 has the estimations for the treatment-effects model which is estimated using

the full information maximum likelihood method. Column 3 and 4 have the simple OLS and probit estimations with the Mills-ratio procedure for controlling for the endogeneity of treatment effect, which is the access to micro-credit in our estimations. In both of these estimations, we find evidence of positive and significant sample selection terms which means that simple OLS estimation and probit estimates will have upward bias compared to the main estimation result. Such bias is consistent with our earlier discussion that the estimated impact of access to micro-credit in the single probit model might be affected by the endogeneity due to the fact that poor households are more likely to access micro-credit. Since such households are more likely to migrate seasonally during the lean period, this type of endogeneity should cause an upward bias. Finally in column 5, we have the instrumental variable (IV) probit estimates by using the maximum likelihood procedure. Though the estimates show consistency with our preferred model, IV-Probit model is not applicable in our causal story since IV-Probit assumes that the endogenous regressors are continuous and are thus not appropriate for use with discrete endogenous regressors.

[Table 5 about here]

6 Concluding Remarks

We find that economic and individual characteristics play an important role in migration decisions. Among the economic factors, seasonal hardship has a significant effect. Personal characteristics, such as sex, and the role of networks are significant at less than the 5% level of significance.

This study has found systemic differences between seasonal migration and permanent internal migration. To the author's knowledge, existing empirical studies on permanent internal migration have found that education has a significant positive impact on migration. In this study, we find a reverse relationship. Seasonal migration is temporary in nature and, as a result, individuals who have relatively better education will tend to choose permanent over temporary migration.

This study finds evidence that temporary internal migration in the lean period is an efficient coping strategy that individuals in rural areas use to overcome income shock in the lean period. However, seasonal migration is not an efficient long-term sustainable solution to the seasonal downturns suffered in the agricultural sector vis-à-vis village level poverty. Temporary migration can provide short-time economic benefits to migrants, their families and their villages, but such movements may not be possible over the years.

Micro-credit schemes have increased the opportunities for rural people to access the informal credit market. One could reasonably assume that individuals who have direct or indirect access to micro-credit (through family members) could be involved in both firm and non-firm activities and be less likely to suffer from seasonality, and therefore less likely to migrate during the lean period. However, our results suggest that people with prior access to micro-credit are more likely to migrate seasonally during the

lean period. Furthermore, we find that unexplained migration has a significant negative association with unexplained access to micro-credit which could plausibly indicate an individual's unobserved preference for the option of not accessing micro-credit and opting for temporal seasonal migration during the lean period. One plausible explanation for this finding could be the existing micro-credit borrowing framework in Bangladesh. MFIs have a very strict policy of loan repayments and usually collect repayment on a weekly basis. As a result, if the male member of the household takes credit during the lean period, he will lose his mobility and be unable to undertake migration due to the strict repayment rules. In many cases, the credit is received by the female member of the household but is used by the male member who migrates to the urban areas during the lean season and sends remittances to repay the loan. We have to consider that not all borrowers of micro-credit are capable of using this strategy and a sizable number of female-headed households, elderly and disabled people will be restricted with regard to migration if they have taken credit. MFIs might therefore consider relaxing the loan repayment scheme during the lean period, as this would help to increase rural incomes and the ability to repay loans. Moreover, the results suggest that MFIs and governments should provide more support to adult education and the development of diverse skills (both non-agricultural and agricultural) as well as supporting the provision of job-related information and credit facilities which will help poor migrants during lean seasons, thus alleviate the social problems associated with seasonality in the rural areas in a sustainable way.

References

Afsar, R., 1999. Rural-urban dichotomy and convergence: emerging realities in Bangladesh. Environment and Urbanization 11, 235–246.

Afsar, R., 2002. Migration and rural livelihood, in: Toufique, K., Turton, C. (Eds.), Hands not land: how livelihoods are changing in rural Bangladesh, Bangladesh Institute of Development Studies (BIDS)/DFID, Dhaka, Bangladesh.

Afsar, R., 2003. Internal migration and the development nexus: the case of Bangladesh, presented at the Regional Conference on Migration, Development and Pro-Poor Policy: Choices in Asia, Dhaka, Bangladesh, 22-24 June.

Afsar, R., 2005. Bangladesh: Internal migration and pro-poor policy, presented at the Regional Conference on Migration and Development in Asia, Lanzhou, China, 14-16 March.

Angrist, J., Pischke, J., 2009. Mostly harmless econometrics: an empiricist's companion. Princeton NJ: Princeton University Press.

Banerjee, A., Duflo, E., Glennerster, R., Kinnan, C., 2009. The miracle of microfinance? Evidence from a randomized evaluation. Technical Report. Abdul Latif Jameel Poverty Action Lab, MIT Department of Economics.

Banglapedia, 2006. The National Encyclopedia of Bangladesh. Asiatic Society of

Bangladesh, Dhaka, Bangladesh. 2nd edn. edition.

Barkat, A., Akhter, S., 2003. Urbanization and internal migration in Bangladesh: the onset of massive 'slumaisation', in: Abrar, C., Lama, M. (Eds.), Displaced within homelands: the IDPs of Bangladesh and the region, Refugee and Migratory Movements Research Unit, Dhaka, Bangladesh. pp. 125–148.

Begum, A., 1999. Destination Dhaka, Urban Migration: expectations and reality. University of Dhaka, Dhaka, Bangladesh.

Blundell, R.W., Smith, R.J., 1993. 5 Simultaneous microeconometric models with censored or qualitative dependent variables, Handbook of Statistics. volume 11. pp. 117–143.

Borjas, G.J., 2000. Economics of migration. International Encyclopedia of the Social and Behavioral Sciences 3.4.

Brauw, A.d., Harigaya, T., 2007. Seasonal migration and improving living standards in vietnam. American Journal of Agricultural Economics 89, 430–447.

Breman, J., 1978. Seasonal migration and co-operative capitalism: crushing of cane and of labour by sugar factories of Bardoli. Economic and Political Weekly 13, 1317–1360.

Chapman, M., Prothero, R.M., 1983. Themes on circulation in the third world. International Migration Review 17, 597–632.

Chowdhury, R., 1978. Determinants and consequences of rural out migration: evidence from some villages in Bangladesh, paper presented at the Conference on Economic and Demographic Change: Issues for the 1980s, Helsinki, 28 August - 1 September.

Credit, Development Forum, C., 2006. Bangladesh microfinance country profile.

Deshingkar, P., Start, D., 2003. Seasonal Migration for Livelihoods in India: coping, Accumulation and Exclusion. *Working Papers* 22. *Overseas Development Institute*.

Deutsch, C.J., Reid, J.P., Bonde, R.K., Easton, D.E., Kochman, H.I., O'Shea, T.J., 2003. Seasonal movements, migratory behavior, and site fidelity of West Indian manatees along the Atlantic coast of the United States. Wildlife Monographs , 1–77.

Develtere, P., Huybrechts, A., 2005. The impact of microcredit on the poor in Bangladesh. Alternatives: Global, Local, Political 30, 165–189.

Elkan, W., 1959. Migrant labor in Africa: an economist's approach. The American Economic Review 49, 188–197.

Elkan, W., 1967. Circular migration and the growth of towns in east Africa. International Labour Review 96, 581–589.

Fabbri, D., Monfardini, C., 2008. Style of practice and assortative mating: a recursive probit analysis of caesarean section scheduling in italy. Applied Economics 40, 1411 – 1423.

Greene, W.H., 2002. Econometric Analysis. Prentice Hall, New York, USA. 5th edition.

Guilmoto, C.Z., 1998. Institutions and migrations. short-term versus long-term moves in rural west Africa. Population Studies 52, 85–103.

Heckman, J.J., 1978. Dummy endogenous variables in a simultaneous equation system. Econometrica 46, 931–959.

Hossain, M., 2001. 'rural-urban migration in Bangladesh: a micro-level study', paper presented at the Brazil IUSSP Conference, 20-24 August.

Hugo, G.J., 1982. Circular migration in Indonesia. Population and Development Review 8, 59–83.

Huq-Hussain, S., 1996. Female Migrant's Adaption in Dhaka: a case of the Processes of Urban Socio-Economic Change. University of Dhaka, Dhaka Bangladesh.

Islam, N., 2003. 'urbanization, migration and development in Bangladesh: recent trends and emerging issues', in: Demographic dynamics in Bangladesh looking at the larger picture, Centre for Policy Dialogue and UNFPA. Dhaka. pp. 125–146.

Jones, A., 2007. Applied econometrics for health economists: a practical guide. Radcliffe Publishing.

Karlan, D., Mullainathan, S., 2009. Is microfinance too rigid. QFinance forthcoming.

Katz, E., Stark, O., 1986. Labor migration and risk aversion in less developed countries. Journal of Labor Economics 4, 134–149.

Khan, S., 1982. Rural-urban migration and urbanization in Bangladesh. Geographical Review 72, 379–394.

Khandker, S., Koolwal, G., Samad, H., 2009. Handbook on impact evaluation: quantitative methods and practices. World Bank Publications.

Khandker, S.R., 2005. Microfinance and poverty: evidence using panel data from Bangladesh. World Bank Econ Rev 19, 263–286.

Khandker, S.R., Khalily, M.B., Samad, H., 2010. Seasonal Migration and mitigating income seasonality in Northwest Bangladesh. *Working Paper* no. 5. *Institute of Microfinance*.

Kuhn, R.S., 2001. The impact of nuclear family and individual migration on the elderly in rural Bangladesh: a quantitive analysis. Labor and Population Program Working Paper Series 01-11.

Kuhn, R.S., 2005. The determinants of Family and Individual Migration: a case-study of Rural Bangladesh. Institute of Behavioral Science.

Lucas, R.E.B., 1987. Emigration to South Africa's mines. The American Economic Review 77, 313–330.

Maddala, G., 1983. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge University Press: Cambridge.

McKenzie, D., Rapoport, H., 2007. Network effects and the dynamics of migration and inequality: theory and evidence from Mexico. Journal of Development Economics 84, 1–24.

Mendola, M., 2008. Migration and technological change in rural households: complements or substitutes? Journal of Development Economics 85, 150–175.

Munshi, K., 2003. Networks in the modern economy: Mexican migrants in the U.S. labor market. Quarterly Journal of Economics 118, 549–599.

Nakosteen, R., Zimmer, M., 1980. Migration and income: the question of self-selection. Southern Economic Journal , 840–851.

Navratil, F.J., Doyle, J.J., 1977. The socioeconomic determinants of migration and the level of aggregation. Southern Economic Journal 43, 1547–1559.

Park, H.M., 2009. Regression Models for Binary Dependent Variables Using Stata, SAS, R, LIMDEP, and SPSS. Working Paper. The University Information Technology Services (UITS) Center for Statistical and Mathematical Computing, Indiana University.

Pitt, M.A., Khandker, S.A., 1998. The impact of group-based credit programs on poor households in Bangladesh: does the gender of participants matter? Journal of Political Economy 106, 958–996.

Rahman, H.Z., Hossain, M., 1991. The Anatomy of Mora Kartik: an Enquiry into the Economic Health of the Countryside. Technical Report. Bangladesh Institute of Development Studies.

Rogaly, B., Coppard, D., 2003. "They used to go to eat, now they go to earn": the changing meanings of seasonal migration from Puruliya District in west Bengal, India. Journal of Agrarian Change 3, 395–433.

Rogaly, B., Coppard, D., Rafique, A., Rana, K., Sengupta, A., Biswas, J., 2002. Seasonal migration and welfare/illfare in eastern India: A social analysis. Journal of Development Studies 38, 89.

Rosenzweig, M.R., Stark, O., 1989. Consumption smoothing, migration, and marriage: evidence from rural India. Journal of Political Economy 97, 905.

Shahriar, A., Zeba, S., Shonchoy, A., Parveen, S., 2006. Seasonal Migration of Labor in the Autumn Lean Period: evidence from Kurigram District, Bangladesh. Technical Report. Department of Economics and Social Sciences, BRAC University, Dhaka Bangladesh.

Stark, O., 1991. The migration of labour. Cambridge, Massachusetts/Oxford, England, Basil Blackwell, 1991. x, 406 p.

Stark, O., Levhari, D., 1982. On migration and risk in LDCs. Economic Development & Cultural Change 31, 191.

Stretton, A., 1983. Circular migration, segmented labour markets and efficiency: the building industry in Manila and Port Moresby. International Labour Review 122, 623.

Todaro, M.P., 1969. A model of labor migration and urban unemployment in less developed countries. The American Economic Review 59, 138–148.

A Appendix

TABLE 1: Variable description

Name	Description
Migration decision	A dummy variable that equals one if the individual migrated in the last lean season and zero otherwise.
Seasonal hardship	A dummy variable that equals one if the individual has one meal or less on a typical day in the lean period, zero otherwise.
Access to Micro-credit	A dummy variable, which is coded as one for having access to Micro-credit through any MFIs, zero otherwise.
Flood	A dummy variable that equals one if the respondent has been affected by flood, and zero otherwise.
Age	Actual age of the respondent.
Sex	Sex is coded as one if the respondent is male and zero if she is female.
Marital status	A dummy variable, coded as one for those who are married and zero otherwise.
Education	A dummy variable, coded as one for those who have any education, zero otherwise.
Household size	Number of family members.
Kinship at the place of destination	A dummy variable, coded as one for those who have kinsmen at the potential place of destination, zero otherwise.

TABLE 2: Descriptive statistics

	Migration decision = 0		Migration decision= 1		Full sample	
Variable	Mean	SD	Mean	SD	Mean	SD
Kinship at the migration destination (d)	0.056	0.230	0.730	0.445	0.521	0.500
Sex (1 if male)	0.767	0.425	0.955	0.208	0.897	0.305
Access to Micro-credit (d)	0.233	0.425	0.175	0.381	0.193	0.395
Total amount land (in decimals)	26.839	50.301	15.600	29.719	19.088	37.610
Education (zero if no education)	0.600	0.493	0.350	0.478	0.428	0.496
Seasonal hardship (d)	0.556	0.500	0.620	0.487	0.600	0.491
Age (in years)	37.567	12.028	40.540	12.672	39.617	12.531
Flood (d)	0.489	0.503	0.495	0.501	0.493	0.501
Marital Status (d)	0.722	0.450	0.690	0.464	0.700	0.459
Size of the Household	5.111	1.41	4.86	1.272	4.938	1.319
Observation	90		200		290	

Note: (d) stands for dummy variable

TABLE 3: Cross Tabulation of Seasonal Migration and Access to Micro-credit

	Access to Micro-credit = 0	Access to Micro-credit = 1	Total
Seasonal Migration = 0	69	21	90
Seasonal Migration = 1	165	35	200
Total	234	56	290

TABLE 4: Endogenous Bivariate probit with Instrumental variables [Equation 2]

Dependent Variable:	Model 1		Model 2		Model 3		Model 4	
Migration decision	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.	Coefficient	M.E.
Male	0.928**	0.115	0.935**	0.127	0.968***	0.126	0.985***	0.161
	(0.382)		(0.384)		(0.372)		(0.364)	
Age	0.057	0.109	0.057	0.116	0.052	0.094	0.048	0.116
	(0.049)		(0.049)		(0.049)		(0.050)	
Age^2	-0.001	-0.001	-0.001	-0.001	-0.000	-0.001	-0.000	-0.001
	(0.001)		(0.001)		(0.001)		(0.001)	
Education	-0.549***	-0.817	-0.549***	-0.818	-0.565***	-0.829	-0.551***	-0.833
	(0.211)		(0.211)		(0.206)		(0.203)	
Size of the Family	0.054	-0.007	0.060	-0.028	0.047	-0.004	0.058	-0.005
	(0.079)		(0.078)		(0.079)		(0.080)	
Access to Micro-credit	0.979**	0.447	0.959**	0.443	0.955**	0.427	0.896**	0.416
	(0.434)		(0.438)		(0.423)		(0.419)	
Per Capita Land	-0.006	0.003			-0.005	0.004	-0.005	0.005
	(0.008)				(0.008)		(0.008)	
Flood	-0.006	-0.008	-0.001	-0.006	0.016	0.001	0.007	0.001
	(0.196)		(0.197)		(0.202)		(0.205)	
Kinship	1.559***	0.461	1.576***	0.480	1.593***	0.470	1.650***	0.527
	(0.406)		(0.403)		(0.383)		(0.371)	
Total amount of Land			-0.002	0.001				
			(0.002)					
Marital Status					-0.275	0.001	-0.230	0.006
					(0.215)		(0.218)	
Seasonal Hardship							0.241	0.036
							(0.197)	
Constant	-2.667**		-2.69**		-2.41**		-2.576**	
	(1.115)		(1.116)		(1.133)		(1.139)	
Regional Dummies	Yes		Yes		Yes		Yes	
Correlation between errors: $\widehat{\rho}$	-0.855**		-0.846**		-0.840**		-0.817**	
H_0: Coefficient of IVs are zero	41.06***		75.53***		46.55***		42.44***	
Observation	290		290		290		290	
Log likelihood	-224.686		-224.476		-222.899		-221.978	

Note: Values in the parentheses are the cluster adjusted robust standard errors. M.E. stands for marginal effects which have been calculated at the mean. Significance code: ***1%, ** 5%, * 10%. The variables used in the first stage regression are the instrumental variables as well as all the explanatory variables (except Kinship and regional dummies). Instruments are exclusion restriction as well as age, age^2, family size, education and sex interacted with the exclusion restriction; following the work of Pitt and Khandker (1998), Khandker (2005) and (Khandker et al. 2009, pp. 207)

TABLE 5: Robustness Check [Equation 2]

	Linear Model			Non-Linear Model	
Dependent variable:	LDV	Treatment	Mills Ratio		IV Probit
Migration decision	GMM	FIML	OLS	Probit	MLE
Male	0.191**	0.255***	0.240***	1.061***	0.550
	(0.096)	(0.087)	(0.079)	(0.393)	(0.487)
Age	0.029*	0.016	0.023*	0.086	0.066
	(0.016)	(0.013)	(0.013)	(0.058)	(0.044)
Age^2	-0.000	-0.000	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Education	-0.147***	-0.139***	-0.145***	-0.697***	-0.425*
	(0.057)	(0.045)	(0.041)	(0.208)	(0.250)
Size of the Family	0.022	0.009	0.009	0.073	0.077
	(0.028)	(0.023)	(0.022)	(0.091)	(0.071)
Access to Micro-credit	0.706**	0.292**	0.518**	1.941**	1.667**
	(0.317)	(0.135)	(0.227)	(0.963)	(0.717)
Per Capita Land	-0.001	-0.001	-0.001	-0.004	-0.002
	(0.002)	(0.002)	(0.002)	(0.009)	(0.007)
Kinship	0.499***	0.524***	0.497***	2.070***	1.278**
	(0.061)	(0.063)	(0.048)	(0.273)	(0.585)
Flood	-0.041	-0.004	-0.002	0.013	-0.039
	(0.063)	(0.052)	(0.051)	(0.240)	(0.178)
Kurigram	0.158*	0.100	0.090	0.472	0.443
	(0.092)	(0.073)	(0.076)	(0.332)	(0.285)
Chilmari	0.065	0.042	0.030	0.308	0.259
	(0.077)	(0.057)	(0.059)	(0.288)	(0.231)
Ulipur	-0.064	0.022	0.012	0.027	-0.122
	(0.095)	(0.071)	(0.074)	(0.305)	(0.247)
Constant	-0.574	-0.256	-0.418	-3.740**	-2.745**
	(0.374)	(0.292)	(0.28)	(1.348)	(0.999)
Observation	290	290	290	290	290
Log Likelihood	-185.243	-222.850	-93.037	-95.343	-224.489

Note: Values in the parentheses are the cluster adjusted robust standard errors. Significance code: ***1%, ** 5%, * 10%. The variables used in the first stage regression are the instrumental variables as well as all the explanatory variables (except Kinship and regional dummies). Instruments are exclusion restriction as well as age, age^2, family size, education and sex interacted with the exclusion restriction.