The Impact of Migration on Access to Credit Markets: Experience from Emerging Urban Centres in Tanzania

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Abstract

This paper sought to explore whether rural-urban migration and urban dwellers have equal access to credit services. Data were collected from two case-study emerging urban centres in Kilolo and Mufindi districts in Tanzania. Statistics encompassing measures of association, mean differences and a recursive bivariate probit model were used. Findings revealed marginal difference between the proportions of rural-urban migrants and urban dwellers with access to credit services in the case study areas. The model identified annual income, membership to local network/associations dealing with capital mobilisation and credit services as well as ownership of tangible assets as the main factors leading to increased access to credit. The study recommends policy interventions that can raise labour productivity and effectively engage young people in economic activities both in urban and rural areas. Access to formal credit among potential borrowers can be enhanced through dedicated support in training and sensitization to mobilize collective savings and initiate credit services as means to improve their creditworthiness and access to loans from formal institutions.

Key words: Rural-Urban Migration, Migrants, Access to Formal Credit

Introduction

Rapid rural to urban migration is an outcome of geographical imbalances in economic opportunities between rural and urban areas (Bah *et al.,* 2003; Jamal and Weeks, 1988; Tacoli, 2004). Urbanization is an outcome of rural stagnation and successful urban economic development and migration is perceived to be equilibrating response to these imbalances (McCormick and Wahba, 2001; Goldsmith *et al.,* 2004). The potential effects of this migration on migrants' welfare and other dimensions of urban life have elicited a significant debate in economic literature. Some analysts view rural-urban migration as counterproductive because it encourages a shift of productive people from rural to urban areas where they become unemployed or job seekers thereby increasing labour supply in the urban while depriving rural area of this labour (Bryceson, 1999; Bah *et al.,* 2003). This migration can also result into urban unemployment as it is difficult to create sufficient employment opportunities owing to scarcity of complementary inputs for effective use of the surplus labour in Africa (Jamal and Weeks, 1988). Indeed, some analysts have identified this migration to be the root cause of urban congestion, high crime rates and other illegal activities, increased waste generation and large slums and shanty towns (Tacoli, 1998; Bryceson, 2000; Kingdon and Knight, 2004). These views have prompted policy makers to make cities relatively inhospitable, for example through bulldozing informal low-income settlements or making it difficult for new migrants to secure property rights to land or access public services (Tacoli, 2004).

However, some analysts argue that these problems could be addressed though means that make urban areas contribute more effectively to the growth of nearby rural areas (Kingdon

and Knight, 2004; Tacoli, 2004). These analysts perceived rural-urban migration as a mechanism that allows people to be employed where they are more productive. Through this mechanism economic growth can bring about market integration to allow free movement of goods and people across space thereby allowing surplus labour from rural areas to seek employment within the informal sector in urban areas.

In summary many scholars support the view that what matters is not attempting to prevent rural-urban migration but finding ways to increase labour productivity and accelerating economic growth in both urban and rural areas. One way to achieve this outcome is to enhance migrants' access to credit they need to adapt to economic, social and other aspects of urban life. This access is crucial to induce growth and enhance resource allocation leading to increased production and higher welfare in both urban and rural areas (Singh *et al.,* 1986; Binswanger and Khandker 1995). There is evidence pin-pointing rural-urban migration as the main source of capital flow between rural and urban areas in Tanzania (Bah *et al.,* 2003). This flow has been acknowledged to have alleviated capital constraints among potential entrepreneurs and enhanced investment and self-employment in Tanzania and many other African countries.

While agriculture is a predominant activity in Tanzania the growing trend of rural urban migration has resulted in urban agriculture becoming one of the important activities, especially for the urban poor (Smith *et al.,* 1996; Bah *et al.,* 2003). However, these activities are becoming commercialized and capital intensive thereby limiting the participation of poor people. Consequently a significant number of rural-urban migrants are being employed in the informal sector as casual labour or small scale producers in peri-urban areas.

There is extensive literature linking capital availability and investment (Black and Strahan, 2002; Felsenstein and Aliza, 2002; Parker, 2004; Marlow and Patton, 2005). However, little is known with respect to how capital availability works differently for rural-urban migrants and rural dwellers (Bell, 1990; Mensnard, 2004; Anggraeni, 2009; Laszlo and Santor, 2009). This paper attempts to assess whether rural-urban migrants and urban dwellers have equal access to credit and identify factors underlying their access to this service. The paper offers empirical evidence to bridge the knowledge gap with respect to how various factors can influence access to credit services among rural-urban migrants and urban dwellers. Also the paper attempts to identify factors underlying the migrants' and urban dwellers' access to credit services. Thus two null hypotheses are tested:

i) Rural-urban migrants and urban dwellers have equal access to credit services;
ii) Socio-economic factors have insignificant effect on rural-urban migrants' and urban dwellers' access to formal credit services.

The paper is structured into five sections including this background. Section two presents the theoretical framework followed by a brief description of the novel model adopted to estimate the relationship between migration and access to credit in section three. Section four presents and discusses findings while the last section gives conclusions and recommendations.

Theoretical Framework

Two main perspectives about the financial status of rural-urban migrants and means that allow them to afford the cost of migration and urban life have been established. The first perspective underscores that rural-urban migration is rational decision that a migrant makes based on objective assessment of potential gains and uncertainties. Previous studies from Africa revel that rural-urban migrants come from all income groups but the majority are poor people (Todaro, 1997). However, it is unlikely that a significant proportion of the poor migrants will be the most destitute members of communities because migration entails several reallocation and settlement costs (Levy and Wadycki, 1974; Banerjee and Kanbur, 1981). This migration normally involves migrants with varying levels of liquidity constraint. Migrants that are liquid enough are more likely to meet future financial obligations in urban areas and will borrow only when it is necessary. However, those with

significant liquidity problems must plan to save some money while in rural areas to meet costs associated with reallocation and settling in destination areas. In view of this preparedness rural-urban migrants might not be the neediest people to rely on external financing. However other scholars argue that migrants are bound to have more pressing needs for external financing for two main reasons: Firstly, they may not get employment in the informal sector after settling in urban areas. Secondly, their asset base, especially ownership of resources (e.g. land) and inputs (e.g. family labour) is normally weak implying that they may spend a significant portion of their equity to acquire assets (Lóapez and Valdés, 2000; Epstein and Jezeph, 2001; Lall *et al.,* 2006). Under these circumstances, borrowing becomes inevitable but the migrants may encounter several challenges when they pursue this option.

It is important to note that loan approval in formal financial institutions (e.g. banks) is normally based on subjective criteria that fail to rate accurately some attributes of the loan applicants and their ability to manage the debt financed investment. This subjectivity leads to moral hazard[1], adverse selection[2] and contract enforcement[3] problems, which may particularly be more detrimental to rural-urban migrants whose credit can be rationed when their credit worthiness cannot be established (Stiglitz and Weiss, 1981; Braverman and Guasch, 1986; Hainz, 2003; Karlan and Zinman, 2009; Berndt and Gupta, 2009). This practice may compel the migrants to negotiate a smaller amount of loan from lenders. It is also expected that credit for borrowers with no information at all could be significantly reduced while the interest on credit is raised. This rationing is always counterproductive as it creates a situation where some borrowers are unable to access the external credit they desire (Petersen and Rajan, 1994; Ghosh *et al.,* 2000; Levenson and Willard, 2000). Evidence from African countries supports the view that commercial lenders and specialized credit institutions are normally detached from rural areas. Thus, lenders possess limited information about rural customers including rural-urban migrants[4].

The rationing problem could be even worse in Tanzania where a significant proportion of credit transactions take place in the informal sector because many borrowers in this sector lack credit history and collaterals (Hoff and Stiglitz, 1993). In practice, lending differ markedly from the formal sector because informal loans are normally linked to other commodity markets (e.g. crops) and are not legally binding. Also collateral items are rarely appraised implying that loans ceilings may exceed the value of collateral items thereby making it lucrative for borrowers to default. Moreover, credit worthiness is normally assessed on basis of exclusive or mutual relationships that evolve during repeated transactions; average interest tend to be higher than commercial rates and may not be correlated with loan size and; there is significant rationing which makes the entry of new borrowers difficult (Stiglitz and Weiss, 1981; Haugen, 2006).

In view of these lending practices, it is apparent that rural-urban migration can potentially reduce

1 This problem occurs when borrowers lose financial discipline to the extent that they make suboptimal invest and operational decisions. Thus, risking having sub-optimal performance of the financed project and limiting their ability to meet debt obligations in the long-run.

2 Adverse selection normally occurs when lenders fail to distinguish borrowers with different degrees of risk thereby issuing loan contracts that are subject to limited liability which can effectively discourage repayments out of pocket when project returns are less than debt obligations.

3 Contract enforcement problems arise when lenders have inadequate ability to control for opportunistic behaviour of borrowers to objectively set realist interest rates for effective monitoring of loan use and enforcement of loan repayment.

4 In the context of this study migrants are people who migrated to emerging urban centres but their duration of stay in destinations is less than 5 years. The main assumption underlying this classification is that people who stay in EUCs for more than 5 years are likely to establish social-networks to safeguard them as guarantors thereby making entry into formal credit market possible. In general, there is no well-defined cut-off to distinguish temporary from permanent migrants. However, the sample data revealed that 92% of those who stayed in destination areas for five or more years managed to acquire permanent assets (e.g. houses), commutated less frequently between areas of origin and destination and their duration of stay was relatively short (2-5 days/visit).

the amount of information about a migrant that potential renders can access, which in turn, will make it difficult for migrants to access credit. Migrants experiencing this difficulty may attempt to borrow from other locations where their identity is not well-established. The migrants' attempt to conceal their identity can exacerbate the problem of credit rationing in the future as their presence and practices may eventually become known. This situation can compel them to rely on credit from selected lenders in the informal sector, which might issue inadequate funds to meet the borrowers' needs for credit such as having diversified investments both in urban and rural areas. While it might be convenient for migrants to borrow from specific lenders within the informal sector, credit could be more expensive because interest rates are normally high and ceiling levels are low (Bell, 1990; Hoff and Stiglitz 1990; Kashuliza and Kydd, 1996).

Furthermore, many lenders tend to be uncertain whether the rural-urban migrants will settle permanently because the majority maintain linkages with areas of origin and undertake livelihood activities in both areas leading to circular migration as they occasionally return to their initial residence and come back to new settlements (Adger *et al.,* 2002; Tacoli, 2002). Also it is important to underscore that the migrants settling permanently are detached from social networks in areas of origin to the extent that they lack access to social support from other family members and pears. This detachment reduces migrants' ability to access credit as urban dwellers may be hesitant to act as guarantors when they attempt to borrow. Unlike the rural-urban migrants, urban dwellers without sufficient collateral can appeal to community members to identify potential lenders and their strong social ties may help them to overcome the collateral problem because some community members might volunteer to act as guarantors thereby increasing the probability of having successful loan applications. Moreover urban dwellers are unlikely to be constrained in terms of their liquidity positions because they do not incur relocation and other costs related to migration and this liquidity can enhance their worthiness (Laszlo and Santor, 2009).

The rationing practices described here imply that formal and informal credit markets are segmented and each market serves a unique pool of customers. The formal market for instance, may avoid lending to the migrants that are perceived to impose high risk of default. Thus, financial needs of these migrants will largely be met by informal lenders that are able to effectively rely on personal relationships, social sanctions and other substitutes of collateral to ensure repayment. This segmentation has always created challenges in satisfying credit needs that are not sufficiently fulfilled by either formal or informal credit market. When the formal and informal financial markets are segmented funds cannot flow smoothly between the pools of customers and lenders (Atieno, 2001). Evidence from developing countries reveals contrasting results on the prospect for rural-urban migrants and urban dwellers to access credit services. Anggraeni (2009) found that migrants had poor access to formal and informal credit. Mesnard (2004) found that lenders may indiscriminately ration credit among borrowers regardless of whether are financially constrained. In contrast other analysts argue that some migrants may deliberately avoid borrowing from formal and rely on informal sources of credit to avoid the long screening process and high probability of their loan applications being rejected (Bell, 1990). However, some studies e.g. Laszlo and Santor, 2009) have actually found that urban dwellers and rural-urban migrants may receive equal amount of loan thereby casting doubt on the whole concept of credit rationing.

These varied findings imply that there is no satisfactory empirical evidence to support the view that migrants have poor access to credit services than urban dwellers. However, it is apparent that the impact of migration on access to credit services could varies by country or region depending on migrants' characteristics and institutional factors that govern the migration process and operation of financial markets. The objective of this paper is to assess whether rural-urban migrants and urban dwellers have equal access to credit services in Tanzania

and pin-point factors underlying this access. The study examines the participation of rural-urban migrants and urban dwellers in credit markets in two emerging urban centres (EUCs) in Tanzania which is not yet well-understood because previous studies were centred on other aspects of migration. Beegle *et al.,* 2012; for example, explored the extent to which migration contribute to improve the living standards of migrants and family members while Bah et al. (2003) assessed the evolution of rural-urban linkages. Coast (2006) assessed awareness levels among Maasai migrants to gauge its effect on HIV prevalence in their communities. This study is therefore unique because there is no other study in Tanzania and elsewhere in Africa that has viewed migration and access to credit in this lens.

Modelling Migration and Access to Credit

An econometric model showing the relationship between migration decisions, a perceived selection variable and the outcome of this decision on access to credit among the rural-urban migrants vis-à-vis urban dwellers was required to test the two hypotheses specified in the background information. In principle the outcome of migration decision can only be observed if one actually migrates from rural to urban. Thus, access to credit in urban areas is implicitly embedded in the decision to migrate. It has been acknowledged that migration is a rational decision that migrants make after weighting all costs encompassing relocation and settlement as well as exposure to risks vis-à-vis payoffs resulting from exposure to new and arguably more lucrative income opportunities (Zhao, 1999; Kennan and Walker, 2011). The decision to migrate is reached when the expected present value of the realized payoffs exceeds the costs associated with migration. Therefore the decision to migrate can be modelled using a binary choice model where the decision is perceived to be following an unobservable latent variable that determines the choice that a prospective migrant will make. When migration is envisaged, this latent variable could be interpreted as the difference in expected utility from staying in home areas and migrating to urban (Todaro, 1969; Li and Zahniser, 2002). This decision is mathematically stated as:

$$I_i^* = \beta_o + \beta_1 X_i + \varepsilon_i \quad \text{.....(1)}$$

In equation (1) I_i^* is an unobservable latent variable for i^{th} decision maker with unique set of socio-economic characteristics (Xi) that influence the ultimate decision. The last component of the equation (ε_i) is the random component—a catchy for all variables other than those specified in the empirical model. The latent variable is defined as:

$$I = \begin{cases} 1 \text{ if } I_i^* > o : \text{One decides to migrate} \\ 0 \text{ if } I_i^* \leq o : \text{One decides to stay} \end{cases} \quad \text{...(2)}$$

$$\varepsilon_i \sim N(0,1) \quad \text{.....(3)}$$

Empirical studies have identified that propensity to migrate can vary across people and this variation should account for differences in their socio-economic factors. Socio-economic factors hypothesized to influence migration decision include age, income, education, length of stay in the area, previous experience in migration, family size, sex, origin, marital status, farm size, total land area in the origin and presence of a family member or friend in the prospective destination area (Hoddinott, 1994; Li and Zahniser, 2002; Finnie, 2004). Similarly participation in financial markets is a rational decision that a borrower makes and is normally conditioned on socio-economic and demographic factors including those hypothesized to influence migration (Sebopetji and Belete, 2009). While migration decision centres on whether to migrate or not, accessing credit cannot be perceived in the same way because there could be people within non-borrowers who would like to borrow but are discouraged as they anticipate that their credit applications will not be approved (Kon and Storey, 2003). This represents a self-selection bias problem that needs to be addressed[5].

5 Thus access to credit is an act of being able to borrow from formal financial sources. People without this access are those willing to borrow but unable to do so because they either do not qualify or are discouraged to apply.

Participation in credit market is a binary variable that can also be modelled with the aid of binary choice probability model. In this modelling approach a dichotomous dependent variable-a measure of whether one has access to credit, is hypothesized to be a function of one's socio-economic characteristics that influence borrowing. This choice can also be modelled as univariate probit model using the maximum likelihood technique. In terms of specification this model is conventionally written as:

$$y_i^* = \phi_o + \delta_1 X_i + \mu_i \quad \text{.....(4)}$$

$$y = \begin{cases} 1 \text{ if } y_i^* > o : \text{One decides to borrow} \\ 0 \text{ if } y_i^* \leq o : \text{One decides not to borrow} \end{cases} \quad \text{.....(5)}$$

Since migration precedes borrowing decision and the two are influenced by common factors, it is robust to model these two decisions jointly. In practice the two univariate models specified in equations (1) and (4) can be pooled to form a bivariate model which has the potential to overcome the problem of selection bias. Literature shows that selection bias cannot be ruled out when the univariate models that are endogenously determined are estimated separately (Liu, 2012). In the context of this study the decision to migrate is endogenous to accessing credit. Moreover there is a potential for selection bias because rural-urban migrants could be self-selected as factors leading to this decision are lagged and some of these factors cannot be measured objectively. Therefore, this paper estimates a bivariate endogenous treatment model also known as recursive bivariate probit where the determinant of migration and access to credit are jointly modelled as per specification and details that are provided in Annex 1 (Maddala, 1983; Green, 2002). In this model the maintained assumption is that migration status can influence one's access to credit services. The rationale for including urban dwellers in the bivariate model is having a control that will specifically show the difference in access to credit between migrants and native residents.

Methods

Data and sources

Data used in the analysis were collected from two emerging urban centres (EUCs) in Iringa region namely Igowole and Ilula that are located in Mufindi and Kilolo districts, respectively. The dominant commodities underlying urbanization and the linkages that emerge from the urbanization process in Igowole and Ilula EUCs are tea and tomato, respectively. Data were collected during the implementation of a project titled "Rural-Urban Complementarities for the Reduction of Poverty (RUCROP)," which is a development research project supported by the Danish Ministry of Foreign Affairs through DANIDA. The research component of this project covered several interrelated aspects of rural-urban linkages including urbanization, migration and credit services. The main objective was to underscore the implication of these aspects of rural-urban linkages on rural and urban growth as well as welfare of people involved. Data were collected from random samples of 284 respondents (194 males and 90 females) through questionnaire interviews. The questionnaire contained questions meant to solicit information on varied aspect of rural-urban migration and credit services in the two EUCs. These interviews were conducted by project Research Assistants in collaboration with Senior Researchers. The sample consisted of male and female respondents with different socio-economic characteristics that are discussed in subsequent section. Data collected from these two sites were pooled to form a cross sectional data to increase the degree of freedom and allow both descriptive and inferential analyses.

Data Analysis

Data collected during the surveys were analysed using descriptive and inferential statistics. The descriptive analysis involved the use of frequencies and percentages along with measures of central tendency and dispersion. Inferential statistics involved contingency analysis to measure association between qualitative variables and identify differences between groups of respondents that were disaggregated according to sex; age groups; migration and marital status; membership to associations or

groups dealing with capital mobilization and credit services and; involvement in tomato or tea value chains. The inferential analysis for continuous variables involved the use of independent t-test to compare means for rural-urban migrants' vis-à-vis urban dwellers. A similar analysis was performed to compare means between borrowers and non-borrowers. Another aspect of inferential statistic involved the use of the bivariate probit model (Annex 1) following the functional forms presented in equations (7) and (8) under the maintained assumptions that are presented in equations (9) through (11). Explanatory variables that were included in the outcome and selection model are described in Table 1:

(tomato and tea) in any node of these value chains (e.g. as a producer or casual labourer). Tomato and tea are the major cash crops considered in this article. Involvement in these value chains is perceived as a means to enhance earnings and thereby boosting credit worthiness among potential borrowers. Similarly, the involvement in farmer group and networks (MEMBER), especially for those dealing with capital mobilization and credit services (e.g. share-contributions for lending) could serve as an entry qualification in credit markets for two reasons: first, members could agree to issue credit among themselves; secondly this group cohesion could pave ways to formal credit as fellow members volunteer to guarantee

Table 1: List of independent variable included in the outcome and selection equation

Variable name	Type	Description
Outcome model		
AGE	Continuous	Age of respondent (years).
Sex	Binary	Sex of respondent: codes as 1 for males and 0 for females.
SCHOOL	Continuous	Years of schooling.
PART	Binary	Participation in key commodity value chains (tomato and tea): Codes as 0 for non-participants and 1 for participants.
INC	Continuous	Total annual income from all activities measured in Tanzanian Shillings (TAS).
MARITAL	Binary	Marital status of respondents: coded as 1 for married respondents and 0 otherwise.
MEMBER	Binary	A measure of whether a respondent is a member of local network or association (e.g. farmer groups and savings and credit societies): coded as 0 for non-members and 1 for members.
MIG	Binary	Migration status: Coded as 1 for migrants and 0 for urban dwellers.
ASSET	Binary	Ownership of tangible (fixed) assets such as house and land that was coded as 1 for respondents owning such assets and 0 otherwise.
OCCUP	Binary	Main occupation of respondents: coded as 1 for farming and 0 for all other options such as petty businesses and food vending.
Selection model		
AGE	Continuous	Age of respondent (years).
Sex	Binary	Sex of respondent: coded as 1 for males and 0 for females.
SCHOOL	Continuous	Years of schooling.
MARITAL	Binary	Marital status of respondents: coded as 1 for married respondents and 0 otherwise.
HS	Continuous	Number of people in a household.

Note that PART is a measure of whether one is involved in key agricultural commodities

repayment for those willing to borrow through joint liability. The variable was included in

the analysis because this type of financing was common in both areas. The rationale for including other independent variables in this model has been discussed where the analytical model is described.

Results and Discussion

The sample farmers who were engaged in tea and tomato value chains was predominantly comprised of married males (68%) with age ranging from 18 to 45 years (57%). In terms of migration status there was equal number of migrants and urban dwellers (about 50% each). About 65% of these respondents had access to credit service in the EUCs. Data show that about 62% of the respondents were members of farmer groups and networks including those identified with saving mobilization and credit (Table 2).

Chi-square tests were performed to test whether there were significant relationships between respondents' characteristics and their access to credit services. Results show that membership to local networks and associations dealing with

Table 2: Socio-economic characteristics of respondents

Variable		Name of EUC				Total	
		Igowole		Ilula			
		%	Freq.	%	Freq.	%	Freq.
Sex	Female	49	32.7	41	30.6	90	31.7
	Male	101	67.3	93	69.4	194	68.3
Migration status	Urban dwellers	77	51.3	67	50	144	50.7
	Migrants	73	48.7	67	50	140	49.3
Marital status	Single	15	10.0	11	8.2	26	9.2
	Married	118	78.7	121	90.3	239	84.2
	Divorced	2	1.3	0	0.0	2	0.7
	Widowed	15	10.0	2	1.5	17	6.0
Access to credit	No	98	65.3	87	64.9	185	65.1
	Yes	52	34.7	47	35.1	99	34.9
Engagement in tea/ tomato subsector	No	94	19.4	26	19.4	120	42.3
	Yes	56	80.6	108	80.6	164	57.7
Membership to local networks and associations	No	75	50	101	75.4	176	62.0
	Yes	75	50	33	24.6	108	38.0
Age structure	18-45 years	113	75.3	110	82.1	223	56.9
	45-60 years	34	22.7	19	14.2	53	13.5
	Above 60 years	3	2.0	5	3.7	8	2.0
Family size	Less than 3 people	49	32.7	35	26.1	84	29.6
	3-5 people	64	42.7	56	41.8	120	42.3
	More than 5	37	24.6	43	32.1	80	28.2
Ownership of assets	With tangible assets	118	78.7	127	94.8	245	86.3
	Without tangible assets	32	21.3	7	5.2	39	13.7
Main occupation of respondents	Farming	100	66.7	118	88.1	218	76.7
	Petty trade and similar activities	50	33.3	16	11.9	66	23.3

capital mobilization and credit service had a significant association with access to credit and this effect was common among rural-urban migrants and urban dwells. Results also revealed that ownership of tangible assets was significantly higher among the urban dwellers than migrants (Table 3).

Table 3: Association between access to credit and socio-economic and demographic characteristics of respondents

Attribute	Respondent category	Categories	Proportion with access to credit	Proportion without Access to credit	Total	Chi-square test: Likelihood ratio (df)
Marital status	Urban dwellers	Single	6.2	2.8	9.0	2.48(3)
		Married	54.2	29.9	84.0	
		Divorced	0.7	0	0.7	
		Widowed	2.8	3.5	6.2	
		Total	63.9	36.1	100.0	
	Migrants	Single	6.4	2.9	9.3	3.24(3)
		Married	57.1	27.1	84.3	
		Divorced	0	0.7	0.7	
		Widowed	2.9	2.9	5.7	
		Total	64.4	33.6	100.0	
Membership in local networks	Urban dwellers	Non-member	49.3	10.4	59.7	32.83***
		Members	14.6	25.7	40.3	
		Total	63.9	36.1	100.0	
	Migrants	Non-member	56.4	7.9	64.3	52.54***
		Members	10.0	25.7	35.7	
		Total	66.4	33.6	100.0	
Sex	Urban dwellers	Female	19.4	12.5	31.9	0.26 (1)
		Male	44.4	23.6	68.1	
		Total	63.9	36.1	100.0	
	Migrants	Female	20.7	10.7	31.4	0.08(1)
		Male	45.7	22.9	68.6	
		Total	66.4	33.6	100.0	
Involvement in value chain activities	Urban dwellers	No	22.2	11.8	34.0	0.65 (1)
		Yes	41.7	24.3	66.0	
		Total	63.9	36.1	100.0	
	Migrants	No	35.0	15.7	50.7	0.43 (1)
		Yes	31.4	17.9	49.3	
		Total	66.4	33.6	100	

Attribute	Respondent category	Categories	Proportion with access to credit	Proportion without Access to credit	Total	Chi-square test: Likelihood ratio (df)
Age groups	Urban dwellers	18 to less than 45 years	54.9	30.6	85.4	2.09 (2)
		45-60 years	7.6	5.6	13.2	
		Above 60 years	1.4	0	1.4	
	Migrants	18 to less than 45 years	46.4	25.0	71.4	1.58(2)
		45-60 years	17.9	6.4	24.3	
		Above 60 years	2.1	2.1	4.3	
		Total	66.4	33.6	100.0	
Family size	Migrants	Less than people per household	22.9	11.1	34.0	3.6 (2)
		3-5 people per household	27.1	11.8	38.9	
		More than 5 people per household	13.9	13.2	27.1	
		Total	63.9	36.1	100	
	Migrants	Less than people per household	17.9	7.1	25.0	0.6 (2)
		3-5 people per household	29.3	16.4	45.7	
		More than 5 people per household	19.3	10.0	29.3	
		Total	66.4	33.6	100.0	
Ownership of tangible assets	Urban dwellers	With assets	35.4	54.9	90.3	7.02(1)*
		Without assets	0.7	9.0	9.7	
		Total	36.1	54.9	100.0	
	Migrants	With assets	29.3	52.9	82.1	1.31(1)
		Without assets	4.3	13.6	17.9	
		Total	33.6	66.4	100.0	
Main occupation	Urban dwellers	Farming	27.8	54.9	82.6	1.8(2)
		Other businesses	8.3	9.0	17.4	
		Total	36.1	63.9	100.0	
	Migrants	Farming	22.1	48.6	70.7	0.2(1)
		Petty and related business	11.4	17.9	29.3	
		Total	36.6	66.4	100.4	

Note: *=p<0.10; **=p<0.05; ***=p<0.01

A preliminary test on whether rural-urban migrants and urban dwellers were different with respect to qualitative attributes showed that the proportion of the urban dwellers engaged in commodity value chains was significantly higher than that of rural-urban migrants. In terms of age groups, the number of younger people among the migrants was significantly higher than the urban dwellers (Table 4). This difference in age was also observed when mean

Table 4: Association between migration status and socio-economic and demographic characteristics of respondents

		Residence status		Total	Chi-square test: Likelihood ratio (df)
Variable	**Category**	**rural**	**Migrants**		
Involvement in tea/ tomato sub sector	No	17.3	25.0	42.3	8.1(1)***
	Yes	33.5	24.3	57.7	
	Total	50.7	49.3	100.0	
Access to credit	No	32.4	32.7	65.1	0.2(1)
	Yes	18.3	16.5	34.9	
	Total	50.7	49.3	100	
Marital status	Single	4.6	4.6	9.2	0.1 (3)
	Married	42.6	41.5	84.2	
	Divorced	0.4	0.4	0.7	
	Widowed	3.2	2.8	6.0	
	Total	50.7	49.3	100.0	
Sex	Female	16.2	15.5	31.7	0.1 (1)
	Male	34.5	33.5	68.3	
	Total	50.7	49.3	100.0	
Age group	18 to less than 45 years	43.3	35.2	78.5	8.7 (2)**
	45-60 years	6.7	12.0	18.7	
	Above 60 years	0.7	2.1	2.8	
	Total	50.7	49.3	100	
Family size	Less than 3 people	17.3	12.3	29.6	2.8(2)
	3-5 people	19.7	22.5	42.2	
	More than 5	13.7	14.4	28.2	
	Total	50.7	49.3	100	
Main activity of respondents	Farming	34.9	41.9	76.8	5.67(1)**
	Petty and related business	14.4	8.8	23.2	
	Total	49.3	50.9	100.0	
Ownership of tangible assets	With asset	40.5	45.8	86.3	4.0(1)**
	Without asset	8.8	4.9	13.7	
	Total	49.3	50.7	100.0	

Note: *=p<0.10; **=p<0.05; ***=p<0.01

age for the migrants and urban dwellers were compared as the mean was about 36 and 39 years for migrants and urban dwellers, respectively.

Results from the bivariate probit model are presented in Table 5. The model fitted the data well ($\chi^2 = 102\,;\, p < 0.01$). The correlation coefficient between errors in the selection and outcome equations was not statistically different from zero at all conventional levels of significance. Elsewhere in the literature it is suggested that the selection and outcome equations can be estimated as two independent univariate probit models when errors in the selection and outcome models are not correlated (Liu, 2012). While this is true for this model our robust check reveals that the bivariate probit model provided more efficient results as it accounted for correlation between the unobserved errors. The sum of log-likelihoods for the two univariate probit regressions was -285.97 while the log-likelihood of the bivariate probit regression was -321.48.

Table 5: Comparison of means for quantitative variable disaggregated by migration status

Variable	Migration status of household head	N	Mean	Std. Deviation	Std. Error Mean	t-statistic
Age of household head	Urban dwellers	144	39.7	10.978	0.9	2.8***
	Migrants	140	36.3	9.873	0.8	
Years in Schooling	Urban dwellers	144	7.5	2.74039	0.2	1.1
	Migrants	140	7.9	2.48799	0.2	
Average monthly income	Urban dwellers	144	370,000	680000	56680.3	0.2
	Migrants	140	390,000	520210	43966.0	
Number of household member	Urban dwellers	144	4.5	2.1	0.2	0.6
	Migrants	140	4.7	2.1	0.2	

Note: *=p<0.10; **=p<0.05; ***=p<0.01

With respect to access to credit annual income, membership in local networks and associations identified with capital mobilization and lending functions and ownership of tangible assets were the variables with significant impact on access to credit (Table 6). These variables have long been recognized to increase ones' credit worthiness (Hainz, 2003; Karlan and Zinman, 2009; Berndt and Gupta, 2009). High levels of income increase the probability that a borrower will have sufficient income to meet family, debt and other obligations while tangible assets can assure lenders to recover loan issued to borrowers in an event they default. Membership to savings and credit associations and other local networks that provide credit to members—the most common financial service in the study areas, can allow migrants and urban residents to improve their liquidity positions and social capital thereby increasing the likelihood of accessing credit from formal financial services. Previous studies from Africa revel that rural-urban migrants come from all income groups but the majority tend to be poor people (Todaro, 1997). There is evidence showing that poor people in developing countries do not receive credit because they have irregular cash flows to guarantee repayment as a majority are either self-employed, or wage-employees on short-term contracts (Sander *et al.,* 2005). An assessment of credit services to small and medium enterprises (SMEs) in Kenya, Uganda, Tanzania and Zambia identified the lack of collateral or adequate guarantees as a major obstacle for SMEs to get bank financing (Calice *et al.,* 2012). Thus, better access to credit services among rural-urban migrants with higher levels of income might imply that they are able to engage more effectively in urban activities

such as small and medium scale enterprises leading to stable income, rapid accumulation of acceptable collateral items, increased credit worthiness and better access to credit services.

According to the results of analysis presented in Table 6, rural-urban migration appeared to be common among people with 18-45 years. This is not astonishing as it is expected that young adults who migrate tend to experience more problems in the destination areas. With inadequate training, many young adults seem to be unable to secure employment opportunities in urban areas. Consequently they normally become victims of human rights abuse as they lack parental and legal protection (Mbonile and Lihawa, 1996; Van Blerk, 2008).

Further analysis revealed that the marginal

Table 6: Parameters of the Bivariate Probit Model

Outcome equation			Selection equation		
Variable	**Coefficient**	**Standard Error**	**Variable**	**Coefficient**	**Standard Error**
Constant	-1.25	0.65	Constant	-1.04	0.41
MIG	-0.31	1.66	Sex	-0.02	0.16
AGE	0.01	0.01	SCHOOL	0.04	0.03
Sex	0.16	0.17	INC	0.00	0.00
SCHOOL	-0.07	0.51	MARITAL	-0.04	0.24
PART	0.12	0.19	HS	-0.02	0.51
INC	0.00**	0.00			
MARITAL	0.30	0.24			
MEMBER	1.66***	0.31			
ASSET	0.94**	0.33			
OCCUP	-0.36	0.23			
Correlation parameter					
Rho *(P)*	0.22	0.11			
Likelihood-ratio test of rho=0: chi-square(1)=0.05; Prob> chi-square=0.85					
Wald Chi-square=102.12***					
N=284; AIC=678; BIC=678					

Note: *=p<0.10; **=p<0.05; ***=p<0.01

the very young and old people are less likely to endure the trouble associated with travelling long distances and bear the risk of searching for new employment or investment opportunities. Naturally, the probability of becoming a migrant should increase at decreasing rate as an individual grows before it declines at old age. Experience from other countries within Southern Africa reveal that migrant families are more likely to be young adults (19-30 years) and adults (31-50 years) while people below 19 and above 50 years are less likely to migrate (Van der Berg *et al.,* 2003). Other empirical studies from Western Africa and Tanzania reveal the same pattern of migration but suggest that

effect of annual income was small ($dy/dx^{6} \equiv 0$) implying its smaller effect on the probability of having a migrant with access to credit (Table 7). However, the study also found that the probability of having a migrant with access to credit increased with ownership of tangible assets. The probability of a migrant having access to formal credit was 14% higher for migrants owning tangible assets. Similarly, migrants who subscribed to groups or associations dealing with savings mobilization and lending had 29% more chances of accessing credit than non-members. The probability of having a male migrant with access to credit was 72% higher than female

[6] *For all discrete variable dy/dx measures a discrete change from zero to one.*

migrants arguably because females are more risk averse than males (Powell and Ansic, 1997; Bolland, 2003; Turner and McClure, 2003). This difference in risk behaviour implies that males might be more willing to apply for formal loans than females thus increasing the probability of their loans being approved. The results of analysis also show that marital status; main occupation; family size; age and education levels of the households' heads had insignificant impact on access to credit among urban dwellers and migrants.

Table 7: Marginal effects (evaluated at mean values)

Variable	dy/dx	X
MIG	-0.06	0.49
AGE	0.00	37.96
Sex*	0.72	0.68
SCHOOL	0.01	7.69
PART*	0.02	0.57
INC	0.00	381,354.00
MARITAL	-0.06	0.84
MEMBER	0.29	0.38
ASSET	0.14	0.86
0CCUP	-0.07	0.76
HS	-0.02	4.60

Summary of main findings and recommendations

Summary of main findings

This paper sought to test whether rural-urban migrants and urban dwellers have equal access to credit services. To address this challenge the paper assessed the extent to which rural-urban migrants and urban dwellers have access to formal credit services and; identified factors underlying their access to these services.

The results of analysis revealed marginal difference between the proportions of rural-urban migrants (about 31%) and native residents (about 32%) with access to formal credit services within the case study EUCs. This difference was statistically insignificant at all conventional levels of significance. Therefore, the null hypothesis that migrants and non-migrants have equal access to credit services could not be rejected.

The bivariate probit model identified age as the main factor influencing rural-urban migration where people who were 18 to 45 years were more likely to migrate than those in other age groups. The high rate of rural-urban migration among people within this age group implies that they were more likely to be exposed to the risks of urban unemployment and other risks associated with such decision.

The main factors leading to increased access to formal credit services were annual income; membership in local network/associations, especially those dealing with savings mobilization and credit and; ownership of tangible assets. Thus, the null hypothesis stating that socio-economic factors have insignificant effect on rural-urban migrants' and urban dwellers' access to formal credit was rejected.

While significant at 10% level, the marginal effect of annual income was generally small implying its small effect on the probability of having access to credit. The study also found that the probability of having access to credit increased with ownership of tangible assets. Similarly, people subscribing to groups dealing with savings mobilization and lending had higher chances of accessing credit than those who did join in these groups. The analysis established that other factors hypothesised to influence access to credit such as marital status; main occupation; family size; age and education levels, had insignificant impact on access to credit among urban dwellers and migrants. These results are consistent with empirical evidence. High income can allow migrants to effectively participate in economic activities leading to rapid accumulation of acceptable collateral items, increased credit worthiness and access to credit services. Similarly, membership in credit and saving institutions and other social networks that offer credit to members can uplift the migrants' liquidity positions leading to increased investment, asset accumulation and better access to credit services.

Recommendations

The study revealed high rate of rural-urban migration among young adults and adults (18-45 years). This problem and it negative impacts on urban life can be ameliorated through policies that raise labour productivity and effectively engage potential migrants in economic activities both in urban and rural areas. In practice these outcomes can be realized through improved provision of critical support services and infrastructural improvement to make rural life more attractive, promote market integration and create new opportunities for the exchange of goods and services in both areas.

Also the study revealed higher prospect for people who are members of micro-finance institutions to access credit from formal institutions than those who are not members. Thus, access to this credit can be enhanced further through dedicated support in training and sensitization of potential borrowers to mobilize collective savings and initiate micro-credit as a strategy to accumulate wealth and build the reputation required to source services from other lenders including banks that are more capable of issuing big loans.

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References

Adger, W. N., Kelly P.M., Winkels, A., Huy L.Q. and Locke, C. (2002). Migration, remittances, livelihood trajectories, and social resilience. AMBIO. A Journal of the Human Environment, 31 (4): 358-366.

Anggraeni, L. (2009). The function of social networks to credit access and off-farm work: A case of coconut farmers in rural areas of Riau province, Indonesia. Journal of International Society for Southeast Asian Agricultural Sciences, 15 (1): 63-76.

Atieno, R. (2001). 'Formal and informal institutions' lending policies and access to credit by small-scale enterprises in Kenya: an empirical assessment (Vol. 111). The African Economic Research Consortium, Regal Press Kenya, Ltd, Nairobi, Kenya.

Bah, M., Cissé, S., Diyamett, B., Diallo, G., Lerise ,F., Okali, D., Okpara, E., Olawoye, J. and Tacoli, C. (2003). Changing rural–urban linkages in Mali, Nigeria and Tanzania, Environment and Urbanization, 15 (1): 1-24.

Banerjee, B. and Kanbur, S.M.R. (1981). On the specification and estimation of macro rural-urban migration function: with application to India data. Oxford Bulletin of Economics and Statistics, 43: 7-29.

Beegle, K., De Weerdt, J. and Dercon, S. (2012). Migration and Economic Mobility in Tanzania: Evidence from a Tracking Survey. Review of Economics and Statistics, 93 (3): 1010-1033

Bell, C. (1990). Interaction between institutional and informal credit agencies in rural India, World Bank Economic Review, 4 (3): 297-327.

Berndt, A. and Gupta, A. (2009). Moral hazard and adverse selection in the originate-to-distribute model of bank credit. Journal of Monetary Economics, 56(5): 725-743.

Binswanger, H.P. and Khandker, S.R. (1995). The impact of formal finance on the rural economy of India. Journal of Development Studies, 32(2): 234-262.

Black, S.E. and Strahan, P.E. (2002). Entrepreneurship and bank credit availability. The Journal of Finance, 57 (6): 2807-2833.

Bolland, J.M. (2003). Hopelessness and risk behaviour among adolescents living in high-poverty inner-city neighbourhoods. Journal of Adolescence, 26(2): 145-158.

Braverman, A. and Guasch, J.L. (1986). Rural credit markets and institutions in developing countries: Lessons for policy analysis from practice and modern theory. World Development, 14 (10): 1253-1267.

Bryceson, D.F. (1999). African rural labour, income diversification and livelihood approaches: a long-term development

perspective. Review of African Political Economy, 26 (80): 171-189.

Bryceson, D., (2000). Rural Africa at the crossroads: livelihood practices and policies. Overseas Development Institute, London.

Calice, P., Chando, V. M. and Sekioua, S., (2012). Bank Financing to Small and Medium Enterprises in East Africa: Findings of a Survey in Kenya, Tanzania, Uganda and Zambia. Working Paper Series. pp.146.

Coast, E., (2006). Local understandings of, and responses to, HIV: Rural–urban migrants in Tanzania. Social Science and Medicine 63 (4):1000-1010.

Epstein, T.S. and Jezeph, D., (2001). Development—There Is Another Way: A Rural–Urban Partnership Development Paradigm. World Development, 29(8): 1443-1454.

Felsenstein, D. and Aliza, F., (2002). Small–Scale Entrepreneurship and Access to Capital in Peripheral Locations: An Empirical Analysis. Growth and Change, 33(2):196-215.

Finnie, R., (2004). Who moves? A logit model analysis of inter-provincial migration in Canada. Applied Economics, 36(16): 1759-1779.

Ghosh, P., Mookherjee, D. and Ray, D., (2000). Credit rationing in developing countries: an overview of the theory. Readings in the Theory of Economic Development: 383-401.

Goldsmith, P. D., Gunjal, K. and Ndarishikanye, B., (2004). Rural–urban migration and agricultural productivity: the case of Senegal. Agricultural Economics, 3 (1): 33-45.

Green, W. H., (2002). Econometric Analysis. 5th Edition, New York: United States.

Hainz , C., (2003). Bank competition and credit markets in transition economies. Journal of Comparative Economics, 31 (2): 223-245.

Haugen, N. (2006). The informal credit market: A study of default and informal lending in Nepal. Doctoral dissertation, Department of Economics: University of Bergen.

Hoddinott, J., (1994). A model of migration and remittances applied to Western Kenya. Oxford Economic Papers: 459-476.

Hoff, K. and Stiglitz, J., (1990). Imperfect Information and Rural Credit Markets: Puzzles and Policy Perspectives. World Bank Economic Review, 4 (3): 235–250.

Hoff, K. and Stiglitz, J., (1993). Imperfect Information in Rural Credit Markets: Puzzles and Policy Perspectives. In: Hoff K, Braverman A, Stiglitz, J. (Eds.), The Economics of Rural Organizations: Theory, Practices and Policy, London: United Kingdom; pp 814-816.

Jamal, V. and Weeks, J., (1988). Vanishing Rural-Urban Gap in Sub-Saharan Africa. The International Labour Review, 127(3): 271-292.

Karlan, D, and Jonathan Z., (2009). Observing unobservables: Identifying information asymmetries with a consumer credit field experiment. Econometrica, 77(6): 1993-2008

Kashuliza, A.K. and Kydd, J.G., (1996). Determinants of bank credit access for small holder farmers in Tanzania: A discriminant analysis application. Savings and Development, 3: 285–297.

Kennan, J. and Walker, J. R., (2011). The effect of expected income on individual migration decisions. Econometrica, 79 (1): 211-251.

Kingdon, G.G. and Knight, J., (2004). Unemployment in South Africa: The nature of the beast. World Development, 32(3): 391-408.

Kon Y., and Storey, D. J. (2003). A Theory of Discouraged Borrowers. Small Business Economics, 21:37-49.

Lall, S. V., Selod, H. and Shalizi, Z., (2006). Rural-urban migration in developing countries: A survey of theoretical predictions and empirical findings. World Bank Policy Research Working Paper, Vol. 3915.

Laszlo, S. and Santor, E., (2009). Migration, Social Networks, and Credit: Empirical Evidence from Peru. The Developing Economies, 47 (4): 383-409.

Levenson, A. R. and Willard, K. L. (2000). Do firms get the financing they want? Measuring credit rationing experienced by small businesses in the US' Small Business

Economics, 14 (2): 83-94.

Levy, M.B. and Wadycki, W.J., (1974). Education and the decision to migrate; an econometric analysis of migration in Venezuela. Econometrica, 42: 377-388.

Li H. and Zahnise, S., (2002). The Determinants of Temporary Rural-to-Urban Migration in China. Urban Studies 39 (12): 2219-2235.

Liu, J., (2012). On the Rural Economy of China: How do Rural-Urban Migration and Rural Non-farm Business Affect Each Other? American International Journal of Contemporary Research, 2 (4): 30-38.

Lóapez, R. and A. Valdés (2000). Fighting Rural Poverty in Latin America: New Evidence of the Effects of Education, Demographics, and Access to Land. Economic Development and Cultural Change, 49(1): 197-211.

Maddala, G., (1983). Limited Dependent and Qualitative Variables in Econometrics. London: United Kingdom;

Marlow, S. and Patton, D., (2005). All credit to men? Entrepreneurship, finance, and gender. Entrepreneurship Theory and Practice, 29 (6): 717-735.

Mbonile, M.J. and Lihawa, H.E., (1996). Rural-Urban Female Migration in Tanzania: A Case of Dar es Salaam City, UTAFITI (New Series), 3 (2): 169-184.

McCornick, B. and Wahba, J., (2001). Overseas work experience, savings and entrepreneurship amongst return migrants to LDCs. Scottish Journal of Political Economy, 48 (2): 164-178.

Mesnard, A., (2004). Temporary migration and capital market imperfections. Oxford Economic Papers, 56 (2): 242-262.

Parker, S.C., (2004). The economics of self-employment and entrepreneurship. Cambridge University Press.

Petersen, M.A. and Rajan, R.G., (1994). The benefits of firm-creditor relationships: Evidence from small-business data. Journal of Finance, 49: 3-37.

Powell, M. and Ansic, D., (1997). Gender differences in risk behaviour in financial decision-making: An experimental analysis. Journal of Economic Psychology, 18(6): 605-628.

Sander, C., and Mainbo, S.M., (2005). Migrant labour remittances in Africa: Reducing obstacles to developmental contributions.

Sebopetji, T.O. and Belete, A., (2009). An application of probit analysis to factors affecting small-scale farmers' decision to take credit: a case study of the Greater Letaba Local Municipality in South Africa, African Journal of Agricultural Research, 4 (8): 718-723.

Singh I., Squire, L. and Strauss, J., (1986). Agricultural Household Models: Extensions, Applications, and Policy. Maryland, United States.

Smith, J., Ratta, A. and Nasr, J., (1996). Urban agriculture: Food, jobs and sustainable cities. United Nations Development Programme (UNDP), New York.

Stiglitz J. and Weiss, A., (1981). Credit rationing in markets with Imperfect Information. American Economic Review, 7: 393-410.

Tacoli, C., (1998). Rural-urban Interactions; A guide to the literature. Environment and Urbanization, 10: 147-166.

Tacoli, C. (2004). Rural-Urban Linkages and Pro-Poor Agricultural Growth. In: An Overview Paper Prepared for OECD DAC POVNET Agriculture and Pro-Poor Growth Task Team. Helsinki Workshop, 17 – 18.

Tacoli, C. (2002). Changing rural-urban interactions in the Sub-Saharan Africa and their impact on livelihoods: A summary. London: United Kingdom.

Todaro, M. (1969). A Model of labour Migration and Urban Unemployment in LDCs. American Economic Review, 59: 138-148.

Todaro, M.P. (1997). Urbanization, unemployment, and migration in Africa: Theory and policy, 104. Population Council, New York.

Turner, C. and McClure, R. (2003). Age and gender differences in risk-taking behaviour as an explanation for high incidence of motor vehicle crashes as a driver in young males. Injury control and safety promotion, 10 (3), 123-130

Van Blerk, L., (2008). Poverty, migration and sex work: youth transitions in Ethiopia. Area, 40 (2): 245-253.

Van der Berg, S., Burger, R., Leibbrandt, M. and Mlatsheni, C., (2003). Migration and

the changing rural-urban interface in South Africa: What can we learn from census and survey data? Labour Markets and Poverty in South Africa (2002): 22-24.

Zhao, Y. (1999). Leaving the countryside: rural-to-urban migration decisions in China. The American Economic Review, 89 (2): 281-286.

Annex 1

Description of Bivariate Probit Model

The empirical model was specified as a bivariate model with simultaneous equations (Equations 7 and 8) to account for migration decision (Equation 7)—a selection variable that influence the outcome i.e. whether a migrant will be able to access credit after migrating to urban area (Equation 8).

$$I_{1i}^{*} = \beta_o + \beta_1 X_{1i} + \varepsilon_{1i} \quad \text{.....(6)}$$

$$y_{1i}^{*} = \varphi_o + \delta_1 X_{1i} + \mu_{1i} \quad \text{.....(7)}$$

The bivariateprobit model was estimated using maximum likelihood method in Stata programme. The assumption underlying this estimation was that errors were identically and independently distributed (Equations 9 through 11).

$$E[\varepsilon_{1i}] = E[\mu_{1i}] = 0 \quad \text{.....(8)}$$

$$\text{var}[\varepsilon_{1i}] = \text{var}[\mu_{1i}] \quad \text{.....(9)}$$

$$Cov[\varepsilon_{1i}] = Cov[\mu_{1i}] = \rho \quad \text{.....(10)}$$