EDUCATION AS A MEANS OF SMOOTH RURAL-URBAN MIGRATION: SOME EVIDENCES FROM ETHIOPIA[1], [2]

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Abstract

This paper models the impact of education on rural-urban migration in selected villages of Ethiopia. Level of education is found to be significant in triggering rural-urban migration even after accounting for its indirect effect on migration through earnings differential. This may support the argument that education changes the preferences of individuals in rural villages in favour of public goods that are found in urban centers over cultural 'status goods' in rural areas. Income differential in the migration decision model is positive and significant lending support to the standard Harris-Todaro model.

Key words: Rural-urban migration, status goods, education, self selection

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1. Introduction

A major phenomenon that challenges a typical developing country is unhealthy rural-urban balance where the rural areas are characterized by high population pressure in the face of meagre resource base such as land, and the urban centers grappling with high rate of unemployment and poverty (Ray, 1998; Lucas, 1997). A way out of this abnormal status quo requires a rural transformation-structural change in the livelihood of the rural population which involves a change in the economics, social, demographic, and environmental organizations of the rural area (Koppel and Zurick, 1988).

Rural –urban migration as a means of rural transformation through its effect on the rural-urban balance is constrained by the fact that urban areas are also challenged by high rate of unemployment and rampant poverty. This paper argues that smooth rural-urban migration, that is migration which at least does not contribute to the urban socio-economic problems, can be achieved by making quality education a rural phenomenon.

One of the distinctive features of development process that has been witnessed by the now affluent nations is the fact that their economies have changed from rural based agriculture to urban-based industry (Lucas, 2004; Bhattacharya, 1993). At the heart of such transformation towards what Lucas (2004) called "a society of sustained growth in opportunities," lies rural-urban migration. In particular, according to Bhattacharya (1993), the more palliative steady rural-urban migration in terms of reducing population pressure in pre-industrial Europe got its momentum following the industrial revolution. The labor intensive industrial establishments induced long term industrial growth and created enough jobs that could absorb the rural surplus labor. This led to a decline in the share of rural population in Western Europe.

Rural-urban migration is believed to help reallocate resources, most importantly labor, from less productive sectors, usually agriculture, to vibrant sectors such as manufacturing industry. It also improves efficiency in both traditional and modern sectors in particular in the presence of redundant labor in the agricultural sector and relatively high real wages in the modern sector (Ghatak et al, 1996).

Regardless of such historical merits that rural-urban migration has had, policy makers in developing countries are fearful of this phenomenon. Thus, their policy interest towards rural-urban migration is dictated by the concern regarding the rate of urban population growth (Lucas, 1997). This is partly due to the undesirable consequences of migration resulting from the mismatch between urban jobs created and new migrants seeking jobs.

As Bhattacharya (1993) argued, in early 1950s, industrialization in developing countries was favoured not only to ensure growth but also to change the rural-urban population balance. In this regard, the role of rural-urban migration has been emphasised as a positive phenomenon in relieving population pressure in the countryside of developing countries. After the realization of the prevalence of inequality and poverty despite gains in growth in the 1960s, the rural-urban migration came to be considered as both a cause and symptom of underdevelopment in developing countries (Bhattacharya, 1993).

These concerns were complemented by research works in the field. One of the most cited theories in the migration literature that has predictions of unintended results of rural-urban migration is that of Harris and Todaro (1970). The Harris-Todaro model argues that individuals' migration decisions are determined by rural-urban income differentials net of cost of migration and probability of finding jobs at destinations. The most important prediction of the model is that the equilibrating condition of the process of rural-urban migration is unemployment in the urban centers and as such migration is a disequilibrium phenomenon. This follows their basic assumption that urban wages are rigid and are set too high. Thus, development schemes that target on reducing urban unemployment might end up with an even higher level of unemployment rate in urban centers which compromises welfare.

Even though the merit of rural-urban migration is contentious in developing countries, the fact that a large segment of the society of these countries still resides in rural areas necessitates for a policy that targets a smooth rural-urban migration to enhance rural transformation. The pressure of the seemingly alarming rural-urban migration is felt probably because migrants flow mainly to a few destinations, usually the capital cities. The reality is that the long term resultant of the rural-urban

migration in developing countries is a low share of urban population. While the share of the rural population in England was 50 percent as early as 1850 and a mere 11 percent in 1998 (Lucas, 2004), Ethiopia, in her long history, managed to urbanize only 15 percent of her population as she enters the 21st century (CSA, 2008). In sub-Saharan Africa countries, the average share of the urban population in 2005 was 35 percent (UN, 2007).

Following the Harris-Todaro (1970) predictions of the persistence of rural-urban migration even in the face of high unemployment in urban areas, there have been a number of extensions to the debate. Stark (1991) argued that individuals may not migrate even under significant wage differential or they may do so in the absence of meaningful wage differential, and yet this does not imply irrationality. He argued that this has rather something to do with risk-pooling strategy of a household and relative deprivation. Lucas (2004) has associated the phenomenon with human capital where high urban wages are available only for high skilled labors and as such individuals migrate to urban centers because "cities are good places to accumulate human capital." Thus, at a point in time, it is possible to find individuals who are in the process of learning but not employed. Rural-urban migration in this sense can be perpetuated by the widening difference in skill between the urban and traditional rural workers.

However, it is quite difficult for a rural individual who has never been introduced to some level of education to migrate to urban centers in search for education that would enable him to accumulate the high skill that is required to be able to compete in the urban labor market. This is because the gap between the initial stock of knowledge of an individual and the level of skill required for urban jobs could be too high to the extent that rural values are more appreciated. This paper approaches the problem from a different perspective. When individuals are introduced to some level of education, their preferences change from rural-based traditional status goods to urban-based public goods. Once rural life is considered as backward, higher rural income over the expected urban earnings in urban areas may not be able to keep individuals in rural origins. As such, rural areas are 'safe' and effective places to accumulate the initial human capital which serves as a basis for both smooth rural-urban migration and further human capital formation with better quality.

The paper emphasizes the role of education in inducing smooth rural-urban migration which is a means for rural transformation. Education, besides its effect on migration through its impact on earnings differential (Fan and Stark, 2008; Lucas, 2004), also has the power to break the cultural inertia that keeps individuals in their original rural place of residence by changing their preference. Since urban employers have a preferential treatment for educated migrants, the level of unemployment may not necessarily be as high as predicted by Haris and Todaro- a point stressed by Fields (1975). More importantly, urban labor markets in developing countries are characterized by a skill gap where the unemployed are unskilled while there is a sheer absence of critically needed skilled manpower.

The empirical section of the paper attempts to model the determinants of rural-urban migration using Ethiopian data collected on both migrants and non-migrants from some villages in North and South Wollo of the Amhara regional state. The analysis gives a particular emphasis to the role of education in inducing smooth rural-urban migration as a means of desirable rural-urban balance.

The remaining part of the paper is organized as follows. Section two introduces the study sites, discusses the data, and briefly assesses the patterns of migration in Ethiopia. In section three, an attempt is made to derive the theoretical underpinnings of the decision to migration in special reference to Ethiopia. Section four discusses empirical results. Section five concludes.

2. Patterns of Migration in Ethiopia

2.1. The National Pattern

In general, rural-urban migration in Ethiopia has been relatively low for so long. The fact that only 16.2 percent of the 73.9 million people of the country live in urban centers indicates the sluggishness of the rural-urban migration. The most populous regional states Oromia, Amhara, and Southern Nations, Nationalities, and Peoples which account for 80.4 percent of the total population have urbanization rate of only 12.4, 12.3, and 10.3 percent, respectively. The capital, Addis Ababa, accounts for about 22.9 percent of the total urban population of the nation (CSA, 2008).

The large population in the agricultural sector of the country could not even manage to feed the nation. About 83.8 percent of the population of this country ekes its living from subsistence agriculture. The agricultural sector in which such large mass of the population is engaged accounts for 43 percent of the GDP. With declining per capita land holdings, land fragmentation, and loss of soil fertility, rural households hardly accumulate a buffer stock that would enable them to cope with even a onetime crop failure. Thus a development policy that does not put effort on significantly changing such rural-urban balance seems to have a slim probability of success.

According to the 1999 Labor Force Survey of the Ethiopian Statistical Agency (CSA, 2000), 19.9 percent of the Ethiopian people were internal migrants. For the five years period prior to 1999, only about 4.3 percent of the population have migrated. These figures include rural-rural, rural-urban, urban-urban, and urban-rural migrations which account for 37.6, 23.5, 23.2, and 15.7 percent of all migrations, respectively.

In terms of relieving the population pressure in rural areas, the rural-urban migration rate can be shown to be insignificant. Given, according to the 1999 National Labor Force Survey, the total number of migrants and the 23.5 percent share of the rural-urban migration in all forms of migrations, rural-urban migrants in proportion to the rural population over the five year period prior to 1999 is calculated to be 1.2 percent. This can be roughly translated as only some 0.23 percent of the rural population migrating to urban centers annually. This figure contrasts with the 2.7 percent annual growth rate of the rural population of the country. About 17 percent of the rural migrants and 16.8 percent of urban migrants headed to the capital, Addis Ababa (CSA, 2000).

Generally educated people are more mobile. In the 1994 population census, about 51 percent of all recent migrants of all forms were literate. The literacy rate of the non-migrants during the same period was however 21 percent. The migration rate (all forms of migration) for the illiterates was 0.8 percent and this rate progressively increases with education. Among individuals with primary, junior secondary, senior secondary and tertiary levels of education, the overall migration rates were 2.1, 3.5, 6.0, and 16.2 percent, respectively. Moreover, about 69.6 percent of migrants with

urban origins (to all destinations) were literate. About 30.4 percent of the migrants with rural origin were literate. Given the literacy rate of 68.9 percent in the urban areas during the same period, it might not be appropriate to directly associate the form of migrations with urban origin to level of education. However, given the 15.3 percent of the literacy rate in the rural areas, the 30.4 percent literacy rate among migrants of rural origin can clearly show self selection of migrants by level of education[3].

Table 1: Percentage Distribution of Recent Migrant Population by Broad Age group, Sex and Main Reason for Migration: National - 1999

Age Group and Sex		Main Reason for Migration						
		Education	Marriage	Search for work	Job Transfer	Along with family	Returned home	To live with relatives
All ages	Total	9.0	13.2	17.4	5.1	24.5	10.4	8.2
	Male	10.8	1.4	22.2	8.8	23.4	14.1	8.3
	Female	7.5	23.0	13.4	2.1	25.4	7.4	8.2
0 – 14	Total	8.9	0.8	7.3	0.3	58.0	5.8	10.8
	Male	7.7	0.1	9.1	0.5	60.1	5.2	9.3
	Female	10.1	1.5	5.5	0.1	56.0	6.4	12.2
15 – 64	Total	9.2	18.7	22.0	7.3	10.6	12.2	6.6
	Male	12.4	2.1	28.7	12.8	6.8	18.0	7.2
	Female	6.6	31.8	16.7	2.9	13.6	7.6	6.1
65+	Total	0.6	0.7	3.8	0.6	8.2	20.4	33.2
	Male	1.1	0.5	4.7	1.2	5.7	24.5	31.8
	Female	0.0	0.9	3.0	0.0	10.5	16.5	34.5

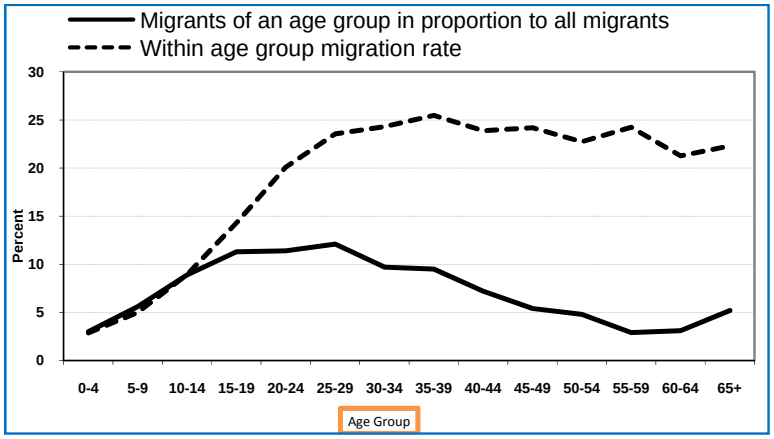
Source: CSA, Ethiopian National Labor Force Survey, 2000.

[3] It was not possible to determine the pattern of rural-urban migration specifically by level of education from the 1994 report on population and housing census.

Among those individuals in the age group 15-64, the major reason for migration is job search. By the account of this reason of migration, male are dominant. The earning differential between the urban and rural sectors is believed to be a major catalyst of rural-urban migration at least for those who migrate looking for jobs. In the country, about 55 percent of GDP is accounted by the non-agricultural sectors. It can be roughly approximated that the per capita income of citizens engaged in non-agricultural sectors is about 7 times higher than the per capita income of citizens who make their livelihood from agriculture. Such differences naturally trigger a net movement of people from rural to urban centers.

As it can be shown in Figure 1, the proportion of migrants by age category (number of migrants in a given age group in proportion to total number of migrants of all ages) increases with age and then tends to decline after the age range of 30-34. The within age group migration rate, which is calculated as the total migrants of each age group divided by the total population of the same age group, tends to follow a similar pattern to the proportion of migrants. However, the age specific migration rate for older people is still higher. The important point is that the movement of the older people is not dominated by motives of work. Results of the 1999 labor force survey shows that about 67 percent of migrants of age 65 and above changed their place of residence mainly to live with relatives, to return to their original home, and in some cases due to health problems. Among the migrants of this age group, those who moved seeking job account only for 3.4 percent.

Figure 1: Migration by age group



Source: Author's calculations using the 1994 population census report of Ethiopia.

2.2. Patterns of Migration in the Villages under Study

2.2.1. The Study Sites and the Data

The study covers about 250 households and 1000 respondents in six villages in Amhara regional state in Ethiopia. These villages are Alasha, Buhoro, Menentela, Kulie, Girana, and Habru-Ligo. They were systematically selected based on their distances from major towns. The systematic sampling is preferred because distance of each village from urban centers is the major variable in other two studies which have made use of the same data set.

Table 2: Distance of the Study Sites from Urban Centers

		Mersa Zuria				
	Alasha	Menentela	Kulie	Buhoro	Girana	Habru-Ligo
Distance from District Town (in km)	7	4	7	8	15	20
Distance from Major Towns (in km)						
Dessie	12	94	97	98	75	85
Woldiya		20	25	20	50	60

The village with closest proximity to an urban center is about 4 kilometre from a reference district town and the farthest village is 20 kilometre away from the nearest district town. Proximity to major towns is also considered. The major towns that are taken as references are Dessie and Woldiya. The two towns are 120 kilometre apart along the main Addis Ababa – Mekele road. District towns include Kutaber and Mersa.

One of the villages covered by the study called Alasha is located in Kutaber district some 12 kilometre from Dessie. The nearest district town to Alasha is Kutaber.

The other study site, Mersa Zuria area, includes three villages intercepting the district town Mersa on either side of the Dessie-Woldiya road. The villages are Buhoro, Menentela, and Kulie.

The third study site is Girana. It is located about 7 kilometres east of the Addis Ababa-Mekele road. There is a gravel road linking the village to the major highway.

Among the villages covered by the study, Habru-Ligo has the farthest distance from both urban centers and major roads. Even worse, people in this village have no access to feeder road that is accessible by vehicle. Individuals have to travel a minimum of three hours on difficult terrains to work on their land.

Due to absence of a complete list of households in each Peasant Association (PA) of the study sites (the lowest administrative unit of the rural areas), a cluster sampling technique is used for the survey. Each PA is divided into small and fragmented sub-villages called '*got*'. Each sub-village was randomly selected. Households in the selected sub-villages were listed. From the complete list, some 55 to 75 households were randomly selected for the study depending on the size of the population in the clusters of each PA. The number of households that are covered by the study in all villages is 252.

Households were asked about their income by source and factors of production and whether any member of the household has currently migrated out. Sending families were also asked about some demographic and socio-economic information of the migrants including the income and type of job of the migrant.

For individuals who migrated to a nearby town, it was not difficult to trace them and get information as required. Most migrants are teachers and are in fact destined to nearby towns and cities. The coincidence of the survey with school vacation helped to meet quite a number of migrant respondents at the survey sites. The income of three respondents who have migrated to far places such as Dire Dawa and Jimma had to be estimated by their occupation. The income of an individual who migrated to Addis Ababa and whose contact details were denied was also estimated based on his sector of employment.

2.2.2. Patterns of Migration

The migration pattern in the villages under study in relation to the various migration characteristics is more or less similar to the national pattern. It is observed that the rate of rural-urban migration has an inverted u-shape trend with age. In general, men and those individuals with better education dominate the rural-urban migration.

The rate of rural-urban migration among villages significantly varies with distance from major urban centers. Alasha, which is the nearest village to a major town, has a total migration rate of 10.4 percent, while Habru-Ligo, which is the farthest village from urban centers, has a migration rate of 2.5 percent.

The major migration characteristic that influences the pattern of migration is education. In all villages combined, those individuals who are illiterate account for only 4.6 percent of the total migrants. Individuals with primary, junior secondary, senior secondary, and tertiary levels of education account for 24.1, 21.8, 29.9, and 19.5 percent of the total number of migrants, respectively.

The strong association between education and migration becomes even clearer when the migration rate among the groups by education level is considered. The migration rate for illiterate is only 0.6 percent. On the other hand, this rate for educated individuals progressively increases from 4.1 percent for those with primary level of education to 94.4 percent for those who have tertiary level of education. This figure excludes individuals who moved to urban areas exclusively for education purpose and are currently enrolled.

3. The Model

A given household might compare utilities in different locations (Stark, 1991; Aroca and Hewings, 2002). Let us consider an individual who contemplates between moving to urban centers and staying in rural areas. The individual compares not only expected incomes in the places of destination and reservation income at places of origin but also the type of goods he prefers to consume in maximizing his utility. Suppose that the utility in rural area is a function of a composite of goods x_r and

cultural values that can be considered as 'status good', g_r. The variable g_r represents the mode of life such as weddings, traditional beliefs, child-rearing, traditional savings and insurance schemes (such as *iqqub* and *iddir* in the Ethiopian case) in association with a place where one is born and has grown up. Thus, the utility is given by:

$$u_r = u_r(x_r, g_r) \quad \textbf{(1)}$$

The individual faces a budget constraint. Assume that each basket of commodities is bought for a price p_{xr}. However, the 'cultural' good g_r does not have an explicit price. To enjoy the rural 'status' good, or cultural values, one has to claim a certain rank in the society. An individual has to put an effort to accumulate wealth that would be enough to cover lavish festivals such as wedding, charity, lending to neighbours during unfavourable circumstances to get a status of benevolent[4]. Let us assume that all of these activities claim the household to possess wealth beyond what is required for decent life. An individual who can afford to pay for such cultural values can enjoy them and pays extra prices p_{gr}. The budget constraint is therefore given by:

$$p_{gr}g_r + p_{xr}x_r \leq W_r \quad \textbf{(2)}$$

where W_r is wealth. To simplify matters, assume that wealth equals rural income, y_r.

Maximization of utility represented by Equation (1) subject to the budget constraint (2) gives demands for x_r and g_r. Substituting these ordinary demands back into the utility function, we have:

$$V_r = V_r\left(x_r^*(p_{xr}, y_r, p_{gr}), g_r^*(p_{xr}, y_r, p_{gr})\right) \quad \textbf{(3)}$$

[4] The rank of an individual or a household in a community has been emphasized as an important determinant of migration decisions through relative deprivation by Stark (1991), Stark et al (2004).

If the individual were to migrate, he would maximize his utility by consuming composite goods x_u and public goods, g_u, that are very rare in rural areas. The public goods might include electricity, tap water, hospitals, asphalt roads, public TV channels, and cinemas.

More importantly, the preferences for public goods require some level of sense of 'modernity' which in turn can be thought of being a function of education. The knowledge endowment of a migrant is critical not only as an input to the potential return in terms of income but also as a means to assimilate to the relatively complex urban life. Further, education changes the individual taste in favour of urban life; an individual with some level of education begins to consider some rural cultural values as backward.

Suppose that a parameter B captures the level of such 'modernity' and also the degree of information that an individual has about the urban labor market. The utility with the parameter, B, which is related to demand for public goods is given by:

$$u_u = u_u(x_u, Bg_u) \quad \textbf{(4)}$$

The individual buys the commodities x_u and g_u from the market at their corresponding prices. However, the migrant is expected to contribute to the government in taxes so that public goods would be available. Given the price of each commodity and the tax contribution, the migrant would face a budget constraint:

$$p_{xu}x_u + (t_u + p_{gu})g_u \leq W_u \quad \textbf{(5)}$$

Where p_{xu}= price of ordinary goods, p_{gu}= price of public goods, t_u = tax contribution for the provision of public goods, and W_u= wealth of a migrant at destination.

Let us further assume that urban wealth equals current earnings weighted by the probability of getting job, π. Assuming that earning is a function of the level of education, E, and cost of migration, C_m, is mainly a function of distance, r, we have:

$$W_u = y(E)\pi - C_m(r) \quad \textbf{(6)}$$

The individual would maximize the utility represented by Equation (4) subject to the budget constraint represented by Equation (5). Accordingly, the demands for ordinary and public goods would be:

$$x_u^* = x_u^*\left(p_{xu}, p_{gu}, t_u, y_u(E), \pi, C_m(r); B\right)$$
and
$$g_u^* = g_u^*\left(p_{xu}, p_{gu}, t_u, y_u(E), \pi, C_m(r); B\right) \quad \textbf{(7)}$$

Substituting Equations (7) into (4), we obtain the indirect utility:

$$V_u = V_u(x_u^*, g_u^*) = V_u\left(p_{xu}, p_{gu}, t_u, y_u(E), \pi, C_m(r); B\right) \quad \textbf{(8)}$$

Let the difference in utility in the two locations be given by:

$$\begin{aligned}\Delta V &= V_u\left(x_u^*(.), g_u^*(.)\right) - V_r\left(x_r^*(.), g_r^*(.)\right) \quad \textbf{(9)}\\ &= V_u\left(p_{xu}, p_{gu}, t_u, y_u(E), \pi, C_m(r); B\right) - V_r\left(p_{xr}, p_{gy}, y_r\right)\end{aligned}$$

Let us further define a function $M^* = f$:

$$M^* = f(.) = f\{[y(E) - y_r], (p_u^* - p_r^*), \pi, C_m(r); B\} \quad \textbf{(10)}$$

where $M^* = f: \Re \to \Re$ is a monotonic transformation of ΔV and could be thought as a propensity to migrate of an individual, $p_u^* \; and \; p_r^*$ are weighted prices of goods in urban and rural areas, respectively.

The individual is assumed to migrate if $\Delta V > 0$. By implication, an individual decides to migrate if $M^* = f(.) > 0$. In Equation (10), $(y(E) - y_r)$ represents the income differential which is commonly believed to be the most important determinant of migration decision. The term $(p_u^* - p_r^*)$ represents difference in costs of living in the two places. As mode of life changes when an individual migrates from rural area to urban center, the composition of goods would be different implying that the migrant would face different prices. In particular, households in rural areas enjoy 'lower'

prices for staple crops since they produce it themselves. Cost of transportation could also increase prices at destination. Probability of securing job at destination, π, cost of migration, $C(r)$, and the parameter B which can be proxied by level of education, E , directly enter the function of migration decisions.

The underlying utility function in both areas and their differences are assumed to be continuous. The individual's migration decision model under Equation (10) can be rewritten in econometric setup as:

$$M_i^* = w'\gamma + u \qquad \textbf{(11)}$$

where w = vector of independent variables (those which appear in Equation (10) or their proxies, and other control variables), γ = a set of parameters, and u = random error term. The vector w includes individual, household and location (geographic) attributes. Besides level of education, income differential, and distance from the nearest town are of particular interest.

Denoting the discrete response variable representing whether an individual has migrated or not by M, the propensity of migration can be related to it according to:

$$M = \begin{cases} 1 \; if \; M_i^* > 0 \\ 0 \; if \; M_i^* \leq 0 \end{cases} \qquad \textbf{(12)}$$

The discrete choice variable M assumes a value of 1 if the individual has moved to urban areas and a value of '0' otherwise. Thus, the model can be estimated using probit or logit.

4. Estimation Results

Since data on level of education for both migrants and non-migrants is observed, it would be possible to estimate migration decision using standard index models (logit and probit). But the need to include income differential which is the major determinant of rural-urban migration into the model to account for the indirect effect of education and for specification purpose complicates the estimation. That is because calculating earnings differential is not straight forward. The earnings

outcome for migrants depends on the outcome of migration. For non-migrants, the income which they would have earned had they migrated is not observed. Similarly, the income the migrants would have earned had they stayed in their original location is missing. Thus, earnings is incidentally truncated both from the migrants and non-migrants point of view (Heckman, 1979; Nakosteen and Zimmer, 1980).

Thus, the estimation of the earnings of the migrants and non-migrants in their respective places requires going beyond ordinary least squares due to the possible existence of self selection which may result in biased estimates. The fact that some individuals migrate while others do not could be an indication for the existence of important differences between the two groups of individuals in terms of viewing benefits (Greenwood, 1975). There might thus be self selection in the sense that the sample could no more be considered as random. This threatens the validity of inferences that are made about the underlying population based on OLS regression results. In particular, Heckman (1979) argued that the earnings of the migrants do not give a reliable estimate of the income that the non-migrants would have earned had they migrated resulting in "a biased estimate of the effect of a random treatment of migration". When this problem exists, the OLS model will be mis-specified as if a relevant variable was omitted (Nakosteen and Zimmer, 1980; Ghatak et al, 1996, Greene, 2003).

Fortunately, there is an alternative model which accounts for possible existence of selection problem; that is the Heckman procedure of selection model. Following the argument by Nakosteen and Zimmer (1980) and the framework developed in section 3, suppose that an individual generates an income of y_r from rural based economic activities and an income of y_u from urban based economic activities. The incomes function of an individual in rural areas and the earnings function of a migrant in urban areas can respectively be given by:

$$y_r = x'\theta + \epsilon_1$$
$$y_u = z'\beta + \epsilon_2 \qquad \textbf{(13)}$$

But migration decisions are determined by income differential $(y_u - y_r)$ and costs of migration. At the same time, the earnings outcome is dependent on the outcome

of migration decisions. Hence, the earnings and migration decision equations can simultaneously be given by:

$$\begin{aligned} y_r &= x'\theta + \epsilon_1 \\ y_u &= z'\beta + \epsilon_2 \\ M &= w'\gamma + u \end{aligned} \qquad \textbf{(14)}$$

Given the fact that one observes y_u only if $M_i^* \geq 0$, it is possible to derive for migrants as:

$$E(y_u|M^* > 0) = E(y_u|u > -w'\gamma) = z'\beta + \rho\sigma_{\epsilon_2}\left[\phi\left(w'\gamma/\sigma_u\right)\Big/\Phi\left(w'\gamma/\sigma_u\right)\right]$$

$$= z'\beta + \beta_\lambda\lambda_i(\alpha_u) + \upsilon_1$$

where $\beta_\lambda = \rho\sigma_{\epsilon_2}, \alpha_u = -\left(\frac{w'\gamma}{\sigma_u}\right), \quad \lambda_i(\alpha_u) = \phi\left(w'\gamma/\sigma_u\right)\Big/\Phi\left(w'\gamma/\sigma_u\right)$, $\phi(.)$ and $\Phi(.)$ are the standard normal population density function, and the standard normal cumulative density function, respectively. The function $\lambda_i = \phi(.)/\Phi(.)$ is the inverse Mill's ratio. It is assumed that $\epsilon_1 \sim N(0, \sigma_1^2)$, $\epsilon_2 \sim N(0, \sigma_2^2)$, $u \sim N(0,1)$ and $corr(\epsilon_2, u) = \rho$. The application of the Heckman procedure is necessitated if ρ is statistically different from zero (Greene, 2003; Nakosteen and Zimmer, 1980).

In the rural income function, the dependent variable is annual per capita income in Birr (the Ethiopian currency; 1 USD ≈ 12 Birr as of 2009). The explanatory variables consist of land size, labor, oxen, cattle, dummy for access to irrigation, dummy for rural enterprise, and the level of education of the head. It is required that at least one explanatory variable which does not enter the regression equation should appear in the selection equation. Accordingly, the selection equation includes distance from major towns, sex, age, and age squared besides the variables which also appear in the regression equation. [See Table 3 and 4].

For the estimation of earnings of migrants, a logarithm of annual income of migrants in Birr was used as a dependent variable. The covariates include level of education, age (proxy for experience), square of age, and sex (takes on a value of 1 if the individual is female and 0 otherwise).

Table 3: List of Variables Used in the Estimation

Variable	Mean	Standard Deviation	Min	Max
Rural per capita income (in logs)	6.67	0.84	3.37	8.77
Labor (in logs)	0.88	0.44	-1.39	1.91
Land size (in logs)	-0.47	0.62	-2.08	1.01
Oxen	1.66	1.16	0	9
Level of education of the head	1.44	2.85	0	11
Cattle	2.49	2.43	0	12
Dummy for rural enterprise	0.20	0.40	0	1
Dummy for access to irrigation	0.41	0.49	0	1
Age	37.37	15.75	18	90
Age square	1644.46	1390.02	324	8100
Sex (female = 1, male = 0)	0.49	0.50	0	1
Distance from major towns	62.04	33.97	12	98
Urban income of migrants (in logs)	8.46	0.81	6.40	11.34
Level of education	9.68	4.30	0	21
Age	0.65	7.13	18	45
Sex (female =1, male = 0)	0.35	0.48	0	1
Income differential (difference of logs)	-0.47	0.75	-2.68	2.41
Level of education	3.58	4.41	0	21
Sex (female = 1, male = 0)	0.48	0.50	0	1
Age	36.51	15.44	18	90
Age square	1571.15	1354.49	324	8100
Pre-migration land per labor	0.12	0.08	0	0.5
Land per labor ratio squared	0.02	0.03	0	0.25
Level of education of the head	1.56	2.95	0	11
Age of the head	53.61	12.95	25	90

The data used for the estimation of the model is the own survey data from the villages that are discussed under section 2.2. Full information maximum likelihood (FIML) and Heckman two-step estimation procedures are used to estimate the income function of non-migrants and the earnings function of the migrants. Upon the test of exclusion restrictions, distance from major urban centers had a perverse

sign (positive) in the rural income function unlike that of the distance from district towns. It was not, however, significant in the earnings function of the migrants. [See Tables 4]. Thus, distance from major towns is the main 'instrument' that appeared in the selection equations.

Table 4: Test for Exclusion Restriction

Dependent Variable: Per capita rural income of non-migrants		Dependent Variable: Urban Income of Migrants	
Labor (logs)	-0.609	Level of education	0.124
	(13.14)**		(6.00)**
Land (logs)	0.335	Age	0.022
	(12.05)**		(1.98)
Oxen	0.131	Sex (Female =1)	-0.397
	(8.37)**		(-2.30)*
Dummy - irrigation	0.330	Distance from major towns	0.001
	(7.46)**		(0.41)
Dummy Climate	1.647	Constant	6.304
	(6.78)**		(19.39)**
Access to Road	1.052		
	(14.04)**		
Level of education	0.008		
	(1.76)		
Cattle	0.032		
	(4.23)**		
Dependency ratio	-0.269		
	(11.18)**		
Distance from major towns	0.027		
	(7.57)**		
Intercept	4.122		
	(12.04)**		
Observations	1487	Observations	64
R-squared	0.49	*R-squared*	*0.51*

Absolute value of t statistics in parentheses; significant at 5%; ** significant at 1%*

There were no major differences in the results from the two methods of estimation (FIMIL and Heckman Two-step procedures) both in terms of coefficients and z-ratios. [For FIML results, see Tables 5 and 6]. The null for the absence of selectivity bias was not rejected at 5 percent and 1 percent levels in the case of non-migrants and migrants, respectively, thus supporting the appropriateness of the use of the Heckman procedure.

Table 5: Earnings of Non-migrants (FIMLE Results)

Dependent Variable: Per capita income (in logs)		
	Regression Equation	**Selection Equation**
Labor (in logs)	-0.363	0.359
	(-2.89)**	(1.70)
Per capita land size (in logs)	0.245	-0.116
	(2.50)*	(-0.76)
Oxen	0.173	0.171
	(4.80)**	(1.81)
Level of Education-Head	0.035	-0.178
	(2.33)*	(-7.31)**
Cattle (per capita)	0.063	0.012
	(3.37)**	(0.22)
Dummy rural enterprise	0.445	0.006
	(4.40)**	(0.03)
Dummy access to irrigation	0.470	0.372
	(5.24)**	(1.64)
Intercept	6.308	4.849
	(40.75)**	(3.84)**
Distance from major towns		0.0012
		(0.38)
Age		-0.219
		(-2.75)**
Age-square		0.004
		(2.71)**
Sex (Female = 1)		0.349
		(2.23)
The inverse Mill's ratio (λ)		0.200*
Number of observations	886	
Censored	77	
Uncensored	809	
Wald $\chi^2(7)$	163.48	
LR test of indep. eqns.($\rho = 0$)	$\chi^2(1) = 3.89$*	

Figures in parentheses are z statistics.
* significant at 5%; ** significant at 1%

Table 6: Earnings migrants (FIMLE Results)

Dependent Variable: Per capita income (in logs)		
	Regression Equation	**Selection Equation**
Level of Education	0.180	0.172
	(5.14)**	(6.69)**
Age	0.027	0.247
	(2.53)*	(3.13)**
Sex (female = 1)	-0.530	0.291
	(-2.79)**	(1.56)
Intercept	4.838	-5.738
	(6.55)**	(-4.70)**
Distance from major towns		0.0008
		(0.27)
Age-square		-0.004
		(-3.00)**
Sex (Female = 1)		-0.291
		(-1.56)
The inverse Mill's ratio (λ)		0.533**
Number of observations	896	
Censored	838	
Uncensored	58	
Wald $\chi^2(3)$	31.73	
LR test of indep. eqns.($\rho = 0$)	$\chi^2(1) = 11.46$**	

Figures in parentheses are z statistics.

* significant at 5%; ** significant at 1%

The next step in estimating the migration decision equation is calculating the difference in earnings of individuals at places of origin and destination. Using the estimated incomes function of non-migrants, the reservation level of income of migrants has been predicted. Similarly, using the estimated earnings function of migrants, the expected income of non-migrants which they would earn if they were to migrate is predicted.

Denoting the estimated urban income and rural income by $\hat{y}_u$ and $\hat{y}_r$, respectively, the income differential can be calculated as:

$$\Delta\hat{y} = \hat{y}_u - \hat{y}_r \quad \textbf{(15)}$$

Using the simple income differential $(\hat{y}_u - \hat{y}_r)$ in the migration decision equation may not be appropriate. Individuals who contemplate to migrate to urban centers do not necessarily consider only nominal wage rates at destination. As migration theory dictates, one of the factors that enter in the calculus of expected income is probability of finding job. Harris and Todaro (1970) considered the proportion of filled jobs to the total urban labor force (or simply urban employment rate) as perceived probability of getting a job in urban areas. Following their approach, the employment rates by educational status is used as perceived probability of getting a job for this analysis. Thus, assuming that there is no unemployment in rural areas, the difference in expected income is calculated as:

$$\Delta y = \pi\hat{y}_u - \hat{y}_r = (1-u)\hat{y}_u - \hat{y}_r \quad \textbf{(16)}$$

where π = probability of securing job in urban areas, and u= rate of unemployment.

The Ethiopian national labor force survey shows that urban unemployment rate for active labor force with no formal education, primary level of education (1-8 grades), secondary level of education, and tertiary level education were, respectively, 16.7, 23.1, 33.9, and 12 percent (CSA, 2000).

For a significant number of the observation, the income differential without accounting for urban unemployment is positive for both migrants and non-migrants. Only few migrants have negative income differentials. This might pose a question that if individuals who did not migrate so far have positive income differential in favor of urban expected income, why did they not migrate? In fact, one of the arguments of Haris and Todaro (1970) is that the probability of finding job and cost of migration play a key role in migration decisions. In Stark's (1991) line of argument, individuals may not migrate even under significant wage differential or they may do so in the absence of meaningful wage differential. This reflects the risk-pooling strategy of a household.

In this particular case, accounting for rate of unemployment in urban areas has increased the number of individuals with negative income differential even for

educated migrants, except for those who have a tertiary level of education. This latter result may lead to another interesting point that individuals in rural areas once introduced to a certain level of education may still prefer to work in urban areas even if rural economic activities get them better earnings. This might be due to the fact that education changes their perception so that they prefer urban public goods to rural cultural values.

The migration decision equation is estimated by including the incomes differential using a binary probit model [See results on Table 7]. The explanatory variables include income differential, distance from major towns, level of education, per capita land size before migration and its square, age, and sex (female = 1). It has been found that differences in income adjusted for probabilities of finding job are significant and positive. It seems that the result supports the hypothesis that individuals migrate to urban areas in response to earnings differential.

The significance of education in the migration model may suggest that besides its impact on migration decisions through income, it also causes changes in preferences. That is, individuals with little or no education tend to stay in their original places for cultural reasons even if they face differences in income. On the other hand, individuals with some level of education may not necessarily prefer to stay in rural areas even if their earnings from agriculture are higher than the expected income in urban areas. Education can also serve as a means to narrow the information gap about the labor market at destination.

Distance which is intended to capture costs of migration was not statistically significant. A study by Agesa (2001) using data from Kenya showed also similar result. The insignificance of distance in this particular study might be a result of multicollinearity problem because level of education of individuals also depends on distance from urban centers. In fact, when level of education is dropped from the regression, distance has a negative and significant coefficient.

Table 7: Probit Estimates of Determinants of Migration

Dependent Variable: Migration Decision, M (M=1 if migrated, 0 otherwise)		
	Probit Estimates	
	Coefficients	Slopes
Income differential	0.323 (2.60)**	0.007
Level of Education	0.124 (6.30)**	0.003
Pre-migration land- labor ratio	-5.436 (-2.07)*	-0.123
Land –labor ratio squared	15.338 (2.71)**	0.347
Distance	-0.001 (-0.57)	-0.00003
Age	0.211 (3.30)**	0.005
Age square	-0.004 (-3.26)**	-0.00008
Sex (female = 1)	-0.180 (-1.12)	-0.004
Level of education-Head	0.044 (1.69)	0.001
Education-Head-squared	-0.0003 (-1.44)	-7.45e-06
Intercept	-6.156 (-4.44)**	
Number of Observations	1008	
Wald $\chi^2(11)$	105.43	
Pseudo R^2	0.33	

Figures in parentheses are robust z statistics.

* significant at 5%; ** significant at 1%

Land per labor ratio has a negative and significant coefficient while its square has a significant positive coefficient. This result may in general imply that members of families with small land-labor ratio tend to migrate since such households have excess labor. On the other hand, a relatively higher level of per capita land size may encourage migration by easing the cost of migration through its effect on income.

5. Conclusions

The merit of rural-urban migration is contentious in developing countries. Yet, the fact that a large segment of the society of these countries still resides in rural areas requires a policy that targets a 'managed' rural-urban migration to enhance rural transformation. Education might be considered as a means of achieving rural transformation through smooth rural-urban migration.

It has been demonstrated that relatively educated individuals in rural areas migrate to urban centers not only because education gives them a means to secure higher earnings at destinations but also because it induces them to develop a preference for urban public goods instead of rural based traditional ways of life.

Rural-urban migration is desirable and inevitable. The challenge is how to avoid outcomes that make rural-urban migration a signal of a malfunctioning transformation process. The desirable features of rural-urban migration can be achieved through education and hence the latter can be used as a means of ensuring smooth rural-urban migration in particular in a country such as Ethiopia which is characterized by a high skill gap. This requires making sustainable education a rural phenomenon.

Rural-urban migration does not have to involve dislocation of people from their places. Upgrading small villages to townships with provision of public goods would help to eventually transform rural areas.

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