

〒Migration, Infrastructure Effects and the Urbanization Process in Developing Countries-the Case of Ghana(発展途上国における人口移動、社会資本と都市化に関する分析-ガーナを事例として-)〒

著者	ISSAH ISMAIL
号	268
発行年	2003
URL	http://hdl.handle.net/10097/12965

氏名(本籍)	ISSAH ISMAIL (ガーナ)
学位の種類	博士(情報科学)
学位記番号	情博第268号
学位授与年月日	平成15年9月11日
学位授与の要件	学位規則第4条第1項該当
研究科、専攻	東北大学大学院情報科学研究科(博士課程)人間社会情報科学専攻
学位論文題目	Migration, Infrastructure Effects and the Urbanization Process in Developing Countries-the Case of Ghana (発展途上国における人口移動、社会資本と都市化に関する分析—ガーナを事例として—)
論文審査委員	(主査) 東北大学教授 佐々木公明 東北大学教授 安藤 朝夫 東北大学教授 森杉 壽芳 東北大学助教授 福山 敬

論文内容要旨

Chapter 1. Introduction

The subject of rural to urban migration in developing countries and the factors that cause it continue to engage the attention of both researchers and policy makers in recent times. This is due to the potential impact that migration can have on the overall economic development of a country as a whole. For instance, whilst it can be argued that many developing countries still have capacity for agglomeration economies and therefore urbanization through migration may be good, it (urbanization) sometimes turns out to be a dilemma for policy makers as the benefits of urbanization is not appreciably accomplished. A number of negative externalities have been cited as direct consequences of migration and some of these are urban unemployment, congestion and pollution. In analyzing the underlying factors of rural to urban migration, economists have identified the difference between the income levels of urban and rural areas as the main driving force of migration. This school of thought has been in the limelight since the seminal work of Harris and Todaro (1970). However, recent evidence shown by some studies (Banerjee (1983), Jones and O'Neill (1995), Barry (2002),) suggests that migration may be due to other factors of which inadequate or unavailability of infrastructure in the form of amenities at the sending region is one. Moreover, evidence gathered by us about Ghana and some other African countries shows that places with limited infrastructure in the form of electricity and water tend to be scarcely populated while urban areas which have this infrastructure in abundance continue to witness increasing population through migration. For instance, electricity accessibility is seen to be always higher in the urban areas than in the rural areas. This disparity has been as a result of the pro-urban development stance taken by many governments which makes the urban areas more attractive to potential migrants from the rural areas due to better infrastructure. In short, it can be posited that this ignored determinant of migration may explain some of the situations where the income difference theory can no longer hold. In this dissertation, an attempt is made to determine these infrastructure effects by providing an

extended model of rural to urban migration based on the seminal study by Harris and Todaro. In doing so, we consider utility difference rather than income difference as the main cause of migration. It is noted that the utility level attainable in a particular area depends on the income as well as the infrastructure in the form of amenities that can be enjoyed. The results of comparative static analysis carried out shows positive effect of urban infrastructure on migration and this is verified empirically using data on Ghana.

Chapter 2. Literature Review

This chapter reviews the literature on rural to urban migration by first acknowledging the depth of research that has been centered on the notion of income difference as the main motive for migration. A recap of the basic Harris-Todaro is given followed by a discussion of a host other extensions and criticisms. We point out the research gap in the literature regarding the little attention given to infrastructure difference on migration. Nevertheless, we acknowledge a few studies that mention infrastructure effects on migration whilst drawing our attention to their shortcomings. For example, Jones and O'Neill recognized the part being played by urban infrastructure in the migration process but they did not analyze government responsibility of providing infrastructure at both rural and urban areas. Our approach incorporates government budget for the provision of infrastructure which is not explicitly considered in previous studies.

Chapter 3. Extended Model of Rural-Urban Migration

This chapter concerns with the model building aspects of the research. We set up a two region two-sector model in which migration becomes a rational choice based on the difference between urban expected utility and rural utility. The two sectors are urban and rural sectors. In the rural sector, agriculture production activity uses labour (L_a), infrastructure (G_a) and fixed land (\bar{N}) as inputs such that the agriculture production function is given as

$$Y_a = Y_a(L_a, G_a; \bar{N}) \text{ with } Y_{aL} > 0 \text{ and } Y_{aG} > 0.$$

Farmers in the rural sector receive average income given by

$$y_a = \frac{p_a Y_a(L_a, G_a; \bar{N})}{L_a} \quad (1)$$

$$\text{where } p_a = \gamma \left(\frac{Y_a}{Y_m} \right), \quad \gamma' < 0 \quad (2)$$

is the agriculture output price assuming that urban output price is the numeraire.

Assuming additive separable function for the rural utility, we define it as $U_a = W(y_a) + Z(G_a)$.

For the urban sector, the production activity uses labour L_m , urban infrastructure G_u , and fixed private capital \bar{K}_m , such that urban production is given as $Y_m = Y_m(L_m, G_u, \bar{K}_m)$ and under the assumption of minimum wage, \bar{w} , the urban formal sector income is given as

$$\bar{w} = Y_{mL}(L_m, G_u, \bar{K}_m), \quad Y_{mLL} < 0, \quad Y_{mLG} > 0 \quad (3)$$

There is also the presence of unemployment in the urban sector such that for a total labour force

$$L = L_a + L_m + L_i \quad (4)$$

urban unemployment rate is given by

$$\pi = L_i / (L_m + L_i) \quad (5)$$

where L_i is the unemployed labour force,

Under these conditions, urban expected utility is given by

$$E(U_u) = (1 - \pi)W_1([1 - t_L]y_m) + \pi W_2(y_i) + Z(G_u).$$

Now, since it is the government that provides infrastructure at both the urban and rural areas, we represent a balanced government budget by

$$t_L L_m \bar{w} + (Y_m - L_m \bar{w}) = G_a + G_u + L_i y_i \quad (6)$$

where y_i and t_L are unemployment benefit and tax rate respectively.

The equilibrium utility V at which migration ceases occurs when the rural utility is equal to the expected urban utility. Thus

$$V = U_a = W(y_a) + Z(G_a) \quad (7)$$

$$V = E(U_u) = (1 - \pi)W([1 - t_L]\bar{w}) + \pi W(y_i) + Z(G_u) \quad (8)$$

The equations above are identified as forming a system of eight equations in eight endogenous variables which are $L_a, L_m, L_i, p_a, y_a, t_L, \pi$ and V . These variables are affected by the presence of five exogenous variables identified as G_a, G_u, \bar{w}, y_i and L . To determine these effects, we carry on an extensive comparative static analysis of the system. Under certain assumptions about the signs of first and second order derivatives of outputs and utilities, we make various findings about the effects of the exogenous variables on the endogenous ones.

Chapter 4. Empirical Analysis of the Extended Model

In this chapter, we carry out an empirical analysis to test some of the comparative static analysis results namely, the amenity effects, sensitivity of migration and the Todaro paradox which says that job creation efforts by the government end up increasing the unemployment rate. We also test some of the structural equations and these are the migration function, per-capita agriculture income function and the unemployment rate function. The results of the reduced form equations show that the effect of urban infrastructure on the unemployment rate is positive and significant at 10% level, confirming the theoretical results obtained earlier on. It is noted that this effect is necessarily negative in the basic Harris-Todaro model where government budget as well as utility difference are not considered. The results also show that the effect of rural infrastructure on agriculture income is positive. The empirical results also show that unemployment mainly increases in response to the minimum wage increase.

The behavioral equations results also reveal that better infrastructure in the form of amenities attract more migrants even though they cannot be employed. The effect of urban infrastructure on unemployment rate is negative in this case since increase in urban infrastructure is expected to lower unemployment rate. One important revelation was that an economic structural programme that started in the early 1980's resulted in a considerable decrease in the unemployment rate after 1982. Regarding the agriculture per-capita income, the effect of rural labour force on agriculture income is negative and it is significant at 5% level. Rural infrastructure is also seen to have a positive effect on agriculture income although the result was not statistically significant.

Chapter 5. The Basic Harris-Todaro Model with Infrastructure

Since our main research involves an extension of the Harris-Todaro model, it is expedient to compare our results to the original Harris-Todaro model in which infrastructure is an additional variable. This chapter presents the basic Harris-Todaro model with infrastructure. The same set of exogenous variables are used but the endogenous variables are now L_a, L_m, p_a, y_a and π . Using comparative static analysis, the results obtained are compared to the comparative static results obtained in chapter 3. It is noted that almost the same results apply between the two models. However, while an increase in unemployment benefit in the basic model necessarily increases the welfare in terms of expected income measured by agriculture income, it does not necessarily increase welfare in the extended model. This happens because in the basic model, an increase in the unemployment benefit does not occur as a result of any additional burden on the residents whereas this is the case in the extended model. It is also noted that urban infrastructure increases the welfare in both models. On the other hand, rural infrastructure does not improve welfare in either of the models. The Todaro paradox is found to be present only in the extended model.

Chapter 6. The No-Interference Model

This chapter concerns with the situation where the assumption of minimum wage is relaxed. It is therefore seen that the prevailing urban income is changeable depending on market circumstances. Therefore the urban income y_m is now treated as endogenous whilst the tax rate is regarded as an exogenous. This is done to investigate what effect the tax rate will have on the endogenous ones. For instance we want to know the effect of the tax rate on the urban income. Thus, the endogenous variables are $L_a, L_m, L_i, p_a, y_a, y_m$ and V whilst the exogenous variables are now G_a, G_u, y_i, t_L, L . Comparative static analysis is then carried out to determine the effects of the exogenous variables on the endogenous ones. We then compare the results obtained here with the extended model. The results of the effects on equilibrium utility and the agriculture income were the same for the entire exogenous variables in both models. However, it is observed that the effect of agriculture price had different outcomes for the two models. Whilst in the extended model, rural and urban infrastructure have strictly negative and positive effects respectively on the agriculture price, the results in the no-interference model gave indeterminate signs. Also the extended model indicated a zero effect of rural infrastructure on urban formal labour whilst the no-interference case shows the effect to be positive or negative.

Chapter 7. Conclusions and Recommendations

This chapter summarized the main results of the previous chapters and it also offers some policy recommendations. Regarding the theoretical model, we find from the extended model that the effect of the urban infrastructure on equilibrium utility is positive whilst that of the rural infrastructure can be negative or positive. This can be seen from the fact that urban infrastructure when provided lures migrants to the city thereby reducing urban utility whilst increasing the rural utility. We also obtained the result that the effect of rural infrastructure on agriculture price is negative whilst the effect of urban infrastructure is positive. This means that if more infrastructures are provided in the rural area, more people will be encouraged to stay and agriculture production will increase. The empirical estimations also indicate that amenity effect is working. In the case of the behavioral equations, it is seen that the unemployment rate in the urban area is a crucial factor for migration to

occur. The amenity difference between the two areas is also seen as an important push or pull factor in for migration to occur. One important conclusion made was that labour market conditions are crucial for the migration decision. We finally conclude by saying that indeed, the strong effects of infrastructure on migration and for that matter increased pressure for government to provide infrastructure in the urban areas to the detriment of rural areas is real and therefore cannot be ignored both theoretically and empirically. It is therefore expedient for both researchers and policy makers to recognize this fact and act in concert to arrest the problem of infrastructure disparity between rural and urban areas so that migration can be curtailed.

論文審査の結果の要旨

発展途上国においては、都市への過度の人口集中による問題が深刻である。Harris-Todaroによって定式化されたように、都市での失業の存在にも関わらず、都市と農村間の労働所得格差が都市への人口移動を引き起こしている。しかし、最近の観察によれば、生活基盤社会資本水準の格差が都市への人口移動を加速している。本論文は、後者の要因をも考慮して、Harris-Todaroのモデルを発展させて理論的考察を行い、ガーナを対象とした新しいモデルによる実証分析を行ったものである。論文は全編7章から成る。

第1章では研究の背景と研究の目的が述べられている。

第2章では、発展途上国における農村—都市間人口移動に関するこれまでの文献が批判的に展望されている。

第3章では、発展的Harris-Todaroモデルが提示され、重要な政策変数及び外生変数に関する比較静学分析が厳密に行われている。それは、農村—都市間人口移動要因として生活基盤社会資本水準格差をも導入し、個人が所得格差にではなく、効用水準の差に反応して移動を決定するという全く独創的なモデルである。さらに、税金によって、社会資本投資と都市失業給付金を支出する政府財政を明示的に考慮していることもこのモデルの貢献である。従来のHarris-Todaroモデルに比して格段に複雑さが増した中で、比較静学分析を厳密に行うための方法論にも独創性が認められる。

第4章では、第3章で展開された新しい仮説に基づく統計モデルをガーナのデータに適用した実証分析がなされている。農村から都市への人口移動モデルでは、都市の失業率と共に、社会資本水準の農村—都市間格差が重要な要因であることが統計的に確認されている。これは新しいモデルの適切性を支持する重要な知見である。

第5章では、発展的モデルと従来のHarris-Todaroモデルとの比較検討が行われている。著しく異なる点は、従来のHarris-Todaroモデルでは都市部への社会資本の増加は必ず失業率を低下させるが、社会資本のアメニティ効果を考慮した新しいモデルでは、社会資本増加はかえって失業率を増加させてしまう「パラドックス」が生ずる可能性があることが示されている。これは重要な知見である。

第6章では、都市労働市場での最低賃金制の制約を緩め、都市労働所得が内生的に決定される交替的モデルの分析がなされている。交替的モデルでは前期の失業率が与えられた下で、都市における期待効用が計算されることになるが、多くの発展途上国で最低賃金制が形骸化して多数の労働者がその水準以下の賃金で働いている現状を分析するために、この交替的モデルは有用である。

第7章では、結論と本論文の分析に基づく政策的課題が述べられている。

以上要するに、本論文は発展途上国における農村—都市間人口移動を説明する新しいモデルを構築し、それを理論的、実証的に分析したもので、情報科学の発展に寄与するところが少なくない。よって本論文は博士（情報科学）の学位論文として合格と認める。