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A THEORY OF MIGRATION DECISION

by

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Abstract

The paper presents a simple theoretical model of migration decision using the Neoclassical approach to the individual choice problem. The prospective migrant is depicted as making a decision on the basis of a comparison of the result of a constrained utility maximization problem, and his present situation. Under conditions prevailing largely in less developed countries, factors inducing movement are identified.

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Casimiro V. Miranda, Jr.[1/]

Introduction

The objective of this paper is to provide a more general explanation of internal migration based on the conventional approach to the individual choice problem. It is not denied that current models of migration, especially those relating to less developed countries,[2/] do explain population movement. However, these models lack the following features:

1. An explanation of the possibility — however remote, especially in less developed countries — of "reverse migration", i.e., movement from a location where the migrant anticipates or obtains high economic benefits to a location where he anticipates or will obtain lower economic benefits.

2. An explanation of why most people do not move at all despite the fact that, in the case of less developed countries (LDCs), these people derive very little economic benefits from their native places.

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[2/] See for example Michael P. Todaro, "A Model of Labor Migration and Urban Unemployment in Less Developed Countries," AER, Vol. 59, No. 1, 1969, pp. 138-148; Gian S. Sahota, "An Economic Analysis of Migration in Brazil," JPE, March-April, 1968, pp. 218-245; T. Paul Shultz, "Rural-Urban Migration in Colombia," RESTAT, May 1971, pp. 157-163, among others.

3 3. While existing models look at migration primarily as rural-to-urban movement — which is true of LDCs — no identification is made of the several urban areas which are possible alternative points of destination of migrants.

In addition to these, there is also a need for a migration model that maybe incorporated in a general equilibrium model with spatial dimension.

Of the three features listed above, (2) and (3) are most important insofar as migration in LDCs is concerned. In the case of (2), we do not of course observe mass movement of people from rural areas to urban areas. A large proportion of the population of an LDC is still in the rural areas. In the case of (3), the identification of the possible alternative point(s) of destination of migrants is important in that — considering rural-to-urban migration — this has significant implications with respect to urbanization, the Rank-Size rule, urban socio-economic and political problems, urban fiscal problems, rural-urban inequalities, etc. On the other side of the coin, this has important implications with respect to rural development problems, or, in general, to regional development problems.

The contribution of this paper is to present a simple theoretical model that incorporates these features besides those which are already included in existing models. It will also attempt to identify the factors and how they operate to induce movement. Thus the model to

be presented here offers a more general theoretical scaffolding to existing explanations of migration.

The Model

To begin with, the potential migrant is envisioned as being faced with a choice problem, i.e., whether to move or not, and if he decides to move, which of the possible alternative points of destination will he choose. He solves this problem in two stages. First, he maximizes utility subject to some constraint; then he compares the "solution" with what he is obtaining or anticipates to obtain in his present place, and depending on certain conditions he decides whether or not to move.

The Utility Function

The utility function is of the form

$$U = f(x_j, y_j), \qquad j = 1, 2, 3, \ldots n \tag{1}$$

where $x_j \geq 0$, $y_j \geq 0$ and $\frac{\partial U}{\partial x_j} > 0$, $\frac{\partial U}{\partial y_j} > 0$

The subscript $j = 1, 2, 3, \ldots n$, represents the possible alternative points of destination (including the prospective migrant's present location) of the prospective migrant. The independent variables, x_j and y_j, are the "noneconomic considerations

or factors" and, the economic benefits, respectively, that the potential migrant expects to obtain at the jth destination.

Noneconomic considerations include all subjective factors that the prospective migrant perceives in his native place and, in the possible alternative points of destination, e.g., security of tenancy, peace and order conditions, the "comfort" of being in a place where his roots are, or of being with "nice" relatives, or with the religious or ethnic group to which he belongs, etc., which are difficult if not impossible to either directly or indirectly measure in money terms. While these factors which are of highly subjective nature may exercise a positive influence on the potential migrant's decision in that they keep him from leaving his native place, they may also work negatively as a "push factor" driving the potential migrant into leaving his native place. For example, in the above mentioned noneconomic considerations, tenancy may become insecure, the peace and order conditions deteriorate, etc. Although the noneconomic factors cannot be measured in money terms, it is assumed that the potential migrant can give a rough numerical weight or index to all these. This paper gives but a passive role to the noneconomic factors in the model. They are taken into account simply because they are present in the potential migrant's decision.

Let us now turn to the more important independent variable y_j, in the utility function. y_j includes all the economic benefits

such as income, "better education, health, and housing"[3/], etc., that the potential migrant anticipates at the jth destination, all of which can be readily measured, either directly or indirectly, in money terms. So defined, y_j captures all the uncertainties associated with the economic benefits that the potential migrant perceives at each of his possible points of destination.

The reason behind the important role in the model of y_j which summarizes all the economic benefits that the prospective migrant anticipates at the jth point of destination is obvious. As pointed out, y_j is amenable to measurement in money terms. While x_j may work in a negative way as a push factor, y_j always work in a positive way as a "pull factor" in the prospective migrant's decision.

Now, it is assumed that the prospective migrant is faced with a finite number, n, of possible alternative points of destination (including his native place). He is making a decision at a point of time. He is sufficiently informed of the conditions obtaining at the different possible points of destination, and he perceives that the economic benefits that he anticipates differ among these different points of destination, i.e.,

$$y_1 < y_2 < y_3 < \ldots < y_n \qquad (2)$$

[3/] According to a study reported by Business Day, July 16, 1981, "Villagers migrate to towns and cities not only for employment but also for better education, health and housing."

This perception of the anticipated economic benefits by the potential migrant is not without economic basis. It is recognized that spatial markets are less than perfect. Markets are "segmented" because of differences in transport cost which in turn are due to inadequate infrastructure; some industries cater only to local markets; firms in different industries, with different factor proportions, and population with different incomes, are not uniformly distributed over geographic space, etc. Thus, the demand for an input, say, labor, will be different among the different locations. Also, health and educational facilities have varying "qualities" and are not distributed uniformly over geographic space, making for differences in the prices of these services in different locations. All these are more pronounced in less developed countries than in developed countries.

While y_j is the prospective migrant's anticipated economic benefits at the jth point of destination, when he does migrate to such a place he may or may not actually get y_j. It is assumed that what the migrant will actually get is proportional to y_j. Also, it is assumed that prospective migrants belonging to the same occupation or having the same skill will, more or less, have the same perception of y_j.

Finally, a trade-off is assumed between x_j and y_j so that the utility function in (1) will generate indifference curves having all the usual properties as negative slope, convexity (with respect to the origin), and non-intersection. In addition, to depict the realistic notion that y_j is a more significant factor than x_j in the

prospective migrant's decision, it is assumed that the shape of indifference curves become more biased toward y_j at higher levels of utility, i.e., technically, indifference curves can have a positive y-intercept but never a positive x-intercept, for the obvious reason that the individual must obtain some minimum y in his native place.

The Constraint

The constraint is of the form

$$Y \geq y_j + bx_j \qquad (3)$$

Broadly defined, the constraint gives the attainable set of points. Thus, it is possible that the potential migrant maybe at a point within this set to begin with, and not necessarily at a point on the line itself, so that if he moves it is possible, within a certain range provided by the limit of the constraint, that he can have more of both x and y.

The "price" of y_j is assumed to be equal to unity. The absolute value of the slope of the constraint, b, is the "price" of x_j. (3) says that the total "benefit", Y, of the prospective migrant at the jth destination, is made up of the economic benefits y_j, and the monetary value of the weight that he attaches to the extraeconomic benefits x_j, that he perceives at the jth point of destination.

(3) is, of course, a simplification. It is recognized that at the nth destination where the anticipated economic benefits are y_n, x_n maybe positive.

The y-intercept of the constraint is y_n — the highest anticipated economic benefits at the nth point of destination. The x-intercept is positive (although a solution on the x-intercept is ruled out for the obvious reason that there is some minimum y that the prospective migrant must obtain or anticipates in his native place).

Turning now to b, the slope of the constraint, we take this to be a constant at a point of time, i.e., at the time the prospective migrant is making his decision. Since y_j is determined by market forces, given the weight attached by prospective migrants to their non-economic considerations, b is determined by market forces. Thus at a point of time, b is some constant over which prospective individual migrants have no influence. In analogy with the conventional theory of individual labor supply,[4/] we may take b as the "opportunity cost" of noneconomic considerations.

[4/] It should be noted that in this model, potential migrants are not directly contemplating on the work-leisure relationship in relation to wage. Strictly speaking, potential migrants are considering only the problem of looking for a suitable place or geographic location where they can, more or less, obtain the benefits that they have anticipated. Having decided on and settled at the optimal place or location, the conventional theory of individual supply of labor starts to operate.

Individual labor supply decisions are, however, implicitly taken into account by the model through the migrant's anticipated income which

With a given b, the constraint shows the economic benefit differentials among the various possible points of destination. In the diagram below, the difference in the anticipated economic benefits between the ith place of a prospective migrant and the jth point of destination is AB. If the prospective migrant were at point A (with the same y_i but less x_i), this difference in anticipated economic benefits will still be AB. This difference of course increases as we move along the constraint, from point B toward point y_n.

From the diagram it is clear that as b increases, the economic benefit differentials among the different points of destination increase. If the constraint with a higher slope were $y'_n x_n$, the difference in the anticipated economic benefits between the ith place of the prospective migrant and the jth point of destination is AC which is greater than AB. Denote this difference in anticipated economic benefits between the point of origin i of the potential migrant and the point of destination j as, $D_{ij} = y_j - y_i$.

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is included in y. It is assumed that the migrant's anticipated income at the jth destination is based on his putting in, no more and no less, than the regular amount of work time. Labor supply decisions can, of course, be explicitly incorporated in a more elaborate model. The author will attempt to do this in his next paper.

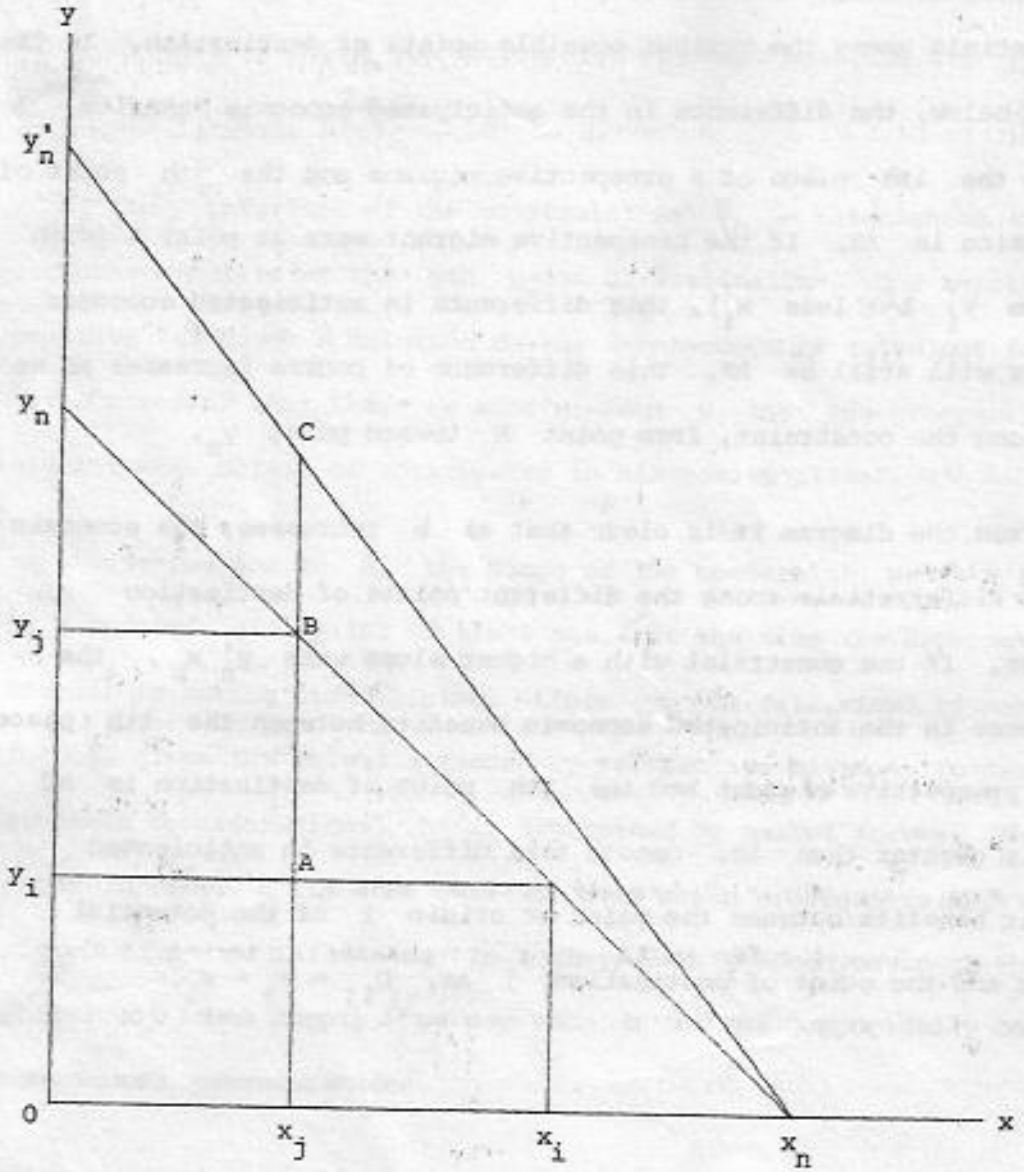

Figure 1

The Prospective Migrant's Decision Problem

As mentioned earlier the prospective migrant's decision problem (whether to move or not, and which of the possible alternative points of destination will be chosen) involves two stages. First he solves the maximization problem:

$$\text{Maximize} \quad U = f(x_j, y_j) \tag{4}$$

$$\text{Subject to} \quad Y \geq y_j + bx_j$$

Then he compares his solution (to (4)) with the (x_i, y_i) that he is getting or anticipates to get at his present location i. When he perceives that (x_i, y_i) is no longer optimal compared with the solution to (4), he moves, otherwise he does not.

As in neoclassical theory of consumer behavior, the graphical solution[5] to (4) is shown in the diagram below as occurring at the point of tangency of the prospective migrant's constraint $y_n x_n$ to his highest attainable indifference curve u_1. This tangency occurs at point E where

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[5] The mathematical derivations of such equation as (5), the Slutsky equation for cross-effect, and the proof that in a two-variable case only substitutability between the variables can occur, etc., are standard so that they need not be reproduced here. See for example James M. Henderson and Richard E. Quandt, Microeconomic Theory, Second Edition, (New York: McGraw-Hill Book Co., 1971), pp. 36-37.

$$\frac{f_x}{f_y} = -b \qquad (5)$$

which is the equality of slopes condition.

At point E, the solution is (x_j^*, y_j^*), which, by virtue of the association between (x_j, y_j) and the points of destination, also determines the potential migrant's optimal point of destination.

Having attributed a passive role to x, we focus attention to y. Three possible cases are shown in Figure 2 below depending on whether $y_j^* \gtrless y_i$.

Case 1. $y_j^* > y_i$, $j > i$, $i, j = 1, 2, \ldots, n$. Suppose that the prospective migrant is at location i. Also, suppose that his utility function yields indifference curves u_0 and u_1. Here there is movement from location i which is no longer optimal, to some destination j which is optimal. In this case, it is seen that the prospective migrant is responding positively to the higher economic benefits that he anticipates at his optimal point of destination. Alternatively, to capture the relative position of the migrant at his optimal point of destination which, in his decision-making process, he is comparing with his situation at his non-optimal location, we say that the migrant is responding positively to the difference, EG, in economic benefits between his present location i and his destination j. Under our assumption that the shape of the indifference curves become increasingly more biased toward y at higher levels of utility, this positive response becomes greater if the prospective migrant were

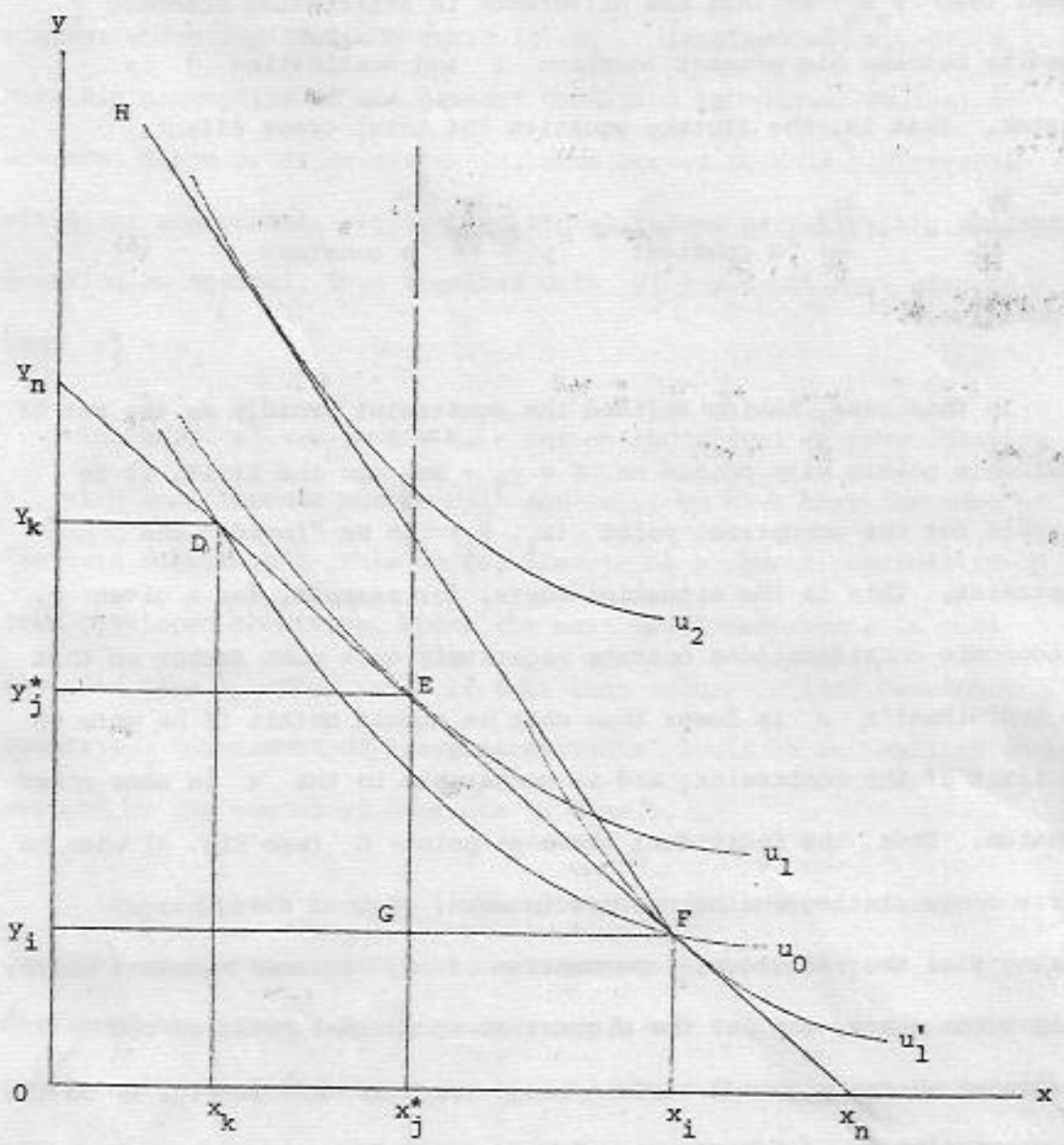

Figure 2

faced with a constraint such as HP the absolute slope of which is higher than $y_n x_n$ so that the difference in anticipated economic benefits between his present location i and destination j is greater. That is, the Slutsky equation for total cross effect,

$$\frac{\partial y_j}{\partial b} = \left(\frac{\partial y_j}{\partial b}\right)_{u \text{ constant}} - x_j \left(\frac{\partial y_j}{\partial Y}\right)_{b \text{ constant}} \qquad (6)$$

is positive.[6/]

In this case, having defined the constraint broadly as the set of attainable points with points on $Y = y_j + bx_j$ as the limit, it is possible for the nonoptimal point (x_i, y_i) to be "inside" the constraint. This is the situation where, for example, for a given y, noneconomic considerations operate negatively as a push factor so that the individual's x is lower than what he should obtain if he were on the limit of the constraint, and is comparable to the x in some other location. Thus, the individual maybe at point G (see Fig. 2) when he starts contemplating whether or not to move. Such a disturbance arising from the individual's perception of x, induces movement which, if it takes place, may put the migrant at an optimal point on the constraint where, within a certain range (such as EF in Fig. 2) on the the constraint, he can have more of both x and y.

[6/] Since we have only two variables, x and y, which are substitutes, (6) should be positive. This means that if the income effect $\left(\frac{\partial y_j}{\partial Y}\right)$ is positive, it is assumed to be small enough so that the term, $-x_j \left(\frac{\partial y_j}{\partial Y}\right)_{b \text{ constant}}$, is much smaller than the positive substitution effect, $\left(\frac{\partial y_j}{\partial b}\right)_{u \text{ constant}}$.

Case 2. $y_j^* = y_i$, $i = j$. This is the case for a prospective migrant whose indifference curve is u_1', (instead of u_0 or u_1). Here his perception of his present condition is optimal so that no movement takes place unless disturbance occurs to make his present situation nonoptimal. If the individual indeed perceives his present location as optimal, then together with $y_j^* = y_i$, it must also be that $x_j^* = x_i$

Case 3. $y_j^* < y_k$, $j < k$. For an individual at some location k, with indifference curves u_0 and u_1, we have here the case of "reverse migration". This we consider to be a remote possibility in less developed countries, where the most usual occurrence is that shown in Case 1. Thus, even if this case occurs in less developed countries, the number of "reverse migrants" would be so small as to be swamped by the number of migrants in Case 1.

Let us return to Case 1 which is the more interesting case to consider as it has significant implications with respect to less developed countries. In this case, as $b \to 0$, i.e., as the difference in economic benefits between the points of destination and the migrant's native place becomes very small to weaken the pull of y, or alternatively, as x becomes a "free good", x assumes a more predominant role in migration. Here "reverse migration" may be the normal state of affair. It may also happen here that a large segment of the indifference curve which becomes asymptotic to the x-axis, may coincide with the constraint so that over a certain range the solution

is indeterminate. This is interpreted as follows: when the difference in anticipated economic benefits among the possible alternative points of destination becomes virtually nil (which is expected to happen as economic development takes place), and any of these points can have any "amount" of noneconomic benefits, these points of destination become equally preferable.

On the other hand, as $b \to \infty$, i.e., as the difference in economic benefits between the points of destination and the migrant's native place becomes very large, in consequence of our assumption that the shape of the indifference curve becomes increasingly biased toward y at higher utility levels, a corner solution at the y-axis will, in general, occur. A rising b will also result in inducing migration in that such location as i which was optimal at a lower b becomes nonoptimal at higher b (see Fig. 2).

As b increases, there is thus a tendency for "most" migrants (from low-y points of origin to high-y points of destination) to concentrate at the nth point of destination where they anticipate to obtain the highest possible y. Since b reflects the difference in anticipated economic benefits between the point of origin and the point of destination of migrants, a possible conclusion that can be made out of this that is not directly derivable from the equations of model but is only indicated by the behavior of b and our assumption on the shape of the indifference curves at higher levels of utility is that,

the number of migrants from i to j, M_{ij}, will be proportional to, the difference in y between i and j, D_{ij}, i.e.,

$$M_{ij} = f(D_{ij}), \quad i < j, \quad i, j = 1, 2, 3, \ldots, n \qquad (7)$$

where $D_{ij} = y_j - y_i$, and $\frac{dM_{ij}}{dD_{ij}} > 0$

To summarize and to conclude. In the tradition of Neoclassical analysis, we have cast the prospective migrant as a decision-maker faced with a constrained maximization problem. Under adverse conditions in his native place, the prospective migrant has, evidently, no choice but to move. However, he has before him possible alternative points of destination over which but within limits provided by the constraint, he has "absolute freedom" to exercise his decision-making.

The model has identified three possible factors inducing migration:

(1) A change in b.

(2) Non-economic factors operating as a push factor.

(3) Given b, the attraction of the difference in economic benefits between the prospective migrant's present location and his possible point of destination.

(1) and (2) are more of the nature of a disturbance than (3) in which movement depends on the prospective migrant's comparison of his present condition with his anticipations at some possible points of

destination, on the basis of the existing difference in economic benefits.

Economic benefits are directly observable and readily measurable in money terms while noneconomic considerations are highly subjective. The prospective migrant considers economic benefits largely as a pull factor. Noneconomic considerations must be taken into account though simply because they are there for the prospective migrant to contend with. Perhaps noneconomic considerations may play a more active role when differences in economic benefits among the different geographic points have disappeared or narrowed down as economic development, the benefits of which are spatially proportionately spread, takes place.

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