ECONOMETRIC MODELS OF INTERREGIONAL LABOUR MIGRATION IN A HUMAN CAPITAL FRAMEWORK

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1. THE HUMAN CAPITAL APPROACH TO INTERNAL MIGRATION

1.1. Introduction

One of explanations of internal migration is based on the neoclassical theory of investment and has appeared largely in the works of the Chicago School, such as Schultz (1961, 1962), Sjaastad (1962), Bowles (1970) and Bowman and Myers (1967). In this approach internal migration is viewed in a framework of costs and returns of investment in human capital. Private costs are comprised of money costs and non-money costs. The expected money returns consist of the differentials in the income streams accruing to the migrant from the expected better opportunities. According to this approach, investment in migration, like other investments in human beings (e.g. nutrition, education, on the job training), has high payoff to the individual and stimulates growth. We begin with the presentation of a model capable of analysing how human capital decisions are made in a variety of settings. This is followed by the presentation of a (simple) human capital model of migration and a discussion of the predictions derived from it.

1.2. A General Model of Investment in Human Capital

Consider an individual who expects to live η years. In his gth year he has a human capital stock i of level $i = K$ from which he earns an income stream $Y_k i$

in any year j (j = g,... n). He thinks of making an investment in his furure earnifng capacity which will raise his human capital stock to level i = K' (i = K, K',...) and which will enable him to earn an income stream YK'J in each year j, through the η - g years in his lifetime (j = g,... n). The costs incurred in year j are composed of the direct costs of the human capital investment CK'J, and an opportunity cost owing to the loss in income during the period in which he makes the investment. Thus the investment will be economically advantageous, if

$$\sum_{j=g}^{n} \frac{Y_{K'j} - C_{K'j}}{(1+r)^{n-g}} - \sum_{j=g}^{n} \frac{Y_{Kj}}{(1+r)^{n-g}} > 0 \qquad (1) \qquad (1.1)$$

where r is the discount rate assumed to be the same in all future years. If we assume allocative efficiency, r would be equal to the marginal rate of return on the best alternative investment. If there is no alternative investment, r can be interpreted as the individual's subjective discount rate representing his evaluation of present relative to future income streams (consumption). It should be noted that in the case of intertemporal efficiency the individual's marginal rate of substitution between present and future income streams (consumption) will be equal to the marginal rate of transformation of future for present income (consumption). The Yij's (i.e. YKJ and YK'J) should be weighted by the probability of the person's being alive in any year j, Pij (i.e. PKJ and PK'J) (j = g,.. .n) and by the probability of being employed in any year j, q_{ij} (i.e. q_{Kj} and $q_{K'j}$) so as to represent expected incomes. These streams of expected incomes should reflect the rates of income growth which result from the appreciation of the human capital stock from seniority and experience and the depreciation resulting from increased age and obsolescence, both of which may vary with the level or type of human capital investment.

Inequality 1.1 can be restated as an equation

$$\sum_{j=g}^{n} \frac{Y_{K'j} - C_{Kj}}{(1+r)^{n-g}} - \sum_{j=g}^{n} \frac{Y_{Kj}}{(1+r)^{n-g}} = 0 \qquad (1.2)$$

The decision rule associated with equation (1.2) is : invest if r exceeds the marginal rate of return on alternative investment opportunities

Finally, if time is continuous rather than discrete, equation 1.2 is reformulated as

$$\int_{j=g}^{n} (Y_K'_j - C_K'_j)_{(t)e} - rt_{dt} - \int_{j=g}^{n} Y_K'_{j(t)e} - rt_{dt} = 0 \qquad (1.3)$$

1.3. A Simple Human Capital Model of Migration

As we said before we can view internal migration in a human capital framework. In this case the decision rule for an individual for investment in human capital consists of comparing the capitalised alternative net income streams of the two activities, migration and non-migration, given the parameter values for the rate of discount and for the duration of each activity.

Following Schultz (1961, 1962) and Becker (1962), Sjaastad (1962) first applied the concept of human capital to the migration decision. Let the present value of the earnings stream in destination j less than in origin i be

$$\sum_{t=1}^{n} (E_{jt} - E_{it}) / (_{1+r})t$$

where r is the rate of discount.

Let also the present value of costs incurred with residence in place j less than in place i be

$$\sum_{t=1}^{n} (C_{jt} - C_{it}) / (_{1+r})\ t.$$

Then the present value PVij) of investment in migration from i to j is

$$PV_{ij} = \sum_{t=1}^{n} \frac{E_{jt} - E_{it}}{(1+r)^t} - - \sum_{t=1}^{n} \frac{C_{jt} - C_{it}}{(1+r)^t} \qquad (1.4)$$

An individual residing in i will migrate to j only if the present value of investment in migration is greater than zero. Furthermore, he will migrate to than locality for which the present value is maximised.

Sjaastad divides the costs of migration into two components : the money and non-money costs. The former include an increased expenditure on food, lodging, transportation (for both the migrants and their belongings), etc. while the latter include opportunity costs as well as psychic costs. Opportunity costs consist of the earnings forgone during the period spent on travelling, searching for, and learning a new job (on - the - job training) while the psychic costs consist of the homesickness, acclimatization strains and so on.

As far as the money returns are concerned, and assuming that occupation, age, and sex are the most important variables affecting earnings, first estimates of the return to migration is the difference in earnings within occupations, ages, and sexes, and between all places. However, as Sjaastad points out «these estimates would almost surely be underestimates because they fail to take into account possible disequilibrium between as well as within occupations and because a change in occupation may necessitate migration. The more relevant alternatives for migrants may be among rather than within occupations» (1962, p. 87).

Sjaastad also stressed that «if the return to migration can be increased by occupational upgrading the problem in estimating the return becomes far more complex. In this context it is particularly useful to employ the human capital concept and to view migration, training, and experience as investments in the human agent. These investments, specific to the individual., are subject to depreciation and deterioration both in a physical and an economic sense» (1962, p. 87).

If a region is depressed and wages are low migration without supplementary .nvestments is sufficient. However, if the wages in an occupation are low in all regions, such as the earnings in agriculture, then migration is economically advantageous only if new skills are acquired by the migrant. In this case the age of the potential migrant becomes crucial. Young people have made a relatively small investment in human capital through on-the-job training and experience and a relatively large through education. On the other hand in older persons we find the opposite proportionality. It should be clear that when an occupation becomes obsolete the younger people can change occupation more easily than the older people because their investment in the specific occupation is less and their longer life expectancy increases the discounted present value of the expected returns to additional investment required for the change in the occupation.

Within an occupation there is an age-income relation due partially to the on-the-job experience. Older persons who enter an occupation after minimal training will receive lower earnings than persons of similar age but with a long working experience in that occupation. Hence, in estimating the rate of return to migration only persons with the same age - occupation histories should be considered so that earnings representing equal experience are compared. «The return so estimated is be attributed to both the migration investment and the investment in on - the -job training, as well as costs of pre - employment training» (Sjaastad, 1962, p. 88).

Sjaastad concludes that «... migration cannot be viewed in isolation ; complementary investments in the human agent are probably as important or more important than the migration process itself» (1962, p. 92).

1.4. Predictions of the Human Capital Model

The human capital model is capable of explaining the profile of the migrants.

First, it predicts that younger people migrate. This is because young people have a longer life expectancy over which they can capitalise the difference in their earnings streams. Young people are also poorer which makes the original income forgone smaller ; they have less «place attachments» and so the psychiccomponent of the non-money costs is smaller ; they have less seniority rights and trasining invested in a job marking the opportunity costs smaller ; they are also less risk averse which can be reflected in assigning lower rates of discount to their future earnings streams.

Second, migrants are disproportionately single. This is because when there are no other family members or a lot of possessions to be moved the money costs lower.

Third, migrants move to places where they have relatives and friends already living there. This can be derived from the human capital model because relatives. and friends are able to lower both the money and non - money costs of movings.

Fourth, migrants have higher educational attainment than the populations from which they originate. According to Yotopoulos and Nugent [1] (1976) this it explained by the fact that the «cross rate» of return to a joint decision to invest in education and migration is higher than the ordinary rate of return to either investment alone.

1. See Yotopoulos and Nugent (1976)

The human capital model can also explain the direction and the stages of migration. In the case of rural - urban migration it predicts that migration tates place from the low-income rural regions to the higher-income urban sector. Furthermore, since both the direct and psychic costs of migration are a function of distance, migration will be a stage process ; that is people will move first from farms to the nearby villages, from villages to towns and from towns to cities. It should be noted that this stage approach was formulated into one of the «laws of migration» first by the English economist Ravenstein (1889). His explanation of internal migration is in terms of «push» and «pull» factors. The «push» fators include outmoded land tenure systems, unfavourable terms of trade between agricultural and industrial products, rural poverty and unequal distribution of income which «push» people out of the rural areas. On the other hand, the «pul» factors include better employment and educational opportunities for the migrants and their children or simply the «bright lights» of the cities. Rural-urban migration may continue despite the fact that migrants find only petty jobs such as a porter, shoe shine or casual worker, rather than regular employment in the urban sector. According to this explanation therefore, money cost-and return calculations are not the only motivations in the migrants decision to move, but as Sahota points out «yet, while the English explanation of the motivations underlying internal migration materially differs from the American explanations, the consequences are similar ... (Furthermore) not only the consequences but also most of the explanatory variables in these approaches are the same. The differences arise mainly in emphasis and interpretation» (1968, p. 221).

2. EMPIRICAL STUDIES ON INTERNAL MIGRATION

2.1. The Specification of the Model

From what we have said so far it should be clear that the migration models of economists are formulated in the context of individual utility maximisation. Individuals select that place of residence which maximises their utility or, in other words, they select that place at which the real value of the expected net benefit which accrues to them from migration is maximal. Furthermore, since there are costs to be incurred· it is appropriate to consider migration as an investment decision. This decision will be economically advantageous if the rate of return on such an investment exceeds that on alternative investments of comparable risk.

In recent empirical work on internal migration this behavioural theory has been «translated» into an operational model with some inevitable modifications (of the basic theory). The «traditional» formulation is a model which relates the probability that an individual will migrate from a specific origin to a specific destination to the characteristics which reflect the «average» costs and benefits of the sending and receiving regions and the disftance between them. As a result, the theory has been modified from one of individual decisions based on individual opportunities, to a probability model based on average regional opportunities. This (basic) model has been used with some modifications for both developed and developing countries.

The basic relationship of the migration function which has been used for econometric estimation is of the following form

$$M_{.ij} = f\ (D_{ij},\ Y_i\ ,Y_j,\ U_i,\ U_j,\ E_i,\ E_j,\ P_i,\ P_j,\ R_i,\ R_j,\ MSIJ) \qquad (2.1)$$

where

Mij = gross migration from origin region i to destination region j which is usually normalised in some way to allow for the effect of the population size of regions.

Dij = distance between capital cities in regions i and j

Yi, Yj = a measure of income or wage rate in regions i and j.

Ui,Uj = unemployment rate in regions i and j.

Ei,Ej = educational achievement or literacy rate of population living in regions i and j .

Pi,Pj = population living in regions i and j.

Ri,Rj = urbanization rate of regions and j.

MSij = number of persons born in region i and living in region j which is usually referred to as «migrant stock» variable.

Multiple regression analysis with a double-log transformation is usually used for the estimation of equation (2.1) which is assumed to have a multiplicative form. In what follows we will discuss each of these variables separately and the rational behind tham. We will start with the dependent variable and then we

will consider each of the independent variables. Finally, we will discuss some of the limitations and policy implications of studies using this model to specify the determinants of interregional migration.

2.2. The Dependent Variable

As we said before gross migration flows from region i to region j are usually normalised to allow for the effect of the population size. One of the most often used normalisation is to divide the migration flow M_{ij} by the population exposed to the risk of out-migration in region i, Pi, that is Mij/Pi [2].

Another often used normalisation is to divide the migration from i to j, Mi), by the total out-migration from i, ΣjMij, that is Mij/ΣjMij [3]. It is supposed, in general, to perform as a relatively more appropriate «allocation variable» (Sahota, 1968).

Greenwood (1971 b) has used the normalisation Mij/PiPj where Pi and Pj are the populations of sending and receiving regions[4]. Finally Vanderkamps (1971) has used the normalisation Mjj/(Pi+Pj»).

It should be pointed out although most of the researchers in this field prefer to use a normalised dependent variable there are some studies in which raw migration flows, the number of migrants from i to j, have been used instead [5].

From what we have said so far it should be clear that there is no agreement on the choice of the dependent variable for cross-section studies of migration.

2. It has been used in many studies. For example Beals, Levy and Moses (1967), Schultz (1970), Bowles (1970), Falaris (1979), Wadycki (1972a), Levy and Wadycki (1972b) 1974a), Munro (1974), Carvajal and Geithman (1974), Kau and Sirmans (1979), Langley (1974).

3. It has been used for example by Greenwood (1969a) in his study of the U.S. interregional migration, by Wadycki (1974b) for the migration in Venezuela, by Wadycki (1974a, 1974b, 1979) for the U.S. migration, and by Sjaastad for the U.S. migration again, though he defines it as ΣjMij/Mij.

4. He used it in a study of rural-urban and urban-urban male migration in India.

5. Raw migration flows have been used by Sahota (1968) for his study of migration in Brazil ; by Greenwood (1971a, 1969b, 1972-73) for the migration in India (lifetime and one-year migration), in Egypt and in India again ; by Levy and Wadycki (1973) for the migration in Venezuela.

Schultz points out that «if interregional migration is to be analysed as a stochastic process for which the parameters can be estimated by ordinary regression analysis, there are cogent reasons to define the dependent variable, migration, as a population rate or average propensity rather than as an absolute number (of migrants). This procedure first provides a clear link between the aggregate estimated model and the underlying rationale of individual behaviour. But also this specification ... corrects for serious sources of bias and inefficiency in the estimated procedure that are introduced by the unequal size of regional populations and their frequent association with other social and economic determinants of the migration process itself. When absolute gross flows of migrants are analysed,. .., the behavioural or statistical interpretation of the econometric findings is in no sense obvious». (1970, p. 158, footnote).

According to Young «observed migration flows should be normalised in such a way that if population movements followed a random pattern independent of political boundaries the normalised values of expected migration flows would be independent of region population sizes» (1975, p. 95). He points out that the normalisation Mij/PjPj, that is the gross migration flow divided by the product of origin and destination region populations, embodying the assumption of unitary elasticity of migration flows with respect to both sending and receiving region population, satisfies his criterion.

Vanderhamps formulation of the dependent variable implying that the elasticity of migration flow with regard to the sum of the populations is unity means that on the average the elasticity of migration with respect to the size of either population equals one-half. He admits however that «... the symmetrical treatment of both populations is indeed somewhat arbitrary» (Vanderkamp, 1971, p. 1020, footnote).

From what we have mentioned it seems that normalised rather than non-normalised migration flows should be used. To our point of view the normalisations Mij/Pi and Mij/ΣjMjj seem to be more appropriate and we are going to use the second as the dependent variable in estimating a model of interregional migration in Greece.

2.3. The Independent Variables

2.3.1. Distance

One of the clearest implications of the literature on internal migration is that

gross migration declines perceptibly with increased distance. Researchers on this field have included distance in the estimated relationship as a proxy for both the transportation and psychic costs of movement as well as for the availability of information. If transportation and moving costs are roughly proportional to distance moved, then migration will be negatively related to distance. However, these costs are usually small, typically a fraction of the added income required to induce a migrant to move large distances. Moreover, distance between regions, which is usually measured by road mileage between principal population centres of the region, is not an ideal measure of the distance moved by migrants especially when regions are irregularly shaped.

Also other variables such as differences of language, food and dietary habits and social practices, for which there are no usable measures, may also be related to distance. If these variables are omitted, and insofar as they are related to distance and are important to migration decisions, the estimated importance of distance as a deterrent to migration is increased. In almost all econometric studies distance coefficients in the migration functions are negative and very significant when included with unemployment, income, education, and urbanization variables.

The flow and availability of information about other places is also related to distance. Levy and Wadycki (1974a) have found that the educated people tend to be less deterred by distance than the less educated. This has been interpreted as support for the information hypothesis (Schwartz, 1973). Information from friends, which the less educated rely on, declines with distance, thereby deterring migration. On the other hand information from the news media, on which the more educated rely on more, does not diminish as rapidly with distance, accounting for the longer distance moved. However this interpretation is ambiguous. First, the more educated simply may face a more national labour market. Second, since migrants are classified according to their present educational attainment, not their educational lever at the time hey migrate, some of the long distance moves may be for the purpose of acquiring more education (Yap, 1977).

Researchers have not yet solved the problem of the relative importance of the various economic and noneconomic factors for which distance serves as a proxy. What seems to be clear is that estimated earning gains associated with dominant migration streams are substantial enough to more than offset any reasonable transportation costs associated with distance. We are therefore led to conclude that distance must reflect mainly the importance of psychic and informational costs associated with the decision to move.

2.3.1a. Distance and Alternative Opportunites

According to Levy and Wadycki (1974b) and Wadycki (1974a, 1974b, 1979) much of the observed deterrent effect of distance on migration studies is attributed to the alternative opportunities concept. They find that including proxy variables for alternative opportunities reduced both the explanatory power of the distance variable and its estimated deterrent effect on migration.

Following Stouffer's (1940, 1960) theory of intervening opportunities they have used alternative opportunities variables to analyse interregional migration in Venezuela and U.S. They have considered three definitions [of alternative opportunities variables.

First, Wadycki (1974a) selects P*, U* and W* as the largest population, smallest unemployment and largest income from among all states other than the origin i and destination j states. There are two serious drawbacks to this definition. First, it assumes that migrants from i to j had perfect knowledge of opportunities available in all other states. Second, since the values of P*, U*, and W* are the same for almost all observations, these variables are highly intercorrelated.

Second, Wadycki (1974a) selects P*, U* and W* from among all states whose principal city is within a circle with the principal city of i as centre and diameter the distance between i and j, Djj. This definition assumes that migrants have a directional preference and search only in that particular direction.

Third, Wadycki (1974a, 1974b, 1979) and Levy and Wadycki (1974b) select the «best» alternative variables from among all states whose principal city is within a circle with the principal city of i as centre and radius Dij. It is assumed that the migrant moving from i to j has knowledge of all places within a circle centred at i.

They estimate a «traditional» economic model of migration with only destination variables including proxy variables for alternative opportunities. They do not include origin variables because following Sjaasted they think that «... if home region variables are included in the allocation model they cannot be assumed to reflect costs of moving since once one has decided to move they are irrelevant. They might be useful empirically, however, if an individual's response to destination variables is influenced by his home income or educational level» (Levy and Wadycki, 1974b, p. 202, footnote). The «improved» model consists of adding the variables P*, U*, and W* defined in the above three ways to the «traditional» model

$$Aij = g_1(D.ij\ Pj,\ Uj,\ Wj,\ random\ errors) \qquad (2.2)$$

which can be written as

$$Atj = g_2(Dij,\ Pj,\ Uj,\ Wj,\ P^*,\ U^*,\ W^*,\ random\ errors) \qquad (2.3)$$

where

Aij = Mij/ΣjMij that is the proportion of total out-migrants from state i who moved to state j during a specilfic period of time.

Dij = road mileage between capital cities of state i and j in kilometres

Pj = total population enumerated in state j

Uj = unemployment rate in state j (percent)

Wj = mediam money income of males living in state j.

Wadycki concludes : « [the] explanatory power [of a «traditional» model] increases significantly and the distance elasticity falls when the alternative oppor. tunity variables are added. The most satisfactory candidate for opportunity costs, from an empirical point of view, is the one which takes the relevant opportunities as «intervening» - the best opportunities found within a circle whose diameter is the distance between the principal cities of states i and j» (1974a, p. 116). They also point out that «our results provide further evidence that the economic approach to migration within the traditional framework of rational choice is valid. The significance and explanatory value of variables which reflect the opportunities at alternative destinations indicate that migrants in Venezuela consider not only the benefits from moving but also the opportunity costs in the best economic tradition» (Levy and Wadycki, 1974b, p. 211)[6].

2.3.3. Income

The econometric research confirms that people move for economic benefit»

6. Their results for Venezuela are supported by Wadycki (1974a, 1979) with United States data and by Wadycki (1974b) for white United States migration ; the alternative opportunities **model** seems less suited for the explanation of nonwhite United States migration flows.

from poorer to richer regions. Differences in medial income or wage levels between two regions are significant variables affecting migration between two places. When average income or wages for the two regions are included separately in the regression, migration is positively related to the destination income and negatively related to the origin income. These results hold, with few exceptions, for rural-urban as well as for interregional migration, independent of model specification.

An individual bases his decision to migrate presumably not on the average regional income but on the income he can earn given his occupation and on-the-job experience. However, it seems that in most of the countries, the relative position of an occupation in the wage structure is almost the same in all regions even though regional average incomes may differ. Furthermore, individuals migrate in search of higher income which is strongly correlated to the regional average. Hence, interregional movements will tend to more prosperous areas with higher per capita income and wages.

There are some conceptual problems related to the measurement of the expected differential income. Accurate income estimates are particularly difficult especially for rural incomes. Various regional income estimates are used-per capita income, average wages or average earnings in industrial establishments. When rural income is used, it is usually cash income or net agricultural output per labour force member. However, the living costs may differ between regions· Since a majority of migrants are supposed to come from the low cost-of-living agricultural regions to the high cost-of-living urban regions the money income difference may overstate the real income difference. There are also non-marketed components of rural and urban income including goods and services produced by households for self consumption, which are very important in rural areas, and public goods which are of relatively greater importance in urban areas. Moreover, to determine the urban income that yields a level of economic welfare equivalent to specific income in the rural areas poses an index number problem. There is also a measurement problem introduced by the use of discounted values. Since precise information on time horizons, discount rates, and change in income over time are not available for most of the developing countries, there is no way to calculate the discounted values of urban and rural income streams without experimenting with different levels of these factors. Finally, the income data employed in estimating the migration models are usually mean income or wages in origin and destination regions which in the context of present value notions means that all returns and costs of migration accrue in the current period. However, if regional incomes are proceeding at differential rates and potential

grants take such differential rates into account, such measures of income or wages may fail to serve as good proxies for present value concepts (Greenwood, 1975).

Although people move from low income to high income regions there are substantial differences in the magnitudes in which income and other factors influence various population subgroups in their decision to migrate. Income, employment status, education, age, and race are important personal charactetisties that influence migration.

Finally, it should be pointed out that some researchers have included instead of income levels separately the ratio of these values[7]. One limitation for such a specification is that it hypothesises that migrants respond to relative differences in the variables, and that the elasticities of migration with respect to a given variable in the origin and destination region are equal and opposite in sign. The imposition of an identical elasticity in the two regions i and j is referred to as the «homogeneity restriction» (Sahota 1968, p. 229, footnote). A minor gain in such a specification is that it uses up fewer degrees of freedom and results pos sibly in a reduction of multicollinearity among explanatory variables.

2.3.4. Unemployment

It is expected that migration flows tend to be deterred by high unemployment in the destination and increased by high unemployment in the origin region. If unemployment is high the probability of a migrant obtaining a job in the destination is reduced, perhaps much more than rates of unemployment would indicate due to seniority rights and the like. Earnings differentials must be further discounted by the risk of unemployment and the discount rate may be very high if imperfect capital markets prevent potential migrants from assuming this risk during periods of high unemployment rates.

As far as the rural-urban migration is concerned Todaro (1969) has pointed out that while the rural-urban income differential may be positive, the expected income differential may be negative because the migraunt from the rural areas will not possess the «right» skills for employment in the urban areas. He suggests that the rate of unemployment in the urban areas serves as a proxy for

7. The ratio of the income levels was used by Greenwood (1969a) for the interstate migration in the United States and by Kau and Sirmans (1977) for the migration from each of the nine census divisions in the U.S. to each of the states.

the probability that the migrant will be selected for a job from the pool of unemployed.

In several studies of migration that have included unemployment rates as explanatory variables, the signs of the estimated unemployment coefficients are «wrong» (e.g. positive instead of negative), or the coefficients are not significant. The explanation for this has been attributed to the simultaneous - equation bias which results from the use in single - equation multiple-regression models of explanatory variables defined for the end of the period, to analyse migration that occurred over the period because migration has influenced end - of- the - period economic conditions[8]. Another possible explanation is that since high unemployment rates are of most concern to the unemployed and of little or no concern to those who have a job in view when they move, and because the unemployed is only a small percentage of the population, higher unemployment rates may fail to demonstrate their effects. A third explanation has to do with the measurement of unemployment in rural and urban areas. The unemployment rates in the urban areas tend to be relatively higher because unemployment is «open», while in rural areas unemployment rates are relatively lower because there is disguised unemployment in the form of underemployment.

2.3.5. Unemployment

Education is an important variable which may account for systematic differences in individual preferences and responses. Educated individuals are regarded as more mobile and adaptable and more alert to changing job opportunities. Information about employment conditions and job opportunities are expected to increase with more education which in turn will increase the likelihood of an individual to migrate. Also, education reduces the importance of tradition and family ties and increases the individual's interest for other places and jobs.

8. Wadycki (1979) employs beginning - of - period variables to avoid the simultaneous - equation bias in both the «traditional» economic and alternative opportunities formulations forme aggregote models for 1955-60 and 1965-70 United States migration flows. For 1955-60 the beginning- of - period variables yield the correct negative signs for unemployment in both the «traditional» and alternative opportunities formulations (employing the «radius» and «diameter» alternative opportunités variables). However, for 1965 - 70 migration flows, the destination unemployment has the wrong sign, although it is not significant when the «diameter» alternative opportunit variables are included (when distance is omitted from this equation and the equation is re-estimated the unemployment destination variable has the expected negative coefficient).

Schwartz (1973) working with U.S. data on interdivisional flows of nonreturnee white male migrants classified by five age and education groups has found that within a given age group the deterring effects of distance decline substantially with education. This finding supports a latter finding by Levy and Wadycki (1974a) who estimated a model of interstate migration for three groups of Venezuelan migrants disaggregated by their level of educational achievement. They conclude that the educated are much less deterred by increased distance and are more responsive to wage rates in alternative locations.

In econometric work, researchers have often included both an origin and a destination region education variable. The most often used education variables have been defined as follows. First, as the percent of population subgroup of a given age and sex who is literate in origin and destination regions[9]. Second, as the median number of years of school completed by residents of a given age-sex subgroup in sending and receiving regions[10]. Third, as the percent of population of a given age enrolled in school in origin and destination regions[11].

If we assume that migrants have educational attainment equal to the avera. ge of their origin, then an index of education at origin serves as a proxy for the education the migrant himself has. If this is so, a high educational attainment at the origin encourages migration. It may be argued that more educated persons finding it easier to compete with others for jobs at their origin might be less likely to migrate. However, this may be true only for small increments of elementary or vocational education ; with increasing educational attainment people from rural areas are more likely to find better opportunities in an urban environment, and hence will have a greater propensity to migrate. This is particularly true in developing countries where modern industry, government, education, social and cultural amenities are concentrated around a few urban centres.

Regions with high education achievement may attract poorly educated persons to improve their own or their children's education and better their prospects.

9. It was used by Greenwood (1971a, 1972-73) ; by Levy and Wadycki (1973) ; by Munr (1974), although he uses only origin educational variable ; and by Beals, Mildred and Moseso (1967.

10. It was used by Greenwood (1969a, 1969b) ; by Kau and Sirmans (1977, 1979), althoughthey include only an origin educational variable ; by Falaris (1979) and by Carvajal and Geithman (1974-75).

11. It was by Levy and Wadycki (1972a, 1972b, 1974a) and by Schultz (1970).

If some regions have higher education institutions they will attract the well-educated individuals who are seeking college education. The occupational structure of these regions will also be affected and the demand for educated persons will be relatively greater. Furthermore, the existence of social and cultural amenities in places that reflect high educational levels will attract the better-educated persons. However, it should not be overlooked that the educated outmigrants of the origin region have to compete with the educated individuals of the destination region, and therefore a high level of education in the destination may serve as a deterrent to the educated immigrants.

When an education origin variable is included with an education destination variable, the sign of the coefficient of the origin variable is usually positive which suggests that migration is more likely among more educated persons. Beals, Levy and Moses (1967), Greenwood (1969b) and Sahota (1968) have obtained a negative sing. Two explanations have been suggested by these authors for this phenomenon. The first is that more education affects other variables which are important in a individual's decision to migrate. More education may result in better employment and income opportunities at home as well as away[12] and their net effect is sufficient to cause more educated persons to remain at home. The second explanation has to do with the simultaneous-equation bias inherent in these models. If more educated persons migrate in greater numbers than the less educated, then migration, especially if it is measured over a long period of time, may cause the end-of-period origin level of education to be low and the end-of-period destination level of education to be high. This would bifs the origin education coefficient downwards and the destination coefficient upwards [13].

As far as the destination education variable is concerned, in most of the studies the sing of the estimated coefficient is positive which suggests that persons are attracted by regions displaying high educational attainment ([14]). One

12. One of the basic hypotheses of the human capital theory is that education is expected to affect wages positively.

13. It should be pointed out also that Levy and Wadycki (1974a) believe that higher levels of origin education would reduce migration. However, the positive signs of the estimated origin education coefficients cast doubt on this hypothesis.

14. Greenwood obtained a negative sign when the migrant stock variable was included into the estimated relationship. His explanation is that current migration does not tend to go to states which display high levels of educational achievement, although past migrants did have some tendency to go to such states. Falaris (1979) obtained a negative sign in his simultaneous equation estimates, though in his sigle equation estimates the sign is positive. Also, Beals, Levy and Moses (1967) found a negative coefficient which they are unable to explain.

notable exception is Levy and Wadycki (1974a) who obtained a negative sign for males with none or only primary education (for males with secondary education the sign is positive). The explanation they give is that the uneducated do not value educational opportunities, or they fear job-market competition from the educated in states with high educational levels.

2.3.6. Population

Population of the origin and destination regions may serve as a proxy for labour market size. If migrants are attracted to regions which have large labour markets, then they may be attracted to areas with large population, ceteris paribus. Furthermore, if a migrant stock variable (to be discussed later) is not included in the regression the population variable may pick up some of the effects otherwise associated with the migrant stock. However, it should not be overlooked that this variable being only a proxy of unknown variables which influence migration «... tell us virtually nothing about the migration process and has little predictive value» (Young, 1975, p. 98).

Some authors have included in the estimated relationship a population density variable since a large population in a region does not necessarily imply a arge labour market if the inhabitants are widely dispersed[15]. Density may attract migrants or it may serve as a «push» factor. The «push» factor may be due to the pressure of population. On the other hand, initial density might have resulted from earlier migration. If so, new migrants may be attracted because they are more aware of the advantages of migrating and may be given aid and information about jobs by old migrants. This might result in a snowball effect, and density may serve as a proxy for this effect (Sahota, 1968).

2.3.7. Urbanization

It is generally thought that the degree of urbanization of the origin and destination regions is an important determinant of migration in both developing and developed countries. Urban areas are preferred by migrants because they offer better job opportunities, the possibility of earning relatively high incomes,

15. A population density variable was used by Sahota (1968) and by Beals, Levy and Moses (1967), though they used density variables together with population variables.

better educational opportunity, and the enjoyment of social and cultural aspects of city life.

Researchers have found in general a positive correlation between destination urbanisation rate and interregional migration[16]. Exceptions are the studies of Levy and Wadycki (1973) and Sahota (1968). However, as Yap points out «these results are only a weak verification of the attractiveness of cities. «Urban» does not mean large cities alone. The definition includes all places of 5,000 or more in most of the studies and 2,500 in the case of Venezuela» (1977, p. 245).

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2.3.8. Migrant Stock

It is widely accepted that the availability of (employment and other) information concerning alternative places play an important role in the migrant's decision regarding his destination. People are more likely to move to places about which they have at least some information rather than to localities about which they know nothing.

As Nelson (1959) has pointed out relatives and friends who have previously migrated from locality i to locality j may provide people in their former origin with information concerning their present location. This information flow may increase the propensity of persons to migrate from i to j rather than to some other place. The larger the number of people who have migrated from i to j in the past, the greater will be the quantity of ingformation channelled from j back to i, and hence the greater is likely to be the migration flow from i to j.

Moreover, relatives and friends may provide the recent migrant with food and accommodation until he can find a job. Also, especially for less educated migrants, the presence of relatives and friends of similar background help make the social transition easier. In either case, the potential migrant in locality i will be less uncertain about his prospects in locality j than elsewhere.

Nelson (1959) has suggested that since the distribution of relatives and friends is a function of past migration, it is a function of all the variables which entered into the determination of past migration. Thus, the parameter estimates of most variables, including distance, would tend to obscure the true relationship

16. This may well be explained by the fact that the mechanisation of the agricultural sector «pushes» people to the urban areas.

between these variables and migration because the variables also influence migration indirectly through their past effect on the distribution of migrants.

Greenwood argues that if this argument is valid then «the introduction of a migrant stock variable[17]. will to some extent affect the parameter estimates of all other variables employed in the model» (1969a, p. 190)[18]. In testing his model for the United States economy as a whole (1969a) and for individual states (1970), Grenwood (1971a) also found the past migration of relatives and friends is an important determinant of the distribution of present migrants and that when a migration stock variable is included the direct effects of distance are not so great as they otherwise seem.

Relatives and friends measured by the migrant stock variable have a posilive effect on current migration to a specific area in both developing and deveoped countries as the work of Levy and Wadycki (1973), Greenwood (1972-73), and Kau and Sirmans (1977, 1979) demonstrates. Greenwood (1971a) also found the same effect for the langauge similarity between regions in India, although this variable ranks very low in importance in terms of addition to R^2.

The fact that destination contacte reduce searching costs and uncertainty for the potential migrant has a clear policy implication. Redirection of internal migration from larger to smaller cities may be feasible if wage incentives are supplemented by advance information and assistance in moving and resettling (Yap, 1977).

2.4. Limitations of the Studies and Policy Implications

There are some problems in the econometric functions of interregional miggration which limit their usefulness for prediction and policy implications. First, there is the aggregation problem. Although there are some studies which analyse

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17. In his U.S. study Greenwood (1969) defines it as the number of persons born in state i and living in state j 10 years before the 1960Census, and in his Indian study Greenwood (1972-73) defines it as the number of males born in state i who had been living in state j for more than 5 years at the time of the 1961 Census. Also, Levy and Wadycki (1973) in their Venezuelan study, define it as the number of males age 15 and over who were born in state i and had been living in state j for more than one year prior to the 1961 Census.

18. It should be pointed out also, that if the migrant stock variable is highly collinear with the other variables, the «t» statistics may be significantly influenced.

specific subgroups of the population classified according to race, age, sex, and education, in the majority of them the level of demographic aggregation is such that masks the differential migration response of subgroups in the population. Also, the level of geographic aggregation by not taking into account the moves within regions, although they may be more than the interregional, reduces the number of moves covered. Furthermore, interregional migration flows lump together rural and urban flows, though in some countries migration to and between urban areas is an important component.

Second, in most migration studies variables defined for the end of the period are used to explain migration that occurred over the period. Especially when the period is long, migration itself can affect end-of-period levels of variables by influencing these variables over the period in question[19]. The assumption that underlies the single-equation multiple-regression models of migration is that while the independent variables influence migration, migration does not in turn influence these variables. If this assumption does not hold, the parameter estimates possess a simultaneous-equation bias and the results are vitiated.

The migration variable is usually measured as (i) the people who moved from region i to region j during the previous years (usually between one and five years) (ii) the people enumerated in region j who were born in region i. Both measures miss the return migrants (migrants returning to their region of origin) and the repeat migrants (high-propensity to migrate types who are making at least their second move), and the loss over a long period of time may be substantial. Furthermore, cumulative migration flows may result in a simultaneous-equation bias which may exaggerate the importance of the independent variable's effect. Levy and Wadycki (1972a) and Greenwood (1971a) using one-year and lifetime migration variables found that the estimated income coefficient tends to be smaller in one-year migration than in lifetime migration.

Given its sensitivity to economic opportunities migration will continue under present circumstances. Government policies which raise wages and employment in urban areas are likely to stimulate out-migration from rural areas, unless economic conditions are also improved in these areas. Hence, if migration is to be minimised, programmes aimed to combat urban poverty should be coupled with programmes directed against rural poverty. It should be noted however that programmes of rural development will have less impact on the young and

19. Note that the effect of migration may occur over several periods.

more educated people than on the rest of rural population, unless they offer what the big cities can offer to them in both economic and social terms.

In recent years a part of the recearch is concentrating on estimating the effects of specific government policies on (or for suggesting instruments for changing) migration flows. Although we know that employment opportunities and the level of income and education are motivating factors, more research is needed on the sensitivity of migration to the jobs under direct government control, or the importance of housing and public services in an individual's decision to migrate. As we mentioned before, if distance and destination contacts serve as proxies for information and assistance, migration can be redirected by providing information, temporary accommodation., and other support to the potential migrant. Finally, migration functions will have more predictive value if they are developed in a simultaneous - equation framework and include more policy variables.

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