Internal migration in Nepal

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INTERNAL MIGRATION IN NEPAL

By

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Date
Determinants of internal migration in Nepal using 1971 census data and socio-economic data by region are analyzed in this paper. This study gauges the impacts on migration in Nepal of origin and destination regions, agricultural surplus, educational attainment, urbanization, employment opportunities and distance. These variables influencing the migration are based on the socio-economic opportunity model of migration which is a mixture of human capital and gravity theories of migration. The model tested is a utility maximization model of internal migration given cost conditions.

Out-migration from regions having agricultural deficit, low level of urbanization, educational attainment and less employment opportunities is found to be particularly intense. On the other hand, regions where residents enjoy better 'qualities of life' and better economic opportunities tend to receive net in-migration. This supports the prevailing economic studies on migration that migrants tend to maximize their present level of welfare when they move from one place to another.
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CHAPTER I

INTRODUCTION

"The quitting of hearth and home, the wrench of emigration to some foreign place is commonly viewed, and probably rightly so, as the classic and essential means by which the mass of man have been able to extend the horizon of their personal quest for future" (Paul David, 1971: 243).

Migration is a worldwide phenomenon of which Nepal is no exception. It is so intense in this tiny Himalayan Kingdom that it led Toni Hagen (1960) to call Nepal a 'Migratory Nation'. A recent census of Nepal (Central Bureau of Statistics, 1974) verifies this fact. In recent years almost 600,000 persons (which is nine percent of the total population) are permanently residing outside their place of birth. In addition, thousands of people temporarily leave their home every year.

Although external migration has always been a part of Nepalese life, internal migration in Nepal intensified only after the eradication of malaria in the southern plain region of the country (see map) during the late nineteen-fifties. Before that, adjoining areas of India acted as a 'Population Vacuum'
for the overpopulated Nepalese hills and mountains.\textsuperscript{2}

Availability of additional arable land in the southern plain during the sixties simply opened new economic opportunities to most of the people in this predominantly agricultural country; thus causing a huge rural-rural human movement. Moreover, the 'high quality of life'\textsuperscript{3} which is enjoyed by most of the southern regions, also attracted thousands of people from other parts of the country. This can be seen by comparing the population censuses of 1952-54 and 1961 with the census of 1971. According to 1971 census, for example, eastern plain region of Nepal has absorbed 175,532 migrants compared to only 68,172 in 1961. This is a 157\% increase in net positive migration (Central Bureau of Statistics, 1974).

The purpose of this paper is to determine the underlying causes of internal migration in Nepal. An economic interpretation of migration is provided using a 'Socio-economic opportunity Model' according to which people move in response to the improved socio-economic opportunity available to them elsewhere. This model is a mixture of human capital theory and host of other migration models such as gravity type models, the cost-benefit model and the dynamic risk taking model. The socio-economic opportunity model of migration is preferred to other migration models because it is thought to be general in nature and thus more suitable for a country like Nepal.
The approach used in this study is strictly a temporal partial equilibrium type approach using the recent (1961-71) inter-regional migration date. A hypothesis showing the effect of different social and economic opportunities on migration is tested by using regression analysis.

A survey of current status of the knowledge of internal migration models is covered in the Chapter II. Chapter III provides a detailed description of the statistical and mathematical models in this study. Chapter IV contains analysis of statistical data and the results gained from the use of socio-economic opportunity model. Chapter V contains policy implications and conclusion.
"Migration means life and progress" (Ravenstein, 1889:228).

Introduction
Studies on migration date back to late nineteenth century when Ravenstein (1889) published his well known article 'The laws of Migration'. Since then not only economists but other social scientists like demographers, sociologists and geographers have made countless contributions to migration literature. The majority of these works deal with the causes of migration. Since the model employed in the present study is concerned with the cause rather than effect of migration, attention is focused to the former.

Theories dealing with causes of either gross or net migration in a country are explicitly or implicitly based upon the theory of utility maximization (Greenwood, 1975). Thus the ultimate goal behind migration, whether it is evaluated using a human capital theory or a gravity type model, is to improve one's present condition. Theories differ from one another only in terms of the emphasis they put on various variables
they employ. A somewhat closer examination of the two theories involved in the present paper will reveal this hypothesis. The human capital theory of migration is discussed first. A discussion of gravity type model of migration will follow later.

Human Capital Theory of Migration

The human capital theory of migration was initiated particularly by the pioneering works of Theodore W. Schultz (1962) and Larry S. Sjaastad (1962). They used a neo-classical theory of investment in describing the continuous dynamic process of labor mobility.

Until recently, growth in output \( Q \) was said to be a function of labor \( L \), Capital \( K \) and some random error \( R \). Stated mathematically:

\[
Q = f(L, K, R)
\]

Unfortunately, growth theories based on this type of function treated labor in an aggregative manner and often considered it as a ceiling of growth. Empirical research employing the above type of functional form that directed the attention of economic growth theorists to the neglected contribution of human resources to production and growth. Empirical research by Schultz (1962), Solow (1962), and Denison (1965) show that advances in knowledge and education significantly affect the economic growth of a country (Wykstra, 1971). Thus unlike classical and neo-classical beliefs regarding labor and productivity, it pays to invest in human beings.
Though criteria for investment in human capital (education, health and other skills) are similar to those of other factors of production, the benefits and costs involved in human capital investment may be of pecuniary and nonpecuniary in nature. The investment hypothesis for human capital development in its simplest form can be summarized by the following equation (Blinder, 1976):

\[ Y = f(H_k, \frac{dH_k}{dt}) \]

Where \( Y \) is observed earnings, \( H_k \) is potential earnings from human capital and \( \frac{dH_k}{dt} \) is the rate of change in human capital over time period 't'. As long as human capital contributions earnings is \( \frac{df}{dH_k} > 0 \), the individual will give up his current earnings in order to increase future earnings opportunities or \( \frac{df}{dH_k} < 0 \). In other words, investment in human capital leads to development of human capacities which inturn improves the future welfare of the individual concerned. This is shown in Figure 1 where the future earning capacity curve (TT) of a person who has invested in human capital has a steeper slope as contrasted to the income curve of an unqualified person (UU) (Becker, 1962).

The magnitude and development of investment to improve the future productivity of manpower are determined by three important activities. They are (1) health, (2) education and (3) migration. Early research on human capital development show
Figure 1

Income/Marginal Product of Labour
that education and health greatly affect migration. This follows from the fact that 'men are not created equal and they will not likely to stay so if they were'. Thus the difference in human capital stock (different educational levels, skills, health, etc.) causes difference in productivity and present and future earning capacity. The difference in future earning capacities in different regions and occupation causes people to invest in migration (Sjaastad, 1962).

As an investment, migration thus not only yields returns but also involves some costs. Distance is a proxy for one of the costs involved in migration. It affects not only the transportation costs but also other costs like information and search costs. In short, migration is determined by the net returns in terms of higher annuities or opportunities from such movements which in turn is affected by education, health, distance, etc. Following is a review of studies which use statistical data to examine the effect of the above mentioned relationship between migration and other variables. The variables evaluated below are employment, income, education, age and distance.

Income
Income has been a prime explanatory variable in most of the studies using human capital model. Income as used in the model is the present value of the individual's earning stream in the location of destination. But unlike the human capital
model most econometric models of migration employ aggregate data on income, especially mean income or wage levels of both sending and receiving regions. Use of mean income is justified by the fact that since current earnings levels enter importantly into present value calculation, such earnings serve as good proxies for expected future earnings (Greenwood, 1975). Gian S. Sahota's (1968) study on internal migration in Brazil shows regional wage as a significant variable both in origin and destination regions. The elasticity of migration with respect to earnings in the destination region in Brazil is approximately two for young (15-29) migrants and one for middle (30-59) aged migrants. Samuel Bowles (1970) in his study of net white and black migration from the south, however, used both a measure of current income differentials and a measure of present value of expected life time income differentials. His study indicates that the present value concept yields better results than the income differentials. In their study of migration in Ghana, Beales et al (1967), pointed out that causes of migration can be described by using regional income differences. The regression coefficient in Beales et al study indicate that one percent increase in income in the origin region leads to 2.3% reduction in out migration while a similar increase in the destination region income causes only 1.96% increase in migration to the destination region. A similar type of study done by Greenwood (1971) concerning rural to urban migration in India suggests that people generally
migrate from relatively low income (rural) regions to relatively high income (urban) region. Like Beales et al, Greenwood found that a relatively small income increase in the origin region is needed to deter migration to other regions. Greenwood (1969) using an average money wage variable for both origin and destination regions found out that migrants in Egypt like in other countries, are equally responsive to income. A Canadian migration study done by Laber and Chase (1971) also indicate similar type of income migration relationship.

Levy and Wadycki (1974) in their Venezuelian migration study, came up with the result evaluating that only destination income is a significant variable. This finding, that the income opportunities provide a better explanation of in-migration than they do of out-migration, is common to number of migration studies. Lowery (1960), Perloff (1965) among others, have pointed out that attractive economic conditions in the form of higher income, attracts migrants from other localities. Their studies also indicate that origin locality income and labor market situation does not affect migration much. It is argued that an increase in destination income increases both the potential investment gain from migration and the expected level of permanent income in turn causes in-migration (Greenwood, 1975).
Although the studies surveyed so far indicate that migrants are attracted by higher income it is the probability of earning such higher level of income which is important to a prospective migrant. Such probability of earning is represented by the unemployment rate or the employment rate in the region. The unemployment rate may also be treated as a cost (Sjaastad, 1962). Studies on rural-urban migration in underdeveloped countries suggest that unemployment or disguised unemployment (under employment) is the major factor behind migration. Todaro (1969) has pointed out that difference in income plays less important role in less developed countries than in developed countries. According to Todaro, high rates of migration to already underdeveloped urban areas lies behind "... the rural-urban 'expected income' differentials adjusted for the probability of finding an urban job" (Todaro, 1969: 138). Gaude (1971) tested time series data from South Korea using an improved version of Todaro's model. He found that the probability of getting a job influenced rural-urban migration as much as the differences in income. But in their Venezuelan study Levy and Wadycki (1974) found that a one percent increase in the destination region unemployment rate deters outmigration only by .82%. Similarly Greenwood's (1971; 1969) studies on India and Egypt indicate that migration is negatively related to the destination region unemployment rate and positively to the origin region unemployment rate.
Education

High income and probability of finding a job are greatly influenced by education, on the job training and other related factors. It has been pointed out by Johnson (1964) and others that education plays a major role in the international migration which is often referred to as the 'brain drain'. Within a country, investment in education increases life time earnings (Becker, 1962; Schultz, 1967).

Investment in education is attributed to the structural change and progress in the labor market and production methods. Migrants in the above type situation are the people who accept new jobs or occupations (or intend to do so) and in the process change their geographical region. Thus, it can be said that migration is directly related to education. One implicit assumption behind such relationship is that educated people have more information regarding job, income and other opportunities available to them in the destination regions than other people. Therefore, an educated person is in a better position to minimize the search, information, transportation costs involved in migration. Further, education also reduces the importance of tradition and family ties thereby reducing the psychic costs of migration (Greenwood, 1975).

Almost all of the studies reviewed above show migration being positively related to origin educational level. This supports
the previous hypothesis that educated people are more mobile than others. But the above result may also mean that the migrants do not value educational opportunities for themselves or for their offsprings. This shows that there are two contradictory hypotheses involved in the effect of education on migration: (1) the educated people are more mobile and (2) educational opportunity is a variable not valuable in addition to real income (Schultz, 1967). The Ghanian migration study done by Beales et al presents a perplexing result where migration decreases both with origin and destination educational levels. In India however, migration increased with origin educational level and decreased with destination region education (Greenwood, 1971).

**Age**

Total returns on any kind of investment including human capital are a function of the time during which returns are expected. It is said that the investment and the time during which returns are expected are inversely related. Accordingly, in case of human capital investment, there will be a less incentive on the part of older people to invest in migration, education, special training and so on. Census data from various countries including Nepal (Central Bureau of Statistics, 1974) show that people between the age 20-45 tend to migrate more than compared to other age groups. Sahota (1968) however indicates that there is little or no difference in the pattern of migration between young (15-29) and middle (30-59) aged groups.
Distance

Distance, probably is the most widely used variable in migration models. In the human capital approach, as mentioned earlier, distance represents pecuniary as well as nonpecuniary costs of migration. Studies covering both the developed and underdeveloped countries show this relationship. For example, in Brazil (Sahota, 1968) where a migrant required an annual income gain of 540 Cruzerious to be willing to move 330 miles which cost only 75 Cruzerious; this finding shows the importance of the nonpecuniary cost in migration.7

To this point, only the variables and statistical results involved in econometric studies based on human capital theory have been examined. But with the exception of the works of Sjaastad and Bowles, all other studies on migration employ some variables such as urbanization, population density, etc., which are either unexplained or unspecified in the human capital theory of migration. Moreover, human capital theory fails to provide any rationale behind using both origin and destination level data. This brings gravity theory of migration into the picture. In particular, gravity theory explains the rationale behind the inclusion of variables like density, urbanization and data from both origin and destination regions. Following is a brief survey of gravity theory of migration.
Gravity Theory of Migration

In the gravity theory of migration, regions are conceived of as masses. "The mass is constructed according to certain principles. These principles govern in an overall fashion the range of behavior of individual particles, both constructing and initiating their action. Interregional relations may be thought of as interactions among masses" (Isard, 1960: 494). This approach is said to resemble an approach frequently used by physical scientists -- law of gravity. According to the (Newtonian) gravity law, a particle of mass M is at point A at a distance 'd' from a second particle of mass 'm' at a point 'a'. A force 'F' acts on each mass attracting them together along the line joining them and having the magnitude:

\[ F = \frac{GM_m}{d^2} \quad \ldots \ldots \ldots \ldots \quad (la) \]

Where 'G' is an universal constant, the gravitational constant. Using similar argument Stewart (1949) formulated 'Laws of Demographic Gravitation'. Replacing mass by \( N \Omega \) where \( \Omega \) is a weighted index attached to the person concerned. Accordingly, equation (la) becomes:

\[ F = \frac{G(N_1 \Omega_1) (N_2 \Omega_2)}{d^2} \quad \ldots \ldots \quad (lb) \]

Where \( F \) is demographic force. The demographic forces of
attraction between two groups \( N_1, N_2 \) with a distance \( d \) becomes

\[
F = \frac{N_1 N_2}{d} \ldots \ldots (2)
\]

The mutual gravitational potential 'V' or the demographic energy as Stewart calls it is shown below:

\[
V_1 = \frac{G N_2}{d} \ldots \ldots (3a), \quad V_2 = \frac{G N_1}{d} \ldots \ldots (3b).
\]

when there are more than two groups distributed throughout a plane which is continuous then the gravitational (population) potential at any point at any point 'c' in the plane becomes:

\[
v_c = \int \frac{1}{r} D \, ds.
\]

Where \( D \) is population density over the infinitesimal element of area \( ds \); and \( r \) is distance from the element to point \( c \).

Thus if \( D \) is known population potentials can be computed.

Although Stewart mentioned population density coupled with distance as a potential gravitational factor, he came to the conclusion that it is difference in income which causes population movement.

Ellis and Van Diren (1966) in their gravitational model came up with a standard gravity formula:

\[
I_{ij} = G \frac{P_i A_j}{T D_{ij}}
\]
Where $G$ is the gravitational constant, $P_i$ is the population at origin $i$, $A_j$ is the attraction index of destination region $j$, $TD_{ij}$ is the minimum time distance on route $ij$ and $b$ is an exponent.

In Stewart's demographic gravity model population size is taken into account. Nevertheless, inclusion of $A_j$ makes the latter model more general in nature. In recent migration studies not only attraction indexes of destination region are taken into consideration but also the attraction indexes of origin region are included. These indexes are some times known as 'push-pull' factors of migration. These factors were outlined in most of the english studies of migration by Ravenstein (1889), Redford (1928).

Some of the push factors mentioned in the migration literature are: loss of employment, unfavourable terms of trade, wide dispersion of poverty and income and pressure of rural poverty. While the pull factors are: employment, education, high income, 'bright lights' in the form of high urbanization and other economic, social and political opportunities. Distractions, commonly represented by distances also affect migration. Thus factors causing migration in push-pull theory can be summarized as (a) factors associated with area of origin, (b) factors associated with area of destination, (c) intervening factors i.e., distance and (d) personal factors like family ties, climate, etc. (Lee, 1965).
Although factors other than (a), (b) and (c) play an important role in human migration, it is the personal factor which ultimately decides the magnitude of such migration. A prospective migrant before migrating will evaluate the situation according to his present and future need. Thus mechanism behind migration boils down to that of decision making process which aims at maximizing utility. This being common to both the human capital and gravity theories of migration. Thus behaviorally the "F" factor in gravity models is the aggregated utility maximizing behaviour of the groups of people in the model.

As mentioned earlier, the studies based on human capital theory employing some of the gravity model variables found population density and size as significant variables explaining migration. It should be clear from the above discussion that the greater the population size or higher the population density the greater will be the population migration. In Brazil destination region density variables are more significant than most of the origin region density. This indicates density is a strong pull factor (Sahota, 1968). According to this study the elasticity of destination region density is 1.35 for young people and .93 for middle aged people. On the other hand, Greenwood (1969) in his Egyptian migration study found that origin population density is more elastic than the destination region population. In Ghana the effect of size of population is less significant (Beales et al 1969).
Urbanization coefficients represent the most perplexing results in many countries. In Brazil, (Sahota, 1968) the urbanization coefficient had a positive sign for the origin region indicating that migration increases with urbanization. But it is negative for the destination region suggesting that in Brazil a high level of urbanization do not act as a pull factor of migration. In Egypt, (Greenwood, 1969) migration is inelastic to both origin and destination region urbanization.

The gravity theory of migration like any other theory, is not free from shortcomings. Perhaps the most severe criticism leveled against this type of approach is that it is not always possible on the part of an individual to make a distinction between push and pull factors. All factors can be said to exert a push type effect. This is also true in case of pull effects. Moreover, as Taylor (1969: 99) puts it "The push pull approach . . . . subsumes all motives under the assumption of the maximization of want-satisfaction so that the complex decision to migrate is reduced to a kind of mechanical balance of external and internal forces."

Unfortunately, this criticism also holds good for human capital theory especially when it is applied to an under-developed country where poor and illiterate villagers do not have the "... experience with decisions involving real choice . . . ." (Munro, 635:74). This gives rise to the need
for a model which incorporates both the theories of migration and at the same time is suitable for countries like Nepal. A model synthesizing all these factors is outlined in the next chapter.
"An art would not be an art unless it were founded upon a scientific knowledge of the properties of the subject matter; without this it would be not philosophy but empiricism . . . " (J.S. Mill, 1948:124)

Introduction: Shortcomings of the Black Box Models

Discussion of migration models in the previous chapter showed that they are incapable of explaining many aspects of the migration problem. These flaws become more serious when these migration models are used to examine the migration problem in a country like Nepal. A careful analysis of techniques and methods involved in these migration models in the light of Nepalese migration situation will verify the above hypothesis.

Prevailing migration models, especially the gravity type models, suffer from serious methodological shortcomings. The methodology upon which these models are based are assumed to be a set of a priori unified principles and the empirical phenomena have been forced to prove them. Although these models, also known as 'Black Box' or Phenomenological models, provide a satisfactory explanation and prediction of a set of data, they "... fail to provide what scientists call an
interpretation of the same data" (Bunge, 1964:248).

Besides these methodological shortcomings, there are some practical difficulties encountered by prevailing migration models when applied to Nepal. For one thing, statistics pertaining to Nepalese migration are very hard to obtain. Similarly, variables suggested by the migration models are almost non-existent in Nepal. Above all, the underlying concept of prevailing migration models i.e., the migrants are capable of making decisions regarding their spatial movement based solely on pecuniary gain/loss while treating migration as an investment, is not applicable in the case of Nepal. For instance, the human capital theory of migration treats migration as an investment and considers migrants as persons who make their decision regarding movement based on the discounted life-time earnings. Munro (1974) in his study on Turkish internal migration, has shown that lack of collection and distribution of complex information regarding net earnings and employment, reduces the applicability of human capital theory in underdeveloped countries. In a somewhat different study about the agriculture in Turkey, Koları́s (1963) found that farmer's decision while planting a new crop bears little resemblance to the maximization process inherent in the human capital theory. A farmer's action in Turkey is based on the result of his/her own observation and 'trial and error'.
Although, the 'trial and error' process is different from the human capital decision making process, it is nonetheless irrational. The human capital theory of migration relies heavily on organize, pooling and diffusion of information. The trial and error process on the other hand relies on tatonnements which leads to the enjoyment of the best accesible 'state of mind'. According to Shackel (1972) this situation is the so called optimal conduct leading to maximization of one's satisfaction. In other workds, a trial and error process like other economic phenomena is rational conduct.

It is therefore, possible that some kind of welfare improvement process (in non-pecuniary form) takes place when a person or family unit in a country like Nepal decides to migrate. Perhaps this type of welfare improvement process can be best explained by dividing population movement into two different but related events: (1) "Changes in the place in which people live and (2) "Changes in the kind of locational decision which individuals make" (Gale, 1971:257). Generally, a migrant's locational decision depends heavily upon his/her mental map of his/her surrounding (socio-economic and political) environment. Any sufficient relative deteriation of the migrant's surrounding environment will cause migration. Nevertheless, migration is a dynamic process. Thus a change in locational decision may cause a change in the environment
which in turn might lead to massive population movement. It is important to note here that migrants ultimate aim is to improve the present condition.

Based on the above discussion of the shortcomings of existing models, a migration model will be developed which (1) is more general in nature than prevailing migration models i.e., which can explain the internal mechanism of empirical phenomena (2) includes some kind of decision making process based on migrant's implicitly assumed welfare calculi and (3) is based on data available in Nepal.

The Translucid Box Model
Before embarking on developing a new model, it is worthwhile to examine the counterpart of the 'Black Box' type model which is known as 'Translucid' or Representational model. The Translucid model, unlike its counterpart "... does not regard behaviour as an ultimate but attempts to explain it in terms of the constitution and structure of system" (Gale, 1971:236). The mechanism involved in this type of model is postulated and all the parameters are assigned to the properties of the mechanism. Therefore, in a Translucid Box model interpretation and explanation of empirical phenomena helps one to observe the internal mechanism involved in the model. Such interpretation of the internal mechanism involved in a migration model can be achieved by examining human interactions and decomposing it into a set of indexes which is not unique to
any one particular situation (Gale, 1972). An example of such transparency element in a migration model is Zipf's 'Principle of Least Effort' (Zipf, 1949).

The Quality of Life Model
The aim of providing a more general model of migration may be achieved by combining elements of a Black Box model with the Translucid model. A model known as the Quality of Life model has some elements which if introduced to the existing migration models might create a model of migration which would have transparent elements and is more general in nature. The Quality of Life model, first developed by Liu (1974), attempts to construct social indicators or indexes which are not unique to any situation. This feature of the Quality of Life model makes it somewhat more transparent than other models.

In his study Liu tried to define and quantify social indicators beyond the conventionally used economic measures of wellbeing. His indicators are constructed interdependently, with the same data often used in deriving a number of quality of life indices with one indicator often a component of another indicator. State assistance for example, is weighted into individual states of life as well as health and welfare quality. Liu presented his measures as an index assigning unity value to the average magnitude of each quality of life for the U.S. His indexes exhibit substantial correlation with each other and with state per capita income. The
strictly socio-economic indexes are thus good indicators of income and other commonly used measures of well being. Moreover, studies showing migration of low income people suggest that poor people are more sensitive to measures than income or other economic opportunities. Cebula, Kohn and Vedder (1973) in their study about the migration of black people from southern to northern states in the U.S. came up with similar determinants of migration. This result is of particular interest to the present study which is explained below.

In Nepal the only available indicators of well being are the social indicators. Moreover, existence of a partially monetized sector i.e., agriculture, where a large portion of rent and wages are still paid in kind, makes money play a less important role in the economy (Ojha and Rajbahak, 1966; Pant, 1970). It is likely that the Nepalese people are interested in general welfare like educational attainment, agricultural development, general living conditions and so on. Thus, social indicators are all that is available for the analysis and in the same sort of information used by the migrants in Nepal.

Socio-Economic Opportunity Model of Migration

Socio-economic indexes from different areas not only show the existence of different socio-economic situations but also indicate different socio-economic opportunities available to
a prospective migrant. For example, higher agricultural
development shows the availability of agricultural income and
employment opportunities. It is thus hypothesized in this
study that migrants in their spatial location decision will
use the above quality of life indicators. If the migrant
finds the socio-economic index of his/her local area inferior
to other places or if he/she thinks that there has been
sufficient relative decline in the place where he/she lives,
he/she will decide to move from that locality. It is important
to point out here that his/her aim is to improve his/her
present situation. In other words, a migrant is involved
in some sort of opportunity maximizing behaviour subject to
the topological barrier, pecuniary and non-pecuniary limitations.

Since migration tends to be from one region to another where
the situations are different, it is important to have variables
showing both presence and absence of opportunities in the
regions. For this, inclusion of both origin and destination
level variables as suggested by the gravity type models seem
most appropriate. This difference in opportunity and welfare
maximizing behaviour on the part of migrants can be shown by
using mathematical programming techniques.

The Mathematical Model
From the preceding discussion it follows that possibilities
for net improvement in general welfare given origin conditions,
destination conditions, costs and individual resource constraints will lead to migration. This can be stated symbolically as:

\[ W = W(\Xi_{oj} - \Xi_{oi}) \]

where \( W \) is (net) welfare, \( 0_i \) stands for opportunities available in the origin region and \( 0_j \) stands for the opportunities available in the destination region. The migrant can gain by moving in response to the perceived benefit-cost ration from the above calculation. Thus higher the net welfare the higher will be the migration from one region to another. Stated otherwise \( M_{ij} = f(W) \), where \( M_{ij} \) is migration from region 'i' to 'j'. This in essence is the classical welfare maximization as conceived by the human capital model. There are several costs involved in migration which a migrant has to take into account while moving from one place to another. One of such costs is represented by the distance between the two regions. This cost constraint is shown below:

\[ 0 \leq C(D_{ij}) \]

Where \( D_{ij} \) is the distance between region 'i' and 'j'.
It should be noted that opportunities available in the destination region $O_j$ and the opportunities available in the origin region $O_i$ measures are based on the Liu's Quality of Life indicators and gravity type migration model. For example, $O_j$'s include agricultural surplus, educational attainment, (Edj) urbanization (Uj), employment opportunity (Nij), in the destination region and $O_i$'s include agricultural surplus (Asi), educational attainment (Edi), urbanization (Uri), and employment opportunity (Nii) in the destination region. But note they are all indexes of benefits and costs associated with the utility maximizing calculations of the potential migrants.

Among the variables mentioned above, distance needs further explanation. Distance, in many studies (Greenwood, Sahota, Lowry) is treated as an impediment to mobility. Movement over long distance cost more than over short distances. Besides this, information regarding distant opportunities is much more expensive than information about near opportunities.

Another hypothesis about distance and migration is that some people do not move to faraway places because there is an intervening opportunity at an intermediate point (Stouffer, 1940; Isbell, 1944). In other words, a rational man considering migration to a distant area would consider only whether there were any suitable opportunities closer and not whether these opportunities lay physically between the migrant and
the more distant area. A similar opportunity available at a nearer place is thus considered as a potential opportunity cost of spatial movement. It is important to note here that both the approaches emphasize the role of distance as a potential cost of migration.

Against this background, one can easily attack the problem of maximizing welfare function of the migrant. Assuming the above mentioned objective (welfare) function is smooth and continuous, the optimization problem can be written in the form of the Lagrangian expression (L). The Lagrange 'L' is identically equal to W (Welfare) for those values of \( \sum 0_j - \sum 0_i \) which satisfy the cost constraint. This is shown below:

\[
L = W(\sum 0_j - \sum 0_i) + \lambda (-C(Dij))
\]

Where \( \lambda > 0 \)

The first order condition for the maximization also know as the Kuhn-Tucker conditions are as follows:

\[
\frac{\partial L}{\partial w} = (\sum 0_j - \sum 0_i) = 0 \quad \ldots \ldots \quad (1)
\]

\[
\frac{\partial L}{\partial \lambda} = -C(Dij) = 0 \quad \ldots \ldots \quad (2)
\]

\[
W \frac{\partial L}{\partial w} = W(\sum 0_j - \sum 0_i) = 0 \quad \ldots \ldots \quad (3)
\]

\[
\lambda \frac{\partial L}{\partial \lambda} = \lambda (-C(Dij)) = 0 \quad \ldots \ldots \quad (4)
\]
Equations (1) and (2) show basic requirements for a maximization problem. Equation (2) also reiterate the constraint that it should be greater than zero. Equations (3) and (4) determine the type of solution (interior or corner solution) applicable to the maximization problem under consideration.

An even more explicit interpretation is available from the above mathematical results. Equation (1) \( \partial L / \partial w = \xi_{j} - \xi_{i} \leq 0 \) requires that opportunity in the origin region 'i' should not be greater than the opportunities available in region 'j' and vice-versa. This condition is also known as the marginal condition where in order to have \( W > 0 \), \( \partial L / \partial w = \xi_{j} - \xi_{i} = 0 \) must prevail. From this it follows that for equilibrium in population movement or zero population movement, opportunities available in region 'i' should equal to opportunities available in region 'j'.

This may be an optimal migration situation for the migrants as a whole where the society enjoys positive welfare from migration. The objective function and the 'marginal condition' used in the mathematical model can be used in building a testable econometric model showing a relationship between migration and various other opportunities employing a multiple regression technique.
According to the migration function, $M_{ij} = f(W)$. Where $W$ is the difference between two set of opportunities, $M_{ij}$ is indirectly related to the opportunities available to a migrant. Rearranging the above function gives the following:

$$M_{ij} = W(As_j - As_i + Ed_j - Ed_i + Ur_j - Ur_i + N_j - N_i - D_j)$$

From the 'marginal condition' it follows that when the difference between the opportunities become zero, there will be no population movement.

Differentiating each variables with respect to $M_{ij}$ gives expected behaviour of a migrant in a disequilibrium situation. In other words it shows the expected regression signs. For example $\frac{\partial M_{ij}}{\partial As_j} = W$ shows a positive welfare gain which will increase migration while a $\frac{\partial M_{ij}}{\partial As_i} = -W$ shows a deterrent to move from one place to another.

Following is the fully developed econometric model of migration for Nepal.

**The Econometric Model**

$$\frac{M_{ij}}{P_i} = W(As_i, As_j, Ed_i, Ed_j, Ur_i, Ur_j, D_j, N_i, N_j)$$
Where,

\[ \frac{M_{ij}}{P_i} = \text{Population born in region 'i' and enumerated in region 'j' divided by population of region 'i'}. \]

\[ A_{si} = \text{Agricultural surplus in region 'i'; (1 = surplus, 0 = deficit)} \]

\[ A_{sj} = \text{Agricultural surplus in region 'j'; (1 = surplus, 0 = deficit)} \]

\[ E_{di} = \text{Percentage of the population in region 'i' having college level education} \]

\[ E_{dj} = \text{Percentage of the population in region 'j' having college level education} \]

\[ D_{ij} = \text{Aerial distance from population center of region 'i' to population center of region 'j'} \]

\[ U_{ri} = \text{Number of urban centers in region 'i'} \]

\[ U_{rj} = \text{Number of urban centers in region 'j'} \]

\[ N_{ii} = \text{Percentage of economically active population self employed and/or unpaid family member in region 'i'} \]

\[ N_{ij} = \text{Percentage of economically active population self employed and/or unpaid family member in region 'j'} \]

Signs underneath the function show the expected relationship between the migration and various other opportunity variables. The actual relationship between these variables using the single linear regression method is reported in the next chapter. Before regression it is important to examine the
the nature and source of data and variables involved in the model.

The Data and the Variables

The data for the model describing the migrant's opportunity maximizing behaviour in Nepal is taken from the population census of Nepal (Central Bureau of Statistics, 1974). The best information available on the internal migration is the distribution of population by (geographic) region of birth and region of residence on the day of enumeration. No individual data are available for Nepal. The data used in this study is a 'stock variable' (i.e., the number of persons born in region 'i' and living in region 'j' at the beginning of the period over which migration occurs). A slightly revised form of measurement of migration viz., Mij/Pi (where Mij is the variable mentioned above divided by the total population of region 'i', (Pi)) is used as the dependent variable in the present study. This measure of migration is preferred to other measures because it shows the migration in terms of probability which is particularly suited for testing hypothesis dealing with differences in opportunity between regions (Haenszel, 1967).

The other variables employed in the present model closely resemble the variables of the mathematical model. These variables are, agricultural surplus in region 'i' and 'j',
educational attainment in region 'i' and 'j', distance from the population center of 'i' to the population center of 'j' and employment opportunity in region 'i' and 'j'. Data on some of the variables of urbanization employment opportunity and educational attainment are drawn from the Population Census of Nepal (Central Bureau of Statistics, 1974) while information on other variables come from diverse sources which will be discussed later.

The Variables

Urbanization

Urban areas included in this study show the absolute number of population centers having more than 10,000 inhabitants. Urban areas are generally considered as dynamic centers which can offer superior educational, employment and other opportunities. In Nepal most of the urban centers are the seats of the government. Urban areas thus indicate the existence of power base around which the political system revolves. In some instances urban areas are not only administrative centers but also religious and major marketing centers. Hence it is expected that existence of urban area will deter out migration while its absence will cause out migration.
Employment Opportunity

The employment variable is used in this study for the first time for Nepal and is the percentage of active population self employed and/or employed as unpaid family members. This variable therefore shows the employment opportunities in the agricultural sector. Although a large portion of Nepalese agriculture is said to be affected by the disguised unemployment situation, nothing can be said definitely regarding the productivity of Nepalese agriculture on the basis of this variable.

In Nepal strong family ties still exist\textsuperscript{12} and potential migrants may be inhibited by this fact. This might cause a negative relationship to exist between the origin level employment variable and migration. A positive relation between the destination level employment variable and migration is expected showing the presence of employment opportunity elsewhere. The migrant will weigh the alternatives and choose an option to maximize family welfare.

Education

The education variable used in this model shows the percentage of the population having a college level education. Data for this variable were derived from the Population Census (CBS, 1974).
Other indicators of educational opportunity for example, percent of colleges existing in an area, were also tested but were found to be insignificant.

The use of this particular educational variable is based on the following hypotheses: (1) high level of educational stock (i.e., number of people having a college degree) opens the opportunity of nonagricultural employment and (2) high level of education creates individual interest in change and self-improvement (Munro, 1974).

To a prospective migrant in a country like Nepal, where 90% of the total population is engaged in agriculture, non-agricultural employment may mean a source of supplemental income and/or an income higher than his/her present agricultural income. Rana and Malla (1971) indicate that in the absence of private sector in Nepal, the government acts as a major employer of the nation's college graduates and other educated people. This makes college degree a vehicle to nonagricultural employment opportunities which leads to migration. The second hypothesis is somewhat general in nature and has been tested in some countries described elsewhere.

It is important to note here that, concentration of highly educated individuals does not always indicate educational and
employment opportunities. A large number of educated people might migrate to a different area after finishing their education in their native region. But in Nepal a recent study by Sanger (1971) shows that 60% of the college graduates stay in the Kathmandu region which has the largest number of educational institutions. Thus a large concentration of educated people in Nepal may mean existence of both the educational and employment opportunities to a prospective migrant.

**Distance**

Distance data used in the model shows aerial distance between two population centers representing two regions. As mentioned elsewhere, distance not only represents pecuniary cost of moving (in terms of rail and bus fare) but also information cost. In Nepal as in the other countries, this variable is expected to have a negative effect on migration.

**Agricultural Surplus**

Agricultural surplus plays an important role in Nepalese life. A large agricultural surplus may indicate the possibility on the part of a migrant to increase his/her income as well as security and productivity. Pant and Jain (1969) note that large marketable agricultural surpluses leads to larger
savings and investment which in turns leads to higher agricultural production. Agricultural surplus thus is very crucial for economic advancement and enhancing general welfare.

Furthermore, in 1969-70 more than 61% of the total value of Nepalese exports consisted of agricultural product (Central Brueau of Statistics, 1974). Hence, an agricultural surplus may show potential additional income and a step away from subsistency. The agricultural surplus variable, following Liu’s indicators of quality of life, also shows agricultural development. It is therefore expected that higher agricultural surplus in a destination region may mean potential opportunities associated with agriculture which might cause in migration. This is true especially in the case of Nepal where a large number of people during the last two decades moved to the southern plains after the eradication of malaria in that area. The southern plain regions due to their unsuitable climatic condition and diseases like malaria and cholera, have a very low man-land ratio compared to the regions in the north. This low man-land ratio coupled with new fertile land enable the southern region to enjoy an agricultural surplus.

Since there is no agricultural surplus data available for 1971, dummy variables are used on the basis of the data provided by Cereal Grain Production Consumption and Marketing Pattern

Moreover, the stock nature of the migration variable used in this study i.e., the number of people born in region 'i' and living in region 'j' at the beginning of the period over which migration occurs, justifies the use of dummy variables based on 1965 information.

All the variables except the migration variable (Mij/Pi) are used as explanatory variables in the econometric model. There are 54 observations. The regions showing migration is shown in the map accompanying this study.

The statistical results using the above variables is reported in the next chapter.
CHAPTER IV

ANALYSIS OF THE DATA

"Words are like leaves; and where they most abound
Much fruit of sense beneath is rarely found"

Introduction: General Results

The regression problem described in the previous chapter can be tested in different forms. The functional form which best explains the relationship and thus has good predicting power is always preferred to other functional forms. This can be determined by checking: (1) significance of adjusted coefficient of correlation or the $R^2$ on the basis of the F statistic; (2) T statistic of regression coefficients and (3) the pattern of residuals (Kamenta, 1971).

Of the three criterion mentioned above, the log of the dependent variable, $Mij/Pi$ gives the best result. This indicates that the relationship between migration and other variables showing opportunities available to a migrant is of an exponential type. The results are presented in the Table 1, while Table 2 shows the zero order correlation matrix.
The results indicated in the Table 1 shows that 56.35% of the propensity to migrate for region i to j can be explained by agricultural surplus, urbanization, education, distance and percent of economically active population self-employed and/or unpaid family member. The F statistic shows that $\bar{R}$ is significant different than zero thus supporting our hypothesis that migration is effected by migrants comparing various opportunities available to them between $0_i$'s and $0_j$ possibilities.

Following is a discussion of effect of the individual variables on migration.

The Specific Results of Regression Analysis
As shown in the Table 1, all but regression coefficients indicating employment opportunity in the destination region and educational level in the origin region are significantly different from zero at the conventional level of significance. Regression coefficients indicating urbanization in destination region and level of education in destination region are significantly different from zero at 10% level of significance. All the significant regression coefficients have expected the signs.

Agricultural Surplus

The agricultural surplus variables are significantly different from zero and have the expected signs. As mentioned
### TABLE I

**REGRESSION COEFFICIENTS BEST ESTIMATING LOG Mi,j**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Regression Coefficients</th>
<th>Standard Error</th>
<th>T Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asi</td>
<td>-1.69</td>
<td>.65</td>
<td>2.58*</td>
</tr>
<tr>
<td>Asj</td>
<td>2.02</td>
<td>.61</td>
<td>3.33*</td>
</tr>
<tr>
<td>Edi</td>
<td>-0.24</td>
<td>.26</td>
<td>.89</td>
</tr>
<tr>
<td>Edj</td>
<td>0.50</td>
<td>.26</td>
<td>1.9**</td>
</tr>
<tr>
<td>Uri</td>
<td>-0.59</td>
<td>.16</td>
<td>3.58*</td>
</tr>
<tr>
<td>Urj</td>
<td>0.29</td>
<td>.16</td>
<td>1.8**</td>
</tr>
<tr>
<td>Dij</td>
<td>-0.009</td>
<td>.002</td>
<td>4.57*</td>
</tr>
<tr>
<td>Nii</td>
<td>-0.13</td>
<td>.05</td>
<td>2.56*</td>
</tr>
<tr>
<td>Nij</td>
<td>0.07</td>
<td>.05</td>
<td>1.5</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjusted $\bar{R} = .5635$, Standard Error of Estimate = 1.20

F statistic = 8.6+

Degrees of freedom = 44

Number of observations = 54

*Coefficient significantly different from zero at 5% level

**Coefficient significantly different from zero at 10% level

+F test significant at 5% level with 44 degrees of freedom
<table>
<thead>
<tr>
<th></th>
<th>Mij</th>
<th>Asi</th>
<th>Asj</th>
<th>Uri</th>
<th>Urj</th>
<th>Edi</th>
<th>Edj</th>
<th>Dij</th>
<th>Nii</th>
<th>Nij</th>
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</thead>
<tbody>
<tr>
<td>Mij</td>
<td>1.00</td>
<td>-0.40</td>
<td>0.31</td>
<td>-0.40</td>
<td>0.34</td>
<td>0.10</td>
<td>-0.40</td>
<td>0.11</td>
<td>-0.23</td>
<td></td>
</tr>
<tr>
<td>Asi</td>
<td>1.00</td>
<td>-0.01</td>
<td>0.50</td>
<td>-0.10</td>
<td>0.10</td>
<td>-0.10</td>
<td>0.20</td>
<td>-0.50</td>
<td>-0.10</td>
<td></td>
</tr>
<tr>
<td>Asj</td>
<td>1.00</td>
<td>-0.10</td>
<td>0.41</td>
<td>-0.50</td>
<td>-0.20</td>
<td>0.30</td>
<td>-0.04</td>
<td>-0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uri</td>
<td>1.00</td>
<td>-0.20</td>
<td>0.50</td>
<td>-0.10</td>
<td>0.13</td>
<td>-0.80</td>
<td>0.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urj</td>
<td>1.00</td>
<td>-0.20</td>
<td>0.42</td>
<td>0.10</td>
<td>0.33</td>
<td>-0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edi</td>
<td>1.00</td>
<td>-0.20</td>
<td>0.24</td>
<td>-0.80</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edj</td>
<td>1.00</td>
<td>-0.02</td>
<td>0.12</td>
<td>-0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dij</td>
<td>1.00</td>
<td>-0.20</td>
<td>-0.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nii</td>
<td>1.00</td>
<td>-0.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nij</td>
<td>1.00</td>
<td></td>
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</tbody>
</table>
elsewhere a marketable surplus to a migrant may mean an advancement from subsistence to relative affluence. Since agriculture is the major source of income to a farmer, an agricultural surplus may also indicate a potential source of additional income. This additional income might enable the prospective migrant to achieve a higher level of welfare by spending more on other social welfare measures viz., education, health, etc. In addition, the significance of agricultural surplus coefficients also indicate either low level of density per cultivated land or higher level of productivity. Looking at the migration pattern in Nepal it is evident that a large number of people moved to the southern plain after the malaria eradication. This shows the availability of additional land which is vital for the migrants. In other words, the above result also shows a low man land ration thus indicating potential agricultural development. The potential was realized by the production of agricultural surplus in the plains region inducing migration as measured in this analysis.

Urbanization

The regression coefficient for the urbanization variable reported in the study have expected signs and are significantly different from zero. This indicates that migrants in Nepal like migrants from other countries, are attracted by the
potential opportunities available in the urban areas. A high level of urbanization in origin region will deter migration in Nepal and vice-versa.

**Education**

Only the variable showing destination region educational attainment is significantly different from zero. It thus indicates that migrants are greatly attracted by the educated else where. On the other hand nothing can be said regarding the sign of the origin level educational attainment. One possible explanation of this kind of result is the possible high correlation existing between the educational attainment variable (Edi) and other explanatory variables included in the study. A close examination of the correlation matrix will reveal that in fact Nii is highly but negatively related to the percentage of economically active population selfemployed and/or unpaid family member variable (Nii). Since higher levels of educational attainment reduces the family ties and increases information, it is natural to have a high degree of negative correlation between Edi and Nii, where the latter also indicates strong family ties. Studies done by Beales et al (1967) and Sahota (1968) reiterate the above result.
Distance

Distance coefficient has the expected sign and is significant. In Nepal, though a country roughly half the size of the state of Montana, rugged topology makes traveling conditions difficult. The infra-structure is still in the developing stage, thus inter-regional information is conveyed in person. This makes available information very scarce and costly. And even a short distance travelling thus becomes a major undertaking in Nepal causing migration to vary inversely with the distance.

Economically Active Population

Last but not least, percentage of economically active population self employed and/or unpaid family member for the origin level regression coefficient have an expected sign and is significant. This shows that family ties are more important to a migrant than the employment opportunities available to him elsewhere. Since this variable also indicates the employment opportunity, there might be simultaneity inherent in the variable. This is because the above mentioned variable uses an end period employment/unemployment rate to explain migration which occurred over the period of time suggested in the study.
To sum up, difference in opportunities represented by the variables used in the model causes migration in Nepal. A brief discussion of the policy implications based on the discussions provided in the previous chapters is presented in the next chapter.
CHAPTER V

CONCLUSION AND POLICY IMPLICATIONS

Summary
The socio-economic opportunity model of migration proved to be an important technique of examining migration. Unlike other migration model, this model has universal applicability especially in the under developed countries where the economy is not fully monetized and where data is lacking in quality to develop relative economic status. The variables used in the model are based on carefully constructed indexes which are general in nature. Moreover, information on these variables are easy to find even in under developed countries like Nepal. At the same time this model employs the underlying concept behind the prevailing migration models i.e., improvement of present welfare situation, to explain migration.

Policy Implications and Conclusion
In the present study it has been shown that the difference in the opportunity available at different locations causes population movement. This type of regional imbalance in the availability of opportunities has been a major problem in the
economic development of Nepal. In Nepal the plain regions account for more than half of all the roads, banks, schools, colleges, urban centers, hospitals and other welfare measures which improve quality of life yet less than half of the country's population reside in these areas. To bridge the disparity between different (hill and plain) regions a regional development plan has recently been launched in Nepal. Its prime objective as emphasized by Gurung "... is not merely an attainment of broad sectoral targets but also the fuller exploitation of varied resources of different regions for a wider sharing of development benefits without slowing down the growth", (Okada, 1970:1). This can be achieved by directing the developmental efforts towards minimizing inherent regional disparity.

It has been argued that regional planning should aim at improving certain potential regions of the country viz., Kathmandu and the plain regions in Nepal, so that the gains so generated in these regions may later be distributed to other areas. Such an approach fails to take into account the increasing consumptive capacity of the developing regions. Besides this, the southern plain regions of Nepal have to compete with the populations centers and other relatively developed areas of Indian Gangetic plains. This reduces the chances of rapid regional development of the plain regions of Nepal.
The regional imbalance is also not desirable from labor's point of view. A huge population movement from one region is regarded as depletion of human capital in that area. This might slow down the productivity and slow down the economic development. On the other hand, labor productivity and economic growth in the region receiving population might slow down because of the excess supply of labor.

The regression results reported earlier provide some of the solution to reduce regional imbalance in opportunities and thereby the unnecessary population movement. The result suggest that the regional imbalance and the population movement can possibly be cut down by improving agricultural surplus, education, urbanization and employment situations in the origin region i.e., hill and mountains regions of Nepal from where most of the out migration occurs.

Agricultural development by increasing agricultural surplus and productivity is a must for the hill and mountain regions of Nepal. An improved agricultural situation not only reduces potential migration from these areas but also increases employment opportunities in the agricultural sector. This can be achieved by supplying farmers with improved technique of agriculture, increased loans and investments, equalable distribution of land, better marketing facilities and so on.
Agricultural development coupled with increased educational opportunities, better social welfare measures and carefully controlled urbanization in the origin region may help in reducing regional imbalance and population movement.\textsuperscript{18}

Distance, although not truly a control variable, might also be used in balanced spatial distribution of population. As mentioned earlier, there are two kinds of costs involved in migration: (a) monetary cost and (b) psychic cost. A large number of Nepalese migrating to the far away Indian hills and mountains suggests that psychic or nonmonetary costs of migration does not have great influence on Nepalese migration. This leaves monetary cost in the form of transportation and information costs as the major hindrances to the spatial human movement in Nepal. Therefore, a system providing low cost transportation and information about the area suitable for further human settlement and economic development is desirable to achieve a balanced regional development in Nepal.

In a nut shell, the mountain and hill regions of Nepal which lack almost all the opportunities vital to improve one's socio-economic situation should be equally improved to achieve a balanced and rapid economic growth for Nepal.
Footnotes

1 External migration to India can be traced as far back as late eighteen and early nineteenth centuries when a large chunk of Nepalese population moved east to north eastern region of India and Sikkim. See Regmi (1971).

2 This is based on man to cultivated land ration. This ration is 3000 persons for hill and mountain as opposed to only 880 for the plain region. Moreover, the hill and mountain provide mere 28% of cultivated land for 58% of the total population (Central Bureau of Statistics, 1974).

3 Based on the work done by B. C. Liu (1974) the quality of life indicators are:

(a) **Individual status** -- including factors promoting maximum development of individual capabilities, widening opportunities for individual choice and improving existing opportunities for self-support;

(b) **Individual equality** -- including factors describing current economic discriminations against race and sex;

(c) **Living conditions** -- including factors illustrating the general social and environmental living conditions, plus the available facilities;

(d) **Economic status** -- including factors indicating cost-adjusted income figures, partial productivity, and employment situations of labor, available resources, and existing technological conditions;

(e) **Technological development** -- including factors reflecting the promotion and encouragement of research and development and the availability of scientific manpower;

(f) **Agricultural production** -- including factors pertaining to the status commercial operations, and utilization of resources of farm;

(g) **Health and welfare provision** -- including factors depicting the available facilities and services of medical care and welfare;

(h) **Educational development** -- including factors measuring educational background, accomplishment, involvement of individuals and government;

(i) **State and local government** -- including factors representing the informed citizenery, professional classes and the performance of the administration.

4 This study takes into account only the equilibrium in the labor market while assuming other markets are held constant.
All of these studies employ single equation regression model using cross sectional data to determine the relationship between migration and other variables.

Gaud's study unlike other studies, examines migration from macro-economic stand point.

This is also true in case of Ghana where pecuniary cost of migration is less than the non-pecuniary cost of migration. See Beales et al.

Sahota (1968), Greenwood (1969), Beales et al (1967) and Levy and Wadycki (1974) used either population density or the population size to explain migration in their studies.

Zipf (1949) in his study examines the interactions phenomenon using a pair of cities. He uses $P_j/D_{ij}$ and $P_i P_j/D_{ij}$ where $P_j$, $P_i$ and $D_{ij}$ are population in region 'j', population in region 'i' and distance between two regions respectively to examine the phenomenon. Zipf in his study finds a straight line relationship between $P_i P_j/D_{ij}$ and other factors like trips made between two regions, telephone calls, railway tonnage etc. indicating impotence of information and distance on migration.

See footnote 5.

The correlation between the Overall Quality of Life index which is an unweighted average of the indicators mentioned elsewhere and the per capita income is .66 (Liu, 1974).

The existence of large number of joint family system in Nepal indicates the prevalence of strong family ties. See Bista (1967).

The mass movement of population to the southern plain region in Nepal has already been mentioned elsewhere. This phenomenon resulted in deforestation and increased in area of cultivated land in the southern plains. During 1965-68 approximately 61% increase in agricultural output was attributed to the extention of the area under cultivation most of which is in the plains. See Rana and Malla (1971).

Regression analysis has been done using electronic computer Dec System-20. The statistical Package for Social Science (SPSS) programme is employed to run the regression.

This also shows that the relationship between the variables and migration is of non-linear type. Nonetheless through simple transformation this non-linear relationship can be turned into a linear relationship. For example, the
log Yi = a + bXi + ei can be rewritten as Yi = e^{a+bXi+ei}. A notable feature of this type of relationship is that for equally spaced value of Xi, the ratio of each consecutive values of E(Yi), where E is expected value, is equal to the same constant. Thus if Xi+1 = Xi = 1 then

\[
\frac{E(Y_{i+1})}{E(Y_i)} = \frac{e^{a+bXi+ei}E(e^{ei+1})}{e^{a+bXi+ei}E(e^{ei})} = \text{thus log } Y_i = Y_i^*
\]

It follows from the above that Yi = a + bXi + ei can be rewritten as Y = a + bXi + ei. The above is adapted from Kmenta (1971).

16 Some other measures of agricultural development viz., agricultural land per capita have been tested but found insignificant.

17 High correlation between the two independent variable or the multicolinearity is treated on the basis of variable(s) effect on 't' and 'F' ratios.

18 The fifth plan of Nepal under the Small Area Package Programme aims at development of small towns in about 20 localities.
APPENDIX A

NEPAL: FACTS AND FIGURES**

Nepal is a sovereign independent kingdom situated on the southern slopes of the mid-Himalayas. The nearest sea coast is about 700 miles from its border. It is located between 26.20° North latitude and 30.10° East longitude. It has an area of 54,662 square miles. The average length from east to west is about 550 miles long. The north south width is not uniform. At its widest it is 150 miles while at its least it is 90 miles resulting in mean width of 120 miles.

Nepal is bounded on the north by Tibet region of the People's Republic of China. On the east, west and south, it borders with India. The country is politically divided into fourteen regions and seventy-five districts. Kathmandu is the country's Capital and biggest urban area.

The country, however, can be divided into three natural regions; Mountain Region, Hill Region and Plain Region. The Mountain Region lies at an altitude of 16,000 to 29,000 feet above the sea level with the snow line running at 16,000 feet.
Mount Everest (29,028 feet), the tallest mountain in the world, lies in this region. The Hill Region is formed by Mahabharat range that soars up to 16,000 feet above the sea level. It is also known as mid-Himalayas. To the south of Mahabharat range lies the Churia range whose altitude varies from 2,000 to 5,000 feet. Between the two ranges lie great valleys of various width and altitude ranging from 2,000 to 3,000 feet. This region accounts for 68% of the total land area. The Plain Region which has a width of about 16 to 20 miles and an altitude of maximum 1,000 feet occupies about 17% of the total land area of the country. This region is an extension of the great Gangetic Plains. The eastern plain is wider and spreads continuously while the western plain is narrow and irregular. Till the 1950's this region was infested with malaria, cholera and other deadly diseases. This region has thick tropical forests, famous for its big game. All three regions run parallel to each other.

The most important economic resources of Nepal are forests which cover about one third of the total land area. The principal forest products are timber, rafters, beams and faggots. Besides this, there is a small number of agro-based industries in Nepal viz., sugar mill, cigarette factory, rice mills, etc. About 93% of the total population derives its livelihood from agriculture and allied activities. The main
crops are paddy, maize, millet, barley, wheat, and potato. In addition tobacco, sugar cane, jute and oil seeds are the major cash crops.

Due to its peculiar geographical location more than 90% of Nepal's export goes to India. Moreover, foreign trade plays a minor role in the country's economy. According to a recent study foreign trade accounts for only 10 - 12% of the nation's Gross National Product.

Following is a brief review of some vital statistics about Nepal:

Population . . . . 11,555,983
Population density . . . . 82.07 per sq. km.
Crude birth rate . . . . 40 - 45 per thousand
Crude death rate . . . . 20 - 25 per thousand
Population growth rate . . . . 2.07%
Dependency ration . . . . 85%
Per capita income . . . . $80.00 (U.S.)
Per capita gross domestic product (at 1971 price) . . . . 565
Adult literacy rate . . . . 11.8%
Primary school enrollment . . . . 32%
Population per physician . . . . 39,000
Percentage of land owned

by top 1% of owners .... 20

Percentage owned by bottom

55% of the owners .... 14

**All the informations provided here are based on data published by Central Bureau of Statistics (1974).**
## APPENDIX B

### MEAN AND STANDARD DEVIATION OF THE VARIABLES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<td>Mij</td>
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<td>.45</td>
</tr>
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<td>.50</td>
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<td>Nij</td>
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SELECTED BIBLIOGRAPHY


Bista, D.B., People of Nepal, Kathmandu, His Majesty's Court, 1967.


