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An Economic Analysis of the Migration Decision : The Case of Korea*

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Ⅰ. Introduction

Interregional migration has been recognized as an important source of interregional adjustment to economic development. The rural-to-urban migration of today's developing countries as well as the historical performance of the West well indicates the close relationship between migration and the process of industrialization. Korea is one of the best examples of rapid urban transformation that is primarily attributable to rural-to-urban migration. Since the early 1960s, when the full-scale economic development policy began to be implemented, economic growth has been accompanied by massive rural-to-urban migration

The problems in Korean urban growth, however, are the patterns of urbanization, i.e., the persistent primacy of the capital city and regional unbalances. Population concentration into a few metropolitan areas has brought about various economic and social externalities that many other developing countries have experienced. Therefore, Korea has adoped various measures to cope with metropolitan overcrowdedness.

To be more effective, the policies should be based on an extensive knowledge of the migration process. The Korean National Migration Survey (KNMS) in 1983, which is the main source of data in this study, was conducted to meet this clear need. Since data limitations have impeded past studies of the migration process of Korea, the availability of survey data on a nationwide sample of individuals provides an unprecedented opportunity for disaggregated research on the migration process. This studys' analysis of personal and place characteristics in multiregional migration decision making is made possible by the new data source of the KNMS.

The scope and objectives of this study are summarized as follows :

First, the focus is on the determinants of migration rather than on its consequences. however, the behavioral analysis of migration decision making may also increase knowledge of

* This article is based upon my Ph.D. dissertation presented to the University of Hawaii, 1987.

regional impacts of migration. A static partial equilibrium approach will be adopted. This may be a limitation of the study since it neglects the interactions between migration and economic factors over time.

Secondly, we adopt micro-level analysis based on the simple migration model governing the mover / non-mover decision. On the other hand, this study differs form previous studies in that we center on the differentials of migration decision factors between diverse migration flows. The comparative analysis may help to explain the region-specific characteristics of population movements. Since regions are stratified based on different levels of population concentration such as large urban, urban, and rural areas, this study uses a more comprehensive analytical framework that integrates the migration process with the population distribution policy context.

Finally, traditional economic hypotheses on the migration process are examined using Korea's national data. Specifically, we investigate: (1) the hypothesis that labor migration is primarily a response to economic incentives arising form regional disequilibrium of expected incomes, (2) the importance of distance variable as a constraint of moving in Korea's migration process, (3) the operation of demographic variables such as age and education with relation to economic opportunities, (4) the long-standing proposition of stages of moving (Ravenstein, 1885), i.e., the existence of step moves, and (5) the role of location-specific capital by analyzing the "ties" to origin and destination places.

Ⅱ. Choice of Approach

Various theoretical models and empirical studies have examined the determinants of migration. For the analysis of migration decision making in developing countries, however, there exist two shortcomings.

First, a complete model of the migration decision should encompass both the personal characteristics of migrants and place characteristics of destination and origin areas. However, most studies that have examined migration decisions in developing countries have used aggregate data. Personal attributes of potential migrants have consequently been afforded little role.

Second, while a number of studies have investigated the relative importance of decision factors by directional streams of migration based on the aggregate approach (Gallaway, 1967; Laber and Chase, 1971)[1] and the individual approach (Davanzo, 1978),[2] few have concentrated on the comparative analysis of decision factors between the migration streams based on an urban / rural hierarchy in developing counties.[3] In Korea, urban and rural areas are clearly contrasted in their socioeconomic conditions and migration patterns. It will be useful, both theoretically and practically, to analyze migration decision factors comparatively between migration flows such as metropolitan inmigration flows, other urban inmigration flows, and rural inmigration flows.

This study attempts to extend the previous studies of migration by considering the two issues above. The model used in the study is a mobility model. For the extensive analysis of place attributes as well as personal characteristics, we separate estimation by directional streams and incorporate place variables into the model. Then the effects of determining variables can be analyzed with relation to the economic status of alternative locations, since the coefficients are destination-specific. The additional advantage of this approach over previous mobility studies is that we can reasonably consider the place variables, such as distance, which vary by destination. Also, the model in this study is a disaggregated version of aggregate models investigating directional flows of migration, however, it is an improvement over the aggregate model since the effects of personal characteristics can be analyzed based on the individual's move/stay decision.

Ⅲ. Model

1. Basic Model

Migration occurs for a complex set of social, cultural and other noneconomic motives, as well in response to econmic incentives. However, the model in the study is based on the usual economic principle assuming that a potential migrant maximizes his utility in terms of earnings opportunity other things being constant. We propose the economic model because of the following considerations : First, the value of nonpecuniary factors such as mild weather and good schools may be different for individuals (Davanzo, 1981). Secondly, although the educational and medical facilities of a region may matter, income and social service levels of a region are closely correlated. Inclusion of social service factors in the model may cause imprecise and unstable estimation of income effects on migration. Since we analyze the migration decision based on a resource allocation framework, it may be safe to center on the pecuniary benefits. Finally, most personal and place variables may represent both economic and noneconomic returns and costs of moving. For example, a familiar place to an individual may provide him psychic benefits, as well as better opportunities for earnings. Thus, the economic modeling of the study does not imply complete ignorance of noneconomic factors.

Thus, considering the economic incentives assuming other things being equal, the net benefit of an individual n moving to destination place j can be simply expressed as :

(3.1) $NB_{nj}=(E_j-E_n)-C_{nj}$

where E_j-E_n=the difference in expected earnings of an individual n at destination j and his origin,

C_{nj}=costs incurred by moving.

We do not observe the expected earnings of the potential migrants at the alternative locations and costs of moving, so the economic studies of migration have frequently assumed that the net benefit of moving is a function of : (a) the income levels of the destination and origin places, (b) probability of securing a job, (c) location-specific capital, (d) opportunity costs, and (e) direct costs of moving.

Since we have assumed that an individual decides to move by weighing the gains and costs of moving, the probability of an individual n migrating form his origin place to destination j (P_{nj}) is related to the net benefit of moving above, that is [4]

(3.2) $P_{nj}=F\ (NB_{nj})$

Both place attributes and personal characteristics are considered to estimate the expected earnings level, job probabilities, and costs of moving, this, modifying the specification of the net benefit of moving into a testable form we have :

(3.3) $P_{nj}=F\ (NB_{nj})$
$=F\ (DIFFINC_{nj},\ AGE_n,\ SCH_n,\ DMARR_n,\ DLIFE_n,\ DBIRTH_{nj},\ DIST_{nj})$

where $DIFFINC_{nj}$=expected difference of real income level between the place j and origin of individual n,

AGE_n=age of individual n,

SCH_n=years of schooling of individual n,

$DMARR_n$=a dummy variable, equal to 1 if individual n is married, 0 if he is not

$DLIFE_n$=a dummy variable equal to 1 if individual n is a lifetime migrant (defined as "someone whose origin is different from the place he was born"); 0 if he is not,

$DBIRTH_{nj}$=a dummy variable equal to 1 if destination place j is the birth place of individual n, 0 if it is not,

$DIST_{nj}$=the traveling hours from origin place of individual n to the destination place j.

The probability of migration can be estimated with grouped data or individual data. We use individual data for the reasons discussed earlier and adopt a binary choice model for the study.[5] In a binary model of migration decisions, each individual's decision to migrate is assumed to be a dichotomous phenomenon, move or not to move. Binary choice logit analysis is, therefore, a reasonable statistical technique, since the logistic cumulative density function closely approximates that of a random normal variable[6]

Assuming that NB_{nj} is a linear function of the explanatory variables we consider, the basic probability model in equation 3.3 can be transformed in logit as:

$$(3.4)\ NB_{nj}=F^{-}(p_{nj})=\log p_{nj}/(1-p_{nj})=b\ Z_{nj}$$

were Z_{nj} is a vector of explanatory variables. It is easily seen that

$$(3.5)\ p_{nj}=1/(1+e^{-NBnj})=1/(1+e^{-b\ znj})$$

We will estimate the probability equation based on observed individual data, thus the relationship actually estimated is

$$(3.6)\ \log D_{nj}/(1-D_{nj})=a_0+a_1\ LNDIFFINC_{nj}+a_2\ LNAGE_n+a_3\ LNSCH_n+a_4\ DMARR_n + a_5\ DLIFE_n+a_6\ DBIRTH_{nj}+a_7\ LNDIST_{nj}+e_{nj}\ ;\ n=1,\ldots\ N$$

Where D_{nj}=a dichotomous variable equal to 1 if an individual n migrated to area j over the period examined, 0 if he did not,

e_{nj}=a random variable reflecting individual idiosyncracies and unmeasured regional variabes, and

N=the number of potential migrants to area j.

The logarithmic forms (LNDIFFINC, LNAGE, LNSCH, and LNDIST in the above equation) of the model have been used in most studies of migration decisions.[7] T. P. Schultz (1982b) suggests a logarithmic specification of the migration function by showing that the internal rate of return to migration can be expressed as a product of arguments representing cost and benefit of moving components.[8]

The theoretical underpinnings and actual measurement of variables in the study are as the next section.

2. Variables

1) The dependent variable–migration

(1) Definition of migration

Migration can be defined broadly as a permanent or semipermanent change of residence (Lee, 1966). However, the reference period and the reference unit of area of migration have differed among studies. In most aggregate studies based on census data, migration is measured over a multi–year period, usually five years. Sometimes, the reference period is the individual's lifetime (T. P. Schultz, 1982a; Levy and Wadycki, 1972). A one—year reference period may be ideal, but this study will be based on a five-year period because of the insufficient sample size of the 1983 Korean National migration Survey (KNMS). In order to avoid the possible complications from multiple movers, we will consider the last move during the past five years. Some bias may be inevitable since most of the explanatory variables are estimated from the 1983 data of KNMS, but it may be an improvement over using simple five-year interval.

The definition of migration usually adopts some territorial scheme, more often than not an administrative unit (Lewis, 1982). For the study we follow the KNMS and define migration as a change of residence between cities, Eups (towns), and Myons (subcounties).

(2) Classification of regions

The approach used here of investigating the directional flows of migration may lead to regional classification so that the classified regions have to be large enough to provide sufficient sample sizes for estimating migration probability functions by migration stream.

Dividing the region by the geographic units of migration (cities, Eups, and Myons) would not be empirically manageable. Since we have ten classified regions based on urban / rural hierarchy and location as discussed below and each classified region may have multiple geographic units of migration, we consider intraregional moves as well as interregional moves.

Stratifying the regions by the urban / rural hierarchy such as metropolitan, other urban, and rural is appropriate for analyzing the regional economic status and the differential migration patterns as discussed before. Also, it can provide more meaningful policy implications than simple rural—urban or provincial classification, since metropolitan and other urban areas are on different dimensions of the population distribution policy, i.e, metropolitan areas are recognized as population dispersal areas while other urban areas may be considered population growth poles as discussed in Chapter Ⅱ. The initial analysis of data from the KNMS divides Korea into the capital region (Seoul and cities of Kyongki), the other urban region, and the rural region (Economic Planning Board and Korea Institute for Population and Health, 1985). Because of the differences of socioeconomic factors among various urban areas, for this study urban areas will be divided into Seoul proper, cities of Kyongki, Pusan and Taegu, and other cities, so there are five regions according to the urban / rural hierarchy.

(a) Seoul
(b) cities of Kyongki
(c) Pusan and Taegu
(d) other cities
(e) rural region

In order to consider the effects of provincial variations and distance in explaining migration decisions, the other cities and rural region above are in turn divided according to location as follows:

--other cities

(a) central urban--cities in the three provinces surrounding Kyongki
(b) southwest urban--cities in the southwest two provinces
(c) southeast urban--cities in the southeast two provinces

--rural region

(a) Kyongki rural
(b) central rural--rural in the three provinces surrounding Kyongki
(c) southwest rural--rural in the southwest two provinces
(d) southeast rural--rural in the southeast two provinces

Thus, taking into consideration both stratification by the urban/rural character and location, we end up with the ten regions classified: three metropolitan areas, three other urban areas, and four rural areas.

(3) Potential migrants

For the consistent analysis of migration decisions, only independent decision makers who are in the civilian labor force at the survey point the discontinuity of estimation, since they tend to be "tied movers." The migrants associated with military service are also excluded. Although we focus on individuals' migration decisions, the family variable of marital status, which could affect migration decision of a potential migrant, is considered. We are assuming that the independent migration of the male laborers can be a proxy for family migration.

2) The explanatory variables

(1) Regional differences in expected real income level

The $DIFFINC_{nj}$ in the migration probability equation may take the form either of the difference or of the ratio of real earnings. This specification choice could depend on whether direct costs or opportunity costs of moving are the primary deterrent to migration (DaVanzo, 1972; T. P. Schultz, 1982b). When all the costs of moving are direct costs, the income difference is a good proxy for the earnings returns. On the other hand, when all the costs of moving are opportunity costs, the income ratio is a better proxy for earnings returns from migration. In Korea, direct costs of moving such as transportation cost are not great because of the short distance of interregional intervals, thus this study uses the relative difference in real earning although we consider direct costs of moving as well as opportunity costs of moving.

$$(3.8)\quad DIFFINC_{nj}=RINC_{nj}\,/\,RINC_n$$

where $RINC_{nj}$ and $RINC_n$ are expected real income levels of potential migrant n in the potential destination j and his origin, respectively.

Since we do not observe the expected real income levels for a potential migrant in the alternative locations, we estimate them using the KNMS observations on monthly earnings from activities, employment status, and montly expenditures of households of people who were located in the particular region in 1983. Regional variations for these variables can be captured by controlling for personal traits such as age and schooling (Mincer, 1974; T. P. Schultz, 1982b), this the parallel specification of income, employment and expenditure functions to be estimated are:

$$(3.9.1)\quad \log INC_{nj}=a_0+a_1\,AGE_n+a_2\,SQAGE_n+a_3\,SCH_n+a_4\,DMARR_n+a_5\,DREGION_j+e$$

$$(3.9.2)\quad \log[EMP_{nj}\,/\,(1-EMP_{nj})]=b_0+b_1\,AGE_n+b_2\,SCH_n+b_3\,DMARR_n+b_4\,DREGION_j+e$$

$$(3.9.3)\quad \log EXPEN_{nj}=c_0+c_1\,AGE_n+c_2\,SQAGE_n+c_3\,SCH_n+c_4\,FSIZE_n+c_5\,INC_n+c_6\,SQINC_n+c_7\,DREGION_j+e$$

where INC_{nj}=observed monthly earnings of an individual n who lives at place j,

EMP_{nj}=a dummy variable representing employment status of an individual n who lives at place j, 1 if he is employed, 0 if he is not,

$EXPEN_{nj}$=observed monthly expenditure of a household with household head n at place j,

$DREGION_j$=regional dummy variables representing the five stratified regions according to the urban / rural hierarchy,

$FSIZE_n$=family size of an individual n,

$SQAGE_n$, $SQINC_n$=quadratic forms of AGE_n and INC_n which are proposed to capture the nonlinear effects of those variables.

Expected income level, employment rate, and expenditure level of individual n at a particular region j are computed based on the coefficients estimated such as:

$$(3.10.1)\quad \hat{INC}_{nj}=\exp\,(A_0+a_1\ AGN_n+a_2\ SQAGE_n+a_c\ SCH_n+a_4\ DMARR_n+a_5\ DREGION_j)$$

$$(3.10.2)\quad \hat{EMP}_{nj}=\log[1+\exp\,(-)\,(b_0+b_1\ AGE_n+b_2\ SCH_n+b_3\ DMARR_n+b_4\ DREGION_j)]$$

$$(3.10.3)\quad \hat{EXPEN}_{nj}=\exp\,(c_0+c_1\ AGE_n+c_2\ SQAGE_n+c_3\ SCH_n+c_4\ FSIZE_n+c_5\ \hat{INC}_n+c_6\ SQ\hat{INC}_n+c_7\ DREGION_j)$$

Then, the $DIFFINC_{nj}$ in the equation 3.9 becomes

$$(3.11)\quad DIFFINC_{nj}=RINC_{nj}\,/\,RINC_n=(\hat{INC}_{nj}\ \hat{EMP}_{nj}\,/\,\hat{INC}_n\ \hat{EMP}_n)\,/\,(\hat{EXPEN}_{nj}\,/\,EXPEN_n)$$

We follow Harris-Todaro's specification (1970) of expected income in the multiplication of income level and employment rate above. The employment rate in this specification is a constituent of expected income level of a place, but it should not be interpreted as the employment probability literally (Todaro, 1976). We assume that it mainly represents the variation of job stability arising from differential regional industrial structure. Since we do not consider the differentials in earnings levels between continuous residents and potential movers and the regional variations in consumption patterns, $DIFFINC_{nj}$ in the study may not be a perfect substitute for the real indicator to represent the variation of expected income level, however it should serve as a proxy for the expected earnings differential between regions. A test is made to examine whether earnings levels differ between continuous residents and movers during the last five years. The results show no significant differences in earnings levels (see next chapter).

(2) Age

The inverse relationship between age and migration is universally noted. Economists have explained the age-migration pattern in terms of higher returns for migration while young (Sjaastad, 1962). That is, the present-value of income and other benefit increments in the destination are inversely associated with age, since benefits of migration are accumulated over an individual's planning horizon. Moreover, young persons have a relatively small amount of experience in a specific job so that expected earnings after migration will not differ greatly from the current level at the destination place, while older movers are likely to receive lower earnings than non-migrants of similar age.

The age-migration pattern can also be explained by the rising costs of moving with age (Gallaway, 1969). Older persons have accumulated specific job experience, location-specific goods, and social relationships that are not readily transferred. Thus the bundle of objective and subjective costs of a move are likely to increase with age.

(3) Schooling

Educational attainment of an individual may represent his ability to search for a job, since educated people possess superior ability to collect and process information (Greenwood, 1975). Schwartz (1973) shows that the deterrent effects of distance decline with education and suggests that the more educated tend to have more national perspectives on the labor market. Also, in developing countries, the more educated tend to be less tied to their native places and thus have lower psychic costs of moving.

(4) Dummy variables representing marital status, lifetime migrants, and birth place

Costs of moving may vary by other demographic traits. Migration would be a more costly investment for those who have married. The opportunity costs of moving for individuals who still live in the birth place may be higher than for lifetime migrants because of the effects of location-spectific capital stock and strong psychic ties with the region (Bartel, 1979; Polachek and Horvath, 1977).

One more variable we consider to capture the higher return from moving is a dummy variable representing the individual's birth place. We as-sume that an individual's native region provides him with extra information for job search. This dummy variable may also indicate the effects on income from specific-location capital and psyc-hic benefits of moving.

(5) Distance

Distance has been the commonly recognized proxy for various costs of moving. We expect that the distance variable is a surrogate not only for transportation costs but also for uncertainty costs and psychic costs. The deterrent effects of distance may also be due to the decreasing availability of information concerning alternative locations with distance (Greenwood, 1975). In addition, distance represents the number of in-tervening opportunities between regions (Levy and Wadycki, 1974).

Since most studies deal with interregional migration rather than point-to-piont migration, the measure of distance is usually arbitrary to a certain extent (Fields, 1982). Road distance between centers of two regions may be used as a distance variable. For Korea, however, the traveling hours by public transportation would more reasonably stand for actual distance. This study uses, therefore, the approximate traveling hours between principal cities of a region for the distance variable.

Traveling hours between two regions (i, j) were calculated based on the road distances between provincial capital cities of each region by the following formula.

$$(3.12)\ DIST_{ij}=\sum_{a=1}^{A}\sum_{b=1}^{B}w_a w_b(KM_{ab}/KMH_{ab})$$

where A and B are the numbers of provinces in region i and j, respectively; w_a and w_b are weightings such as w_a=(population of province a) / (population of region i) and w_b=(population of province b) / (population of region j); KM_{ab} is the distance in kilometers between province a and b; KHM is the kilometers per hour between province a and b which is 80 for Kyung-Bu (Seoul-Pusan) Highway and 70 otherwise.

IV. Major Findings

1. Data and Sample

The principal source of data for this study is the Korean National Migration Survey (KN-MS), which was carried out in 1983 by the Korea Institute for Population and Health (KIPH) with the cooperation of the Economic Planning Borad (EPB) and United Nations Fund for Po-pulation Activities (UNFPA).

From the data analysis, we find that within the four KNMS regions the sampling fractions vary by ten stratified regions of this study. A stratified sampling by the ten regions would be a choice-based sample that might result in in-consistent estimation of the probability model, while a nonrandom sample with respect to exo-genous characteristics of the choosers (e.g., st-ratified sampling by schooling, age, and other demographic attributes) would lead to consistent maximum likelihood estimates (Manski and Ler-man, 1977). Thus, for this study we sample the KNMS data randomlv based on the regional distribution of the male labor force in the survey year 1983. For the estimation of the migration probability equation, we use the five-year mig-ration data of the household survey. A maximum of 4,756 observations of individuals who are in the male labor force can be used for the study after adjusting for the different sampling rate between regions. In order to maximize the sample size of the KNMS, we maintain the inmigration rates form specific rgions for each of the ten classified regions.[9]

2. Estimation of Relative Level of Regional Income

Since the individual survey obtained data on individual monthly income from specific activities, this study uses the individual survey for estimating the individuals expected income level at the alternative locations.

Table 1 shows three alternative estimates of regional income levels, The estimates are based on observations of the individual survey after excluding the unemployed and the observations who did not respond to the monthly earnings variable Eq. 5. 1a estimates the log earnings for national population, while Eq. 5. 1b and Eq. 5. 1c estimate the same equations for urban and rural populations respectively. Eq. 5. 1a has four regional dummy variables representing Kyongki cities (DKKCITY), Pusan and Taegu (DPUSAN), other urban areas (DURBAN), and rural areas (DRURAL), with the reference region of Seoul. The estimated coefficients of this equation are the bases for the imputation of relative income gain in the migration probability function.

Each of Eq. 5.1b and Eq. 5.1c has an additional dummy (DMIGRANT), which represents the rural-to-urban migrants (Eq. 5.1b) and the urban-to-rural migrants (Eq. 5. 1c) during the last five years respectively. The effects of the two recent migrants dimmies are not significantly different from zero, thus the results may increase the validity of the estimation of DIFFINC in this study which is based on the assumption that a potential migrant would earn the income level of current residents who have otherwise similar personal characteristics, in case of migration.[10] All of the coefficients of personal characteristics and regional dummies (except the recent migrant dummies) have the expected signs and are significantly different form zero at the 1 per cent level.

The level of income is a non-linear function of age with an inverse U-shaped age-earnings profile. The income is highest around age 45. For the rural population, the slope of the inverse U shape is steeper, but the highest earning age arises later in the latter half of the 40s. This result may be due to the close association of labor productivity in agricultural industry and land ownership. Thus the rural-urban income difference is greater for younger aged population who are in the earlier stage of the labor market. One might infer that the age selectivity of mig-

Table 1. Estimates of Income Equations[a]

Variable[b]	Eq. 5.1[a] Nation	Eq. 5.1[b] Urban	Eq. 5.1[c] Rural
CONSTANT	9.6411** (0.1886)	9.9304** (2.3054)	7.6568** (0.4169)
AGE	0.1028** (0.0107)	0.0967** (0.0119)	0.1423** (0.0232)
SQAGE	-0.0012** (0.00013)	-0.0012** (0.00015)	-0.0015** (0.00028)
SCH	0.0551** (0.0462)	0.0573** (0.0042)	0.0671** (0.0103)
DMARR	0.3404** (0.0462)	0.2290** (0.0457)	0.7350** (0.1209)
DKKCITY	-0.1323** (0.0497)	-0.1394** (0.0443)	---
DPUSAN	-0.1499* (0.0582)	-0.1515** (0.0509)	---
DURBAN	-0.2049** (0.0434)	-0.1968** (0.0383)	---
DRURAL	-0.5708** (0.0414)	---	---
DMIGRANT	---	-0.0193 (0.0369)	0.0854 (0.1033)
N	2,332	1,718	614

a The standard errors are in parentheses.

b See text for definition of variables.

** The coefficient is statistically significant at the 1% level.

ration is due to the larger pecuniary gain arising from the greater discrepancy in regional income level for the younger population. However, age selectivity of migration can also be recognized in the urban-to-rural migration steram.

As expected, education increases income level. Marriage is also associated with higher income. The effect is more pronounced in the rural areas, probably because married men possess more location specific capital and a stronger will to earn that lead to higher productivity of labor.

The coefficients of four regional dummies show the sequential differences in income level among regions stratified by the urban / rural hierarchy. Income is significantly higher in Seoul, the reference region, than the other regions. The two other metroplotan areas (Kyongki Cities, Pusan and Taegu) have the next highest income and the rural areas have the lowest. Considering that regional income levels have rarely been examined extensively, it may be diffecult to explain the regional income disparities. The differentials in industrial structure, i.e., the higher manufacturing and service sector employment shares in the large urban areas, however, would be one of the most convincing factors in explaining the disparities of income among regions stratified by the urban / rural hierarchy. In addition, the supreme level of income of Seoul may be partially due to the consider able primacy of political decision, economic wealth, and other social amenities of Seoul.

3. Determinants of Migration

Table 2 presents the determining factors of migration decision by migration streams. The number of observations for each urban stream vary by the number of potential intraregional movers.[11] We test the significance of coefficients and models using the likelihood ratio test.[12] For all the models the likelihood statistics indicate that the null hypotheses of zero coefficients of all explanatory variables are rejected at better than 0.5 per cent significance level.

Eq. 2a to Eq. 2j in the table are the results of estimation by ten classified destinations, while Eq. 2k is the result of estimates of the move nonmove decision without dividing streams. This national model is presented for comparison. The findings can be summarized as follows:

First, on the whole, the effects of migration decision factors are in the directions suggested by the economic theory. However, they show considerable differences among migration streams, i.e., according to destination characteristics. Thus, the effects of regional indicators and personal characteristics on the migration decision vary by migration streams.

Second, we have found some systematic differentials in the determining factors between urban and rural migration flows. In the urban flows the ability to search for a job may explain migration more convincingly. Also, the effect of regional income differentials is more significant for urban migration. On the other hand, the costs of moving seem to be more closely associated with the migration decision for the rural flow. That is, for the urban migration the migration decisions may be more affected by probability of securing a job rather than the costs of moving incurred by "ties" of origin place, while for rural migration the benefits of moving may be more individual-specific (lower effects of regional income differentials) and opportunity costs of moving may be more deterrent.

Third, the presence of alternative locations may influence the decision factors for specific migration stream. We have attributed the weaker effect of distance for the Seoul flow to there being little alternative to Seoul. In addition to the effect of distance, the selectivities of migration are also affected by alternative locations. In the empirical results, the lower selectivity in

Table 2. Logit Estimates of Migration Probability Functions[a]

Variable	Eq. 2^{a} Seoul	Eq. 2^{b} Kyongki City	Eq. 2^{c} Pusan Taegu	Eq. 2^{d} Central Urban	Eq. 2^{e} SW Urban	Eq. 2^{f} SE Urban	Eq. 2^{g} Kyongki Rural	Eq. 2^{h} Central Rural	Eq. 2^{i} SW Rural	Eq. 2^{j} SE Rural	Eq. 2^{k} Nation
CONSTANT	-1.6952	3.7733	1.0334	3.3407	-4.6072	0.5645	3.9398	5.9847	1.0327	0.0749	5.0463
	(1.340)	(1.390)	(1.623)	(2.213)	(2.100)	(1.634)	(1.758)	(1.867)	(2.230)	(1.962)	(0.589)
LNDIFFINC	1.7915	1.0531	3.1078	5.0023	2.9876	4.2289	2.0389	-1.2528	0.3529	2.4053	2.4849
	(0.783)	(0.973)	(0.990)	(1.225)	(1.193)	(0.965)	(1.102)	(1.271)	(1.710)	(1.170)	(0.453)
LNAGE	-0.7226	-1.871	-1.1925	-2.1611	-1.1649	-1.3548	-1.7200	-2.4756	-1.9997	-1.6858	-1.9746
	(0.345)	(0.375)	(0.422)	(0.594)	(0.532)	(0.442)	(0.467)	(0.498)	(0.592)	(0.523)	(0.163)
LNSCH	0.9055	0.2504	0.8283	0.4350	2.642	0.8970	0.0102	-0.3853	-0.0932	0.2477	0.3538
	(0.207)	(0.203)	(0.254)	(0.312)	(0.457)	(0.274)	(0.220)	(0.191)	(0.225)	(0.259)	(0.078)
DMARR	-0.9247	0.0748	-1.1424	0.5661	0.0195	-0.3998	-0.1332	-0.2346	-0.1607	-0.4223	-0.5317
	(0.223)	(0.255)	(0.266)	(0.433)	(0.361)	(0.290)	(0.313)	(0.323)	(0.397)	(0.344)	(0.110)
DLIFE	0.2978	0.0251	0.0068	0.6018	0.4328	0.5974	0.5887	0.7945	1.5157	2.1348	0.5459
	(0.186)	(0.204)	(0.217)	(0.309)	(0.275)	(0.238)	(0.280)	(0.313)	(0.393)	(0.419)	(0.086)
DBIRTH	1.3397	0.9024	1.4557	1.4059	1.1745	0.4935	0.9411	1.6137	3.8244	2.4571	
	(0.353)	(0.340)	(0.330)	(0.367)	(0.349)	(0.320)	(0.278)	(0.301)	(0.626)	(0.384)	
LNDIST	-0.3837	-1.3629	-1.6835	-2.4154	-1.6999	-1.8012	-1.7152	-1.5617	-1.1587	-0.9410	
	(0.179)	(0.220)	(0.192)	(0.464)	(0.270)	(0.216)	(0.326)	(0.513)	(0.400)	0.342)	
N	3,583	4,722	4,442	4,733	4,730	4,741	4,756	4,756	4,756	4,756	4,756
Model Chi-square[b]	118.4	115.9	207.6	92.4	131.1	145.9	95.1	149.0	212.0	207.6	498.5

a The standard errors are in parentheses.

b -2 log likelihood ratio with 7 degrees of freedom for Eq. 2^{a} to 2^{j} and 5 for Eq. 2^{k}

* The coefficient is statistically significant at the 5 % level.

** The coefficient is statistically significant at the 1 % level.

educatin and positive effect of marriage for Kyongki urban flow are noteworthy.

Fourth, although the effects of some deterring factors on the migration decision show considerable differences among migration streams, we may assert that migration decisions in Korea are consistent with the economic premise of migration. As we have discussed, most of the variations in migration determinants can be rationalized within the economic theoretical framework, i.e., cost–benefit calculations. Thus, the effectiveness of migration for the efficient resource allocation can be confirmed based on the individual approach.

Finally, some other findings that may deserve to be mentioned are : (1) age selectivity of migration is apparent for rural migration as well as for urban migration, (2) 'step – migration pattern does not seem important in Korea given that the effects of previous migration are lower for the metropolitan flows, (3) location – specific capital may influence migration decision making considering the significant effects of "ties" to origin and "ties" to destination place, and (4) the strong effects of lifetime migrants and birth place dummy variables indicate that there are significant amounts of repeat and return moves in Korea.

V. Policy Implications

As we have shown, the migration decision of a potential migrant in Korea is consistent with economic theory. One may argue that the rapid interregional migration would eventually adjust regional labor forces to the point where the marginal productivities of labor would be equal among regions, therefore, intervention in the migration process might result in inefficient resource allocations. It would be true under the assumption of classical static equilibrium and no socioeconomic externalities. However, in Korea, the overconcentration of population into a few metropolitan areas is thought to be no longer socially efficient because of various externalities as we discussed in Chapter II. Also, the results of this study show that for urban migration flows the individual's ability to search for a job may greatly influence the migration decision, thus indicating that the assumption of flexible factor prices to induce full–employment may no longer be realistic.

The implications of this study for population distribution policy can be summarized as follows :

-- We confirm the previous finding that regional income differentials affect migration. Considering that there are sequential differentials in income level among regions stratified by the urban / rural hierarchy, reducing the regional income gap would decrease rural–urban migration while increasing metropolitan-to-other urban migration.

– Age selectivity of migration is strong for all the migration flows. Population redistribution measures that are directed to the young population would be effective.

– Education selecticity of migration is significant only for urban migration. The differential selectivity in education may imply a tendency to increase rural–to–urban migration as education level of population increase in the future. Also, it shows the transfer of highly educated population from urual to urban areas. Policies for balanced regional development should consider the interregional movement of population by their education levels (i.e., relocation of quality of labor). For example, the rural relocation incentives for the poor metropolitan residents may not be a desirable measure for the population distribution since it will further increase the disparity in education levels of population among regions.

– Being married deters migration significantly only for the Seoul and Pusan migration. It seems that high prices for settlement on these areas incur additional costs of moving. Thus, increasing the settlement costs (e.g., restricting new construction of housing) may deter population movement into Seoul. However, considering the positive effect of marital status for the Kyongki cities flow, it may increase the population growth of adjacent cities.

-- The deterrent effects of distance are noticeably lower for the Seoul migration flow. Considering the predominance of Seoul in political decisions, national wealth, and other sociocultural amenities, the considerably lower deterrent effects of distance may imply little existence of alternative locations to Seoul. Thus, encouraging the growth of alternative opportunities to Seoul could be a policy measure. We expect that deterrent effects of distance for the Seoul flow would be increased by building alternative opportunities to Seoul.

Footnotes

1) Gallaway (1967) estimated the aggregate migration probability function by regions and industries. He suggested that the variation in the effects of distance among industries reflects the presence of barriers to the flow of labor market information between regions. Laber and Chase (1971), in the study of interprovincial labor movements in Canada, estimated four equations for grouped provinces. They also indicated the variation in the effect of distance by directional streams and explained it as regional variation on return move.

2) DaVanzo (1976, p.101) suggests classification of alternative destinations by type (urban / rural hierarchy)--e.g., large metropolitan labor market, small rural labor market, etc. She notes that the main shortcoming of this method will be the difficulty to control for the geographic dispersion of these types and hence to consider distance as an explanatory variable. This study overcomes this shortcoming by dividing the region based on location as well as type (ruban / rural hierarchy).

3) An alternative specification of equation 3.2 can be

$$P_{nj}=F(NB_{nj}+A_{nj})$$

where A_{nj} is a factor representing the existence of alternative locations that affect the migration of individual n to place j. For simplicity, we assume that NB_{nj} is a linear function of place attributes X_{nj} and personal characteristics S_n such as :

$$NB_{nj}=b_0X_{nj}+b_2S_n$$

Most economic models of migration implicitly assume A_{nj} also to be a function of X_{nj} and S_n, thus

$$A_{nj}=a_0+ a_1X_{nj}+a_2S_n$$

If we introduce a hypothetical index I_{nj} such as $I_{nj}=NB_{nj}+A_{nj}$, then logit transformation takes the form :

$$I_{nj}=F^{-}(P_{nj})=\ln P_{nj} / (1-P_{nj})=(b_0+a_0)+$$

$$(b_1+a_1) X_{nj}+(b_2+a_2) S_n$$

which clearly shows that the effects of explanatory variables on migration probability vary by the existence of alternative locations. For example, it is usually noted that strong deterrent effects of distance on migration may be due to effects of intervening opportunities as well as the costs of moving with distance. (Note that no economic model of migration has completely decomposed the effects of alternative locations on the migration decision. The conditional logit model of migration also results in similar estimation as the equation above since the basic probability model in equation 3.10 can be transformed into log $P_{nJ}/P_n = U_{nJ} - U_n = F(X_{nJ}, S_n)$, showing the property of "independence of irrelevant alternatives"). One way to analyze the effects of alternative locations may be an inclusion of factors representing alternative opportunites into the model (Levy and Wadycki, 1974; Feder, 1980).Separate estimation of migration probability function by migration flow in this study may be another way to analyze the effects of alternative opportunities. The results of this study indicate that the deterrent effect of distance for Seoul migration flow is much lower compared with the other migration flows because there are few alternative locations for Seoul to potential migrants.

4) Conditional logit model (CLM) of migration can be an alternative statistical technique. However, CLM may not be appropriate for this study because of the following: (1) We divide the region by urban / rural hierarchy and location. Some urban areas (e.g., Seoul and Kyongki cities, Pusan and southeast urban area) should be close substitutes for each other for potential movers. It is contradictory to the "independence of irrelevant alternatives" of CLM, thus CLM for this study would lead to inconsistent estimates and biased predictions. (2) The regional shares of population in this study vary considerably. Since differences in size and population between classified regions might impact on observed choice of location, it could be another source of bias in the estimation of the CLM. Also, intra-regional movers cannot be considered separately from nonmovers. (3) We attempt to investigate the regional specific features of location choice. If we try single equation using CLM for the estimation, numerous alternative-specific dummies should be included in the model. Considering that we have a large number of observations and alternative locations, it may become unwieldy empirically unless we restrict the scope of the study.

5) The problems of the standard regression model for the binary choice analysis are well known; (1) the presence of heteroscedasticity results in a loss of efficiency, (2) the error term is nonnormal, and (3) the predicted probability may be outside the range of 0 and 1.

6) The logarithmic form of the equation has been used in most studies of migration decisions. Feder (1980) and Renaud (1977) have suggested semilog specifications for the aggregate analysis of Korean migration.

7) See footnote 8 for the expression of the internal rate of return to migration. However, the correlations between the logarithmic forms and plain forms are quite high (e.g., correlations between LNDIFFINC and DIFFINC and between LNAGE and AGE are 0.995 and 0.984, respectively for the sample of this study), so their performances should not vary considerably.

8) The net benefit of moving accrues over time, thus following DaVanzo (1972) equation 3.1 can be expressed as:

$$NB_{nJ} = \sum_{t=1}^{T}(W_{Jt} - W_{nt}) / (1+r)^t - H_{nJ}W_n - DC_{nJ}$$

where W_{Jt} and W_{nt} are the earnings opportunities available to a potential migrant n in the destination j and his origin, respectively; T is the planning horizon of the migrant; H_{nJ} is the number of time periods devoted to moving from origin n to j, including time spent preparing for the move and adjusting afterward; DC_{nJ} is the direct costs of moving from origin n to j. Assume the return to migration, $W_{Jt} - W_{nt}$, is the same in each period, then the return and costs of moving are equalized at the internal rate of return, r^*, such that

$$(W_J - W_n) / r^*[1-(1+r^*)^{-T}] = H_{nJ}W_n + DC_{nJ}$$

Letting T approach infinity, we have

$$r^{*}=(W_{j}-W_{n})\,/\,(H_{nj}W_{n}+DC_{nj})$$

If migration costs are only opportunity costs ($H_{nj}W_n$), then the ration W_j / W_n may be a proxy for the rate of return, since

$$r^{*}=(1\,/\,H_{nj})(W_{j}\,/\,W_{n}-1)$$

9) Seoul migration has nine origins, so nine inmigration rates for the Seoul flow. Each of the other regions has ten inmigration rates including intraregional migration rate. Thus, we have a contingency table of 100 cells in which 99 cells can include migrants. Nonrandom samplings were applied to each cell for the migrants and nonmigrants separately. The computer package "SAS" was used for the data processing and regression estimates.

10) Most studies have used the earnings of people at destination as a proxy of expected earning of a potential mover. The earnings of migrants also can be used. Polachek and Horvath (1977) used earnings change of migrants as a proxy of expected income of potential movers. Such proxies, however, are subject to selectivity bias in measuring the income gain of migrants (Heckman, 1979). This selectivity bias may be examined based on panel data with an income variable over the migration interval.

11) For the Seoul flow the potential movers are all the observations whose origin are not Seoul. Besides the Seoul flow, the observations in the destination region are also potential movers. For example, for the Pusan and Taegu flow observations whose origin are Pusan (or Taegu) could migrate into Taegu (or Pusan). However, the choice set is different between interregional and intraregional potential movers. In the Pusan and Taegu flow, interregional potential movers can migrate into the two cities-- Pusan and Taegu. But intraregional movers can migrate into one of the two cities where they do not reside. If we apply the same sampling rates between interregional and intraregional potential movers, it becomes a choice-based sample that may result in inconsistent estimation. Thus, for each urban flow we sample the observations of intraregional potential movers by the weighting, (number of cities−1) / (number of cities in the destination). For the rural migration flows, the number of towns and Myons (subcounties) are numerous, so we ignored this process.

12) The likelihood ratio can be defined as:

$$\lambda=L_{\omega}\,/\,L_{\Omega}$$

where L_{ω} is the maximum of likelihood function when maximized at the null hypothesis; and L_{Ω} is the maximum when maximized with respect to all the parameters.

The hypotheses that all the coefficients are zero (analogous to the usual F test) can be tested using the chi-square distribution of (-2) log λ with k degrees of freedom, where k is the number of parameters in the equation. In this study, the degrees of freedom are 7 for Eq. 2a to 2j and 5 for Eq. 2k. The 0.5 per cent critical value is 20.28 for 7 degrees of freedom and 16.75 for 5 degrees of freedom.

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