Economic Motivation Versus City Lights: Testing Hypotheses About Inter-Changwat Migration in Thailand

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The World Bank
1818 H Street, N.W.
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ECONOMIC MOTIVATION VERSUS CITY LIGHTS: 
TESTING HYPOTHESES ABOUT INTER-CHANGWAT MIGRATION IN THAILAND

This paper is an expansion of the migration analysis done as part of the Basic Economic Mission to Thailand and contained in Working Paper No. 337. In that paper net and gross, in and out migration were studied. In the current paper the analysis is extended to include the direction as well as level of migration flows between provinces (changwats) and this analysis is integrated with that of others who have done migration research in Thailand.

The models tested here are of the gravity flow variety. They are tested in two basic forms. The first is based on the assumption that it is only the characteristics of the destination relative to the origin that matter. The second is unconstrained and allows one to examine the characteristics of origin and destinations separately. While a number of questions remain unanswered it is very clear from this analysis that:

(1) economic factors predominate over the non-economic attraction of urban areas;
(2) the economic conditions (income per capita, unemployment, and land scarcity) in destinations relative to origins have significant relationships in the hypothesized direction;
(3) male and female migration streams respond to per capita income and unemployment in the same way. Males, however, are more responsive than females to the scarcity or availability of farmland;
(4) migration to and from Bangkok tends to respond in a very similar manner to relative income and the availability of farmland as migration to and from other areas;
(5) in the unconstrained model, conditions in the area of destination all have significant relationships of the hypothesized signs;
(6) conditions in the areas of origin play a far more complex role, since conditions at the area of origin determine not only the push to migrate, but also the ability to afford to migrate. For example, in all specifications the higher the per capita income in the sending area, the higher the outflow of migrants;
(7) the sign and significance of other economic variables in the origin vary depending on the specifications.

The major conclusion of policy relevance from this paper is that the level of migration will increase as economic development proceeds, but the direction of movement will depend on the relative economic opportunities in various changwats. It is the latter that might be most susceptible to policy manipulation.

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I. INTRODUCTION

Although Thailand's population cannot be described as highly mobile, both the upward trend in migration rates and the rapid growth in the urban population have become a cause of some concern in the last two or three decades. Between 1955-1960 and 1965-1970 the rate of migration between changwats (provinces) increased by almost two-thirds. Even though both of these periods were characterized by a high degree of residential stability, particularly in rural areas, over three million persons changed their place of residence (village or municipal area) at least once in the latter period, and about half of them moved across changwat boundaries (Arnold and Boonpratuang, 1976).

The single most popular destination for inter-changwat migrants continues to be Bangkok, which has grown rapidly to a metropolis of more than four million residents. With over half of the country's urban population and a population size more than forty times that of the next largest city (Chiang Mai), Bangkok provides one of the most striking examples of urban primacy in the world (Piampiti, 1979). The rapid increase in Bangkok's population has exacerbated a whole range of social and economic problems in the capital city and has put a severe strain on the government's ability to provide adequate public services to Bangkok's residents. In addition, the large influx of seasonal migrants who augment Bangkok's permanent population during the agricultural slack season further complicates government planning in this area.

Most urban population growth in Thailand is attributable to natural increase, but Goldstein and his colleagues (n.d.: 692) have estimated
that about forty percent of urban growth between 1970 and 1975 was due to migration. As fertility rates continue to decrease, and as the urban population of Thailand continues to expand, migration will continue to be a major component, if not the major component, in the expansion of Thailand's cities for the rest of this century.

Although migration to Thailand's cities, especially to Bangkok, was undoubtedly the factor that initially aroused an awareness of migration problems among policy makers and the public (Prachuabmoh and Tirasa-wat, 1974), urbanward migration constitutes only a minor proportion of all migration in Thailand. In fact, in the period 1965-1970, 72 percent of all changes of residence took place entirely between nonmunicipal areas (Arnold and Boonpratuang, 1976: 9). In the past, migration of this type was often motivated by a search for new agricultural land, as rapid population growth put increasing pressure on previously cultivated land. Farmers have been faced with the prospect of cultivating more and more marginal, inaccessible land. The vanishing frontier has become a matter of major concern in Thailand because the population continues to grow rapidly (at over two percent per year) despite an impressive decline in fertility rates throughout the country during the 1970s. Under these circumstances, if migration rates continue to increase in Thailand (as most theoretical migration models and our analysis suggest), population movement will become an increasingly important consideration in development planning.

The importance of internal migration has been explicitly recognized in the Fourth National Economic and Social Development Plan (1977-1981),
which is the first plan to include programs on population redistribution and human settlements. The plan seeks to redirect migrants to urban "growth poles" and to encourage migrants to move out of the Bangkok Metropolitan Area by:

(a) controlling urban land use on the periphery of Bangkok;

(b) developing urban infrastructure (public utilities, educational and health services, housing) in urban centers outside Bangkok;

(c) creating urban employment opportunities outside Bangkok by offering monetary incentives to attract industries, commerce, and services to regional centers and by establishing industrial estates and export-processing zones; and

(d) accelerating regional and rural development so that regional urban centers will have local sources of raw materials and marketing outlets for their products (Piampiti, 1979).

These policies are designed to affect primarily the pull of urban areas rather than the factors pushing migrants from rural areas. Similar programs have met with only limited success in some settings, and it is too early to assess their impact in Thailand (Rhoda, 1979). But, as in many places, the programs were formulated in the absence of satisfactory information about either the causes or the consequences of internal migration.

This paper attempts to shed some additional light on the determinants of internal migration by means of a regression analysis of economic, social, and demographic factors that are related to migration flows at the changwat level. Data are taken primarily from the 1970 Population and Housing Census. It is hoped that this analysis, together with
the results of microlevel studies, will assist policy makers in designing migration-related policies and programs. First, the results should help in predicting future migration flows. Inputs of this type are crucial for population projections on which economic and social development plans are based. Second, findings on the determinants of migration can be used to formulate plans for altering migration streams according to the government's goals.

The next section of the paper reviews some of the major theoretical models of migration and the hypotheses that are derived from them. It is followed by discussions of previous research on migration in Thailand and the methodology and results of the current study. The final section interprets some of the major results in the Thai context and outlines some policy implications that follow from the analysis.

II. THEORETICAL MODELS OF MIGRATION

Migration can be studied from several perspectives and at different levels of analysis. One can examine migration at the aggregate or the individual level. At the aggregate level, the characteristics of the region can be studied, whereas at the individual level, the characteristics of the individuals who actually move may be analyzed. Although it is possible to analyze the regional factors affecting migration choices of individuals, it is much riskier to use regional data to make assumptions about the individuals who migrate.
In the present context, we shall focus on aggregate migration flows rather than individual migration. This focus is quite useful both for predictions of the magnitudes of the migration flows and for policy, but it cannot be used to determine the characteristics of the individual migrants or therefore the compositional changes of sending or receiving areas. In addition, we shall concentrate our analysis and thus our discussion of models on gross migration from one region to another. This approach involves the study of the volume of movement and the characteristics of both the sending and receiving regions.

The most elementary model of gross migration between areas is based on a simple analogy to the law of gravity. That is, the flow (gravity) between two areas (bodies) is directly proportional to the size of the two regions (mass of the two bodies) and inversely proportional to the distance between them (Zipf, 1946).

\[ M_{ij} = \frac{k p_i a_1 p_j a_2}{(D_{ij})^{a_3}} \]

where \( M_{ij} \) is gross migration from area \( i \) to area \( j \); \( p_i \) is the population of area \( i \); \( p_j \) is the population of \( j \); \( D_{ij} \) is the distance between \( i \) and \( j \); and \( a \) and \( k \) are constants. One major advantage of this simple formulation is that it is multiplicative and can be estimated by a simple log linear equation:

\[ \log M_{ij} = \log k + a_1 \log p_i + a_2 \log p_j - a_3 \log D_{ij}. \]
The gravity model is, of course, largely devoid of behavioral content and does not explain which decision or policy variables affect the volume or direction of migration. Since these factors alone are quite powerful in explaining migration, however, it is necessary to include this mechanistic core in any behavioral model of gross migration to avoid spurious results. A number of models have been developed that attempt to modify the gravity model to incorporate more interesting causal factors. Before examining these models, we shall review the theories of the behavioral factors that determine gross migration.

Ravenstein's laws of migration, published in 1885, represent the first attempt to describe migration in terms of demographic, social, economic and geographic characteristics of the flow. Ravenstein did not attempt to develop a behavioral model of the factors determining migration, but he did identify the variables that probably should be included in such a model. He observed different behavior for urban and rural residents and for males and females. He also stressed the importance of distance, level of development, and economic motivations for migration.

In his 1966 paper, Lee developed a schematic model of the factors determining the flow of migrants from i to j. This schema identifies the important factors in the area of origin and the area of destination and the intervening obstacles between the two. Factors characteristic
of the sending region are high unemployment, low wages, poor climate and topology, and lack of recreational, educational and community facilities. Factors associated with the area of destination are high wages, low unemployment, good climate, and so forth. Intervening variables include the distance and the costs of moving. Various researchers have added intervening opportunities between i and j as determinants of the flow between i and j (Stouffer, 1966).

Although all these factors characterize regions, a large number of factors determining the migration of particular individuals have also been discussed in the literature. Some of these are age (or stage in the life cycle), sex, individual knowledge about the area of destination, and personality traits. Whether these factors have aggregate counterparts is less certain. Human capital models of migration have concentrated on the cost and returns to individuals, but the variables used do not differ substantially from those used by demographers and sociologists (Sjaastad, 1962).

A major alteration of the individual model of migration decision making is Todaro's postulate that migration responds to differences in expected rather than actual earnings (Todaro, 1969; Harris and Todaro, 1970). Expected gains are measured by the difference in real incomes between work opportunities in sending and receiving regions and the probability of the new migrant's obtaining a job in the area of destination. At the regional level, this would imply that emphasis needs to be given to both unemployment and wage or income levels. The exact specification of the interaction of these two variables would depend on how expectations are formed by different individuals and how such individuals are distributed in the two populations.
The primary importance given to economic factors is common to most theories of migration. The major exception is the role of cities per se in attracting migrants. It has often been hypothesized that this effect is important independent of the economic opportunities offered by cities. This is referred to as the "city lights" hypothesis.5/

As Lowry (1966) and others have shown, economic characteristics of sending and receiving areas can be introduced into the gravity model in several ways. A simple formulation might be \( M_{ij} = k \frac{P_i P_j}{D_{ij} E_i E_j} \) where \( E_i \) represents a summary measure of economic opportunities in the \( i \)th region. This could be estimated in one of two ways, either as:

\[
\log M_{ij} = \log k + a_1 \log P_i + a_2 \log P_j + a_3 \log D_{ij} + a_4 \log \left( \frac{E_i}{E_j} \right), \quad \text{if } a_4 = -a_5
\]

or alternatively as:

\[
\log M_{ij} = \log k + a_1 \log P_i + a_2 \log P_j + a_3 \log D_{ij} + a_4 \log E_i + a_5 \log E_j
\]

where there is no restriction that \( a_4 = -a_5 \).

In the relative formulation, it is assumed that economic conditions in the sending region relative to those of the destination affect the flow of migrants; the alternative specification allows for separate and possibly different effects of origin and destination characteristics. The second specification makes it easier to assess the separate importance of push and pull factors in determining migration. In our analysis we shall test both models.

III. PREVIOUS RESEARCH ON INTER-CHANGWAT MIGRATION FLOWS IN THAILAND

It is only within the last two decades that an active interest has been taken in documenting migration flows in Thailand and in examining
the characteristics of migrants and the determinants of migration. Some specialized surveys of migration from Northeastern Thailand to Bangkok were published in the early 1960s (Textor, 1960; Meinkoth, 1962), and the 1954 National Demographic and Social Survey provided some information on the characteristics of migrants (Wichiencharoen, 1960). However, a substantial amount of migration research was not undertaken until the 1960 census data became available.

Ng (1969, 1970) noted the complexity of the spatial pattern of migration streams in Thailand and pointed out the inadequacy of using the normal four regional designations to study migratory movements. He therefore developed a set of ten "migration regions" based on 1960 census data to describe clusters of administrative units that were characterized by a substantial mutual exchange of migrants. Within each region, the population tended to move away from the center of high population density into more sparsely populated areas. This pattern led Ng to conclude that intraregional moves in the 1950s were determined largely by the availability of agricultural opportunities. Our results show that the availability of land is still an important determinant of migration.

Goldstein (1973) used a sample tape from the 1960 census to study the characteristics of migrants, particularly the fertility behavior of migrants and nonmigrants. Data on migration from the 1960 census were also used in a study of migration patterns by Chapman and Allen (1965), in a report to the Thai government by the International Labor Office (1965), and in a succession of masters' theses written by Thai students (e.g., Siripak, 1965; Chamratrithirong, 1973). Many of these studies were mainly descriptions of migration patterns and the characteristics of migrants, but some also attempted to identify the major determinants (or at least the correlates) of migration flows.
Prachuabmoh and Tirasawat (1974) reviewed migration studies from 1947 to 1972 and summarized the major results of those studies. The authors concluded that economic factors were the most important motives for migration in Thailand and that push and pull factors were both important determinants of migration.

The National Longitudinal Survey of Social, Economic, and Demographic Change also spawned several migration publications (Goldstein et al., 1974; Goldstein and Pitaktepsombati, 1974; Tirasawat, 1977). In addition, several studies focusing on particular aspects of migration, such as migration to Bangkok or other specific locations (Thailand, National Statistical Office, 1979; Sternstein, 1977; Piampiti, 1976) and female migration (Arnold and Piampiti, 1979; Piampiti, n.d.), have appeared in the last few years. But more general studies of the areal determinants of migration on a national basis have relied mostly on 1970 census data. At least four Ph.D. theses by Thai students have explored the determinants of migration on a macrolevel with 1970 census data (Prasartkul, 1977; Srisawas, 1977; Chamratrithirong, 1976; Garnjana-Goonchorn, 1974). These studies differ substantially in a number of key respects, including the type of model proposed, the measures of migration used, the provinces included in the calculations, and the method of analysis applied to the data. These variations have resulted in substantially different findings and somewhat different conclusions.

The study by Garnjana-Goonchorn covers migration to the Bangkok metropolitan area, whereas the other three studies include all 71 changwats (except for Bangkok and Thon Buri in some cases). Srisawas
used the life table survival method to estimate net migration rates for 1960-70; the other three studies are based on five-year migration data for 1965-70. All the authors used multiple regression to study inter-
changwat migration flows except for Chamratrithirong, who employed correlation analysis. Because the census publications include only limited information on the types of independent variables that are hypothesized to influence migration, and because the scope and quality of alternative data sources are inadequate for this purpose, the researchers had to be quite resourceful in finding data that were suitable for testing their models. The three studies that used regression analysis all incorporated the standard gravity variables in their models; they also included some economic variables, although the precise economic variables selected were quite diverse (unemployment, income, population or land pressure, socioeconomic development).

The gravity variables were generally found to be highly significant, and the relationships were in the expected direction. The effect of distance, however, does not appear to be linear. Both Chamratrithirong and Prasartkul found support for the "critical distance" thesis, at least in the case of migration to and from Bangkok. The negative effect of distance on migration was strong up to about 250-300 kilometers from Bangkok but insignificant beyond that point. In addition, there was a slight decrease in the significance of the distance effect on migration to Bangkok between 1955-60 and 1965-70, probably due to the availability of better transportation in the latter period (Prasartkul, 1977; Chamratrithirong, 1976).
The significance of economic factors in migration varied considerably from one study to another. Overall, the weakest results were obtained by Srisawas (1977), who found that the level of development, educational attainment of an area, and degree of accessibility were all unrelated to the volume of migration. The only significant effect found was a negative effect of density on net migration, and the level of explanation for the complete model was relatively low ($R^2 = .199$). The author attributes the poor results to weaknesses in measurement procedures and suggests that it would be better to use a measure of population pressure on arable agricultural land or land in cultivation than a simple density measure. Chamratrithirong (1976), on the other hand, found the level of socioeconomic development to be highly correlated with migration flows. His measure of development (the proportion of the economically active population in the primary sector) was positively related to in-migration, out-migration, and gross migration for both females and males. He stressed the importance of physical and cultural facilitating factors rather than "push" factors in explaining migration flows:

On the one hand, it is clear that push factors account for a great number of out-migrants from the poorer provinces. However, when the analysis shifts from the numbers of migrants to migration rates, the characteristics of the more developed provinces seem to facilitate moves. This is particularly visible in the case of out-migration to Greater Bangkok. It appears that areas which have the more modern characteristics, also have populations which are more likely to migrate to the capital city (pp. 173-5).
These results support Davis's thesis of "relative deprivation" since migration does not seem to be directly stimulated by poverty.

Prasartkul (1977) emphasized the effect of "pull" factors on migration. In general, conditions at the destination gave a better fit than conditions at the origin. Population pressure was found to be more important at the destination than at the origin. Migrants tended to move from changwats with low employment rates to those with high employment rates, and more migrants moved to changwats with high rates of business investment and a low degree of social structural disequilibrium. The results, however, were highly dependent on the particular model tested. The additive model explained only 25 percent of the variance and almost all characteristics were insignificant. The multiplicative model, on the other hand, explained 60 percent of the variance, but even with this model, the socioeconomic and demographic variables by themselves were not very effective ($R^2 = .08$).

The best overall level of explanation was obtained by Garnjanagoonchorn (1974) for migration to the Bangkok Metropolitan Area. Once again, the choice of models is crucial. The log linear form explained more of the variance ($R^2 = .85$) than the linear form ($R^2 = .61$), and the explanatory power was slightly better for females than for males in both cases. The neoclassical economic variables (average monthly earnings and unemployment) were significant in the linear model but not in the log linear form. Finally, a set of variables added to measure intervening opportunities was found to be insignificant in the linear model and only partly successful in the log linear model.
The present study builds upon the work summarized above, makes modifications to overcome some of the problems identified in those studies, and expands the analysis into new areas. Our analysis differs from some or all of the previous studies in the following important ways:

(a) All nonzero inter-changwat migration streams are included in the analysis. Other studies rely on the published census volumes which do not print data for small migration streams. The present study is based on complete data for all migration flows from the unpublished 71 x 71 matrix of migration for Thailand. (Since Bangkok and Thon Buri are combined, the analysis uses a 70 x 70 matrix.)

(b) The analysis is conducted for all changwats together and for Bangkok and non-Bangkok migration separately.

(c) Female and male migration streams are analyzed separately and the data are also pooled.

(d) Interaction effects are included in the equations.

(e) Both the relative and expanded gravity models are tested.

(f) Some of the key variables are measured differently from other studies. In particular, land pressure is measured by proportion of land farmed rather than simply density and unemployment includes those waiting for agricultural employment at the time of the census.

Probably the greatest departure from the previous studies is the choice and measurement of variables included in the model. A detailed description of the variables in the model and the results of the analysis are presented in the next section.
IV. THE ANALYSIS

The data for this analysis were obtained primarily from the 1970 census of population. Interprovincial migration is measured by the number of people who had lived in their 1970 place of residence for less than five years and whose previous place of residence was a different changwat. The study includes all combinations of origin and destination in which there was at least one person who migrated from one changwat to another. It is necessary to exclude those combinations where there were no migrants in order to use a log specification. It is unlikely that this exclusion will cause serious bias since only 1.6 percent of the possible combinations have no migration. Other studies, however, which have relied on published data may be subject to serious bias, since published data exclude migration flows of less than thirty persons which results in the deletion of forty percent of the flows.

In this paper, the economic variables included in the analysis are those most relevant to the Thai environment. To adapt the model to the Thai context, it is necessary to recognize the importance of rural-to-rural migration. Therefore, the availability of farmland has been added to the standard economic variables of income and unemployment. In addition, the proportion of population living in urban areas was added to test the city lights hypothesis. Ideally, we would wish to measure our independent variables at the beginning or middle of the 1965-70 period since we want to examine their causal effect on migration and ignore the possibility that migration may have in fact affected the level of the independent variables. For income and proportion of land
farmed, it was possible to obtain figures for 1967 and 1961/62, respectively, but measures of unemployment and urbanization were obtained from the 1970 census. This might lead to a bias in the coefficients of these variables, but given the relatively small magnitude of migration overall we do not expect this bias to be large.

Thus the model to be tested is:

\[ M_{ij} = k \left( \frac{p_i}{p_j} \right)^{a_1} \left( \frac{D_{ij}}{D_{ij}} \right)^{a_3} \left( \frac{I_i}{I_j} \right)^{a_4} \left( \frac{U_i}{U_j} \right)^{a_5} \left( \frac{F_i}{F_j} \right)^{a_6} \left( \frac{UR_i}{UR_j} \right)^{a_7} \]

where \( I_i \) and \( I_j \) represent per capita income in area of origin i and area of destination j, \( U_i \) and \( U_j \) represent unemployment (including those waiting for agricultural work), \( F_i \) and \( F_j \) represent the proportion of land farmed, and \( UR_i \) and \( UR_j \) represent the proportions of the population urban. For the relative model we restrict the coefficients so that:

\[ a_4 = -a_5, a_6 = -a_7, a_8 = -a_9 \text{ and } a_{10} = -a_{11} \]

The log linear formulation of the relative model implies that:

(a) the coefficient on \( I_i/I_j \) should be negative, since the higher the income in the sending area relative to the receiving area, the less attractive migration should appear.

(b) the coefficient on \( U_i/U_j \) should be positive, since higher unemployment in the origin than the destination should encourage migration;
(c) the coefficient on \( F_i/F_j \) should be positive, since the more land already farmed in \( i \) relative to \( j \), the greater the opportunities for homesteading new land in \( j \) relative to \( i \) (a major factor in rural-to-rural migration);

(d) the coefficient on \( UR_i/UR_j \) can be expected to be negative if urbanization per se is attractive to migrants independent of its effects on economic opportunities;

(e) \( P_i \) and \( P_j \) should have positive coefficients equal to 1;

(f) \( D_{ij} \) should have a negative coefficient.

In the expanded model, the coefficients are unrestricted and their signs are less certain. If only the relative values and not the absolute values of the variables matter, then all variables in \( i \) will have the same sign as in the relative model, and all variables in \( j \) will have the opposite sign since they appear in the denominator of the ratio. For example, \( I_i \) would have a negative sign and \( I_j \) would have a positive sign. These are the coefficients hypothesized by Todaro in a recent paper (Todaro, 1980). If the origin and destination variables play independent roles, the signs need not follow this simple pattern.

As suggested by Ravenstein, the importance of these factors may differ for male and female migrants. Therefore, the above models were tested for differences in the behavior of males and females with respect to these variables. In addition, in the context of Thailand, Bangkok plays a very unique role, and the migration flows involving Bangkok may
exhibit behavior quite different from those of the other regions. Therefore, the models were also tested separately for Bangkok and non-Bangkok migration.

The Relative Model

The simple formulation of the model to be tested is specified by

\[ \log M_{ij} = \log k + a_1 \log P_i + a_2 \log P_j + a_3 \log D_{ij} + a_4 \log (I_i/I_j) + a_6 \log (U_i/U_j) + a_7 \log (F_i/F_j) + a_{10} \log (UR_i/UR_j) \]

The results of this specification for total gross migration from i to j are given in the first column of Table 1, and the results for females, males, and a pooling of males and females are given in columns 2, 3, and 4.10/ The first four columns show that the model explains approximately 60 percent of the variation in each group, and that all variables are statistically significant and of the hypothesized sign with the exception of urbanization, which has the opposite sign. This would imply that urbanization per se is not an attracting force once one controls for the economic attractiveness of the changwat. This point will be explored more fully later.

The gravity variables of population size and distance11/ have the greatest explanatory power as measured by beta coefficients (not shown), followed by relative income, relative unemployment and relative proportion
Table 1. Regression Results for the Relative Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1) Total</th>
<th>(2) Females</th>
<th>(3) Males</th>
<th>(4) Pooled</th>
<th>(5) Pooled with interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(t Values in Parenthesis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population I</td>
<td>0.675* (25.47)</td>
<td>0.640* (24.12)</td>
<td>0.658* (24.59)</td>
<td>0.646* (34.17)</td>
<td>0.648* (27.07)</td>
</tr>
<tr>
<td>Population J</td>
<td>0.912* (34.48)</td>
<td>0.871* (32.85)</td>
<td>0.901* (33.72)</td>
<td>0.886* (46.96)</td>
<td>0.878* (36.76)</td>
</tr>
<tr>
<td>Distance</td>
<td>-1.341* (67.11)</td>
<td>-1.323* (65.29)</td>
<td>-1.318* (65.75)</td>
<td>-1.320* (92.23)</td>
<td>-1.320* (67.52)</td>
</tr>
<tr>
<td>Income I</td>
<td>-0.385* (10.41)</td>
<td>-0.351* (9.32)</td>
<td>-0.391* (10.54)</td>
<td>-0.373* (14.08)</td>
<td>-0.351* (9.33)</td>
</tr>
<tr>
<td>Income J</td>
<td>0.163* (6.76)</td>
<td>0.143* (5.80)</td>
<td>0.161* (6.92)</td>
<td>0.157* (9.35)</td>
<td>0.143* (5.80)</td>
</tr>
<tr>
<td>Unemployment I</td>
<td>0.112* (9.02)</td>
<td>0.090* (6.94)</td>
<td>0.135* (10.98)</td>
<td>0.114* (12.76)</td>
<td>0.090* (6.95)</td>
</tr>
<tr>
<td>% of land farmed in I</td>
<td>0.160* (4.77)</td>
<td>0.126* (3.69)</td>
<td>0.174* (5.30)</td>
<td>0.154* (6.52)</td>
<td>0.126* (3.69)</td>
</tr>
<tr>
<td>Urbanization I</td>
<td>Population I * S</td>
<td>0.015 (0.51)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment J</td>
<td>0.003 (0.08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance * S</td>
<td>-0.001 (0.05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income I * S</td>
<td>-0.040 (0.75)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment I * S</td>
<td>0.018 (0.54)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of land farmed in I * S</td>
<td>0.045** (2.55)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanization I * S</td>
<td>0.048 (1.01)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: S = 1 for males, * = significant at 0.01  ** = significant at 0.05
of land farmed in that order. The perverse urbanization variable has the least explanatory power. Thus the purely economic variables perform at a level between that of the simple gravity model and the more impressionistic taste for (or distaste for) urbanization.

Separate equations for male and female migration appear to be remarkably similar in explanatory power and the size of the coefficients.\textsuperscript{12} Only for the relative availability of farmland is there much difference. This is confirmed in column 5, where an interaction dummy variable for which male equals 1 was multiplied by each of the explanatory variables. None of the interaction terms is significant except that for farmland. This coefficient indicates that males are significantly more likely than females to migrate from areas of relatively high proportion land farmed to areas of greater availability of farmland.

The Expanded Model

In this section, we shall address the question of whether conditions in origins and destinations play a symmetrical role in determining migration. A first test of this question can best be addressed by running a less restricted test of the basic model:

\[
\log M_{ij} = \log k + a_1 \log P_i + a_2 \log P_j + a_3 \log D_{ij} + a_4 \log I_i + a_5 \log I_j + a_6 \log U_i + a_7 \log U_j + a_8 \log F_i + a_9 \log F_j + a_{10} \log UR_i + a_{11} \log UR_j
\]

The signs of the coefficients that would prevail if the variables have a symmetrical role in origin and destination are shown in the margin of Table 2. The columns of Table 2 replicate the analysis of Table 1 with the expanded model.
### Table 2. Regression Results for the Expanded Model

(\( t \) values in parenthesis)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Signs Implied by the Relative Model</th>
<th>(1) Total</th>
<th>(2) Female</th>
<th>(3) Male</th>
<th>(4) Pooled</th>
<th>(5) Pooled with Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population I</td>
<td>(+)</td>
<td>3.971*</td>
<td>0.927*</td>
<td>0.955*</td>
<td>0.939*</td>
<td>0.903*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(34.47)</td>
<td>(35.31)</td>
<td>(49.38)</td>
<td>(46.29)</td>
<td>(45.52)</td>
</tr>
<tr>
<td>Population J</td>
<td>(+)</td>
<td>1.207*</td>
<td>1.157*</td>
<td>1.200*</td>
<td>1.180*</td>
<td>1.133*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(43.03)</td>
<td>(44.29)</td>
<td>(62.00)</td>
<td>(60.05)</td>
<td>(55.28)</td>
</tr>
<tr>
<td>Distance</td>
<td>(-)</td>
<td>-1.386*</td>
<td>-1.350*</td>
<td>-1.400*</td>
<td>-1.373*</td>
<td>-1.360*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(66.73)</td>
<td>(67.93)</td>
<td>(68.96)</td>
<td>(66.16)</td>
<td>(67.62)</td>
</tr>
<tr>
<td>Income I</td>
<td>(-)</td>
<td>0.099**</td>
<td>0.173*</td>
<td>0.000*</td>
<td>0.094*</td>
<td>0.121*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.03)</td>
<td>(3.45)</td>
<td>(0.14)</td>
<td>(2.70)</td>
<td>(2.65)</td>
</tr>
<tr>
<td>Income J</td>
<td>(+)</td>
<td>0.852*</td>
<td>0.870*</td>
<td>0.780*</td>
<td>0.834*</td>
<td>0.819*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.02)</td>
<td>(3.46)</td>
<td>(15.86)</td>
<td>(23.83)</td>
<td>(18.19)</td>
</tr>
<tr>
<td>Unemployment I</td>
<td>(+)</td>
<td>-0.489</td>
<td>0.017</td>
<td>-0.113*</td>
<td>-0.099*</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.52)</td>
<td>(3.63)</td>
<td>(2.81)</td>
<td>(3.32)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Unemployment J</td>
<td>(-)</td>
<td>-0.378*</td>
<td>-0.270*</td>
<td>-0.443*</td>
<td>-0.378*</td>
<td>-0.276*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.31)</td>
<td>(14.23)</td>
<td>(17.88)</td>
<td>(17.88)</td>
<td>(8.54)</td>
</tr>
<tr>
<td>% of land farmed I</td>
<td>(+)</td>
<td>-0.070*</td>
<td>-0.102*</td>
<td>-0.061**</td>
<td>-0.074*</td>
<td>-0.219*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5.95)</td>
<td>(2.69)</td>
<td>(6.25)</td>
<td>(6.25)</td>
<td>(5.98)</td>
</tr>
<tr>
<td>% of land farmed J</td>
<td>(-)</td>
<td>-0.295*</td>
<td>-2.80*</td>
<td>-0.314*</td>
<td>-0.302*</td>
<td>-0.100*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(16.26)</td>
<td>(19.15)</td>
<td>(25.52)</td>
<td>(25.52)</td>
<td>(16.21)</td>
</tr>
<tr>
<td>Urbanization I</td>
<td>(-)</td>
<td>0.083</td>
<td>0.104**</td>
<td>0.074</td>
<td>0.080*</td>
<td>0.126*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.32)</td>
<td>(1.72)</td>
<td>(2.61)</td>
<td>(2.61)</td>
<td>(2.68)</td>
</tr>
<tr>
<td>Urbanization J</td>
<td>(+)</td>
<td>-0.232*</td>
<td>-0.145*</td>
<td>-0.270*</td>
<td>-0.226*</td>
<td>-0.124*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.26)</td>
<td>(6.32)</td>
<td>(7.39)</td>
<td>(7.39)</td>
<td>(2.82)</td>
</tr>
<tr>
<td>Population I * S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.075**</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(2.28)</td>
</tr>
<tr>
<td>Population J * S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.087*</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>(2.72)</td>
</tr>
<tr>
<td>Distance * S</td>
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<td>-0.027</td>
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<td>-0.063</td>
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<td>-0.124*</td>
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<tr>
<td></td>
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<td>(1.03)</td>
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<td>(1.12)</td>
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<tr>
<td>Income I * S</td>
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<td>-0.013</td>
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<tr>
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<td></td>
<td>(0.23)</td>
</tr>
<tr>
<td>Income J * S</td>
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<td>0.013</td>
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<tr>
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<td></td>
<td>(0.23)</td>
</tr>
<tr>
<td>Unemployment I * S</td>
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<td>-0.115*</td>
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<td></td>
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<td>-0.158*</td>
</tr>
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<td>(2.58)</td>
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<td></td>
<td>(3.55)</td>
</tr>
<tr>
<td>Unemployment J * S</td>
<td></td>
<td>-0.158*</td>
<td></td>
<td></td>
<td></td>
<td>0.059**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.55)</td>
<td></td>
<td></td>
<td></td>
<td>(2.50)</td>
</tr>
<tr>
<td>% of land farmed I * S</td>
<td></td>
<td>0.059**</td>
<td></td>
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<td>-0.035</td>
</tr>
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<td>(2.50)</td>
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<td>(1.49)</td>
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<tr>
<td>% of land farmed J * S</td>
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<td>-0.035</td>
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<td>(1.49)</td>
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<td></td>
<td>(2.21)</td>
</tr>
<tr>
<td>Urbanization I * S</td>
<td></td>
<td>-0.072</td>
<td></td>
<td></td>
<td></td>
<td>-0.168*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.21)</td>
<td></td>
<td></td>
<td></td>
<td>(2.83)</td>
</tr>
<tr>
<td>Urbanization J * S</td>
<td></td>
<td>-0.168*</td>
<td></td>
<td></td>
<td></td>
<td>-0.124*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.83)</td>
<td></td>
<td></td>
<td></td>
<td>(2.82)</td>
</tr>
<tr>
<td>( \bar{R}^2 )</td>
<td></td>
<td>0.68</td>
<td>0.66</td>
<td>0.67</td>
<td>3.66</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Note: S = 1 for males  
* = Significant at 0.01  
** = Significant at 0.05
In the expanded model, the adjusted $R^2$'s are slightly higher than those in the relative model. The gravity variables are all significant (as in the relative model) and have the predicted signs. In addition, the population coefficients are all close to one, as hypothesized. The economic variables (income, unemployment, and farmland) are all significant and of the hypothesized signs only in the areas of destination. Urbanization in the destination is significant but has a negative sign, opposite from that hypothesized by the city lights theory.

The coefficients of the economic variables in the regions of origin are not all significant, but when they are they have signs opposite to what would be implied by the relative model. The signs for urbanization in both the sending and receiving regions, when significant, are opposite to those hypothesized. The interaction terms indicate that males are significantly more likely than females to avoid destinations of high unemployment and urbanization and more likely to leave areas with a high proportion of land farmed and high unemployment.

A possible interpretation of the effect of the economic conditions in sending and receiving areas is that while migrants flow to areas of relatively better economic circumstances, more of those in changwats with better than average economic circumstances can afford to move. This hypothesis has been suggested for Thailand by Chamratrithirong (1976) and by researchers who have studied migration in other countries.
This would imply that economic development will increase the overall level of migration while differential levels and differential growth rates will determine the direction of flow.

**Push and Pull Factors in Migration**

The gravity model of flows from $i$ to $j$ makes it somewhat difficult to assess the differential importance of factors at origin and destination, because it implicitly assumes that a joint decision is made about whether or not to migrate and where to go. It may be, however, that these decisions are more or less separate. Conditions at the origin might well push people from a region, and it is only after such push factors trigger migration that conditions in various destinations are reviewed to determine where people go.

To further explore the effects of changwat characteristics at origin and destination, two separate regressions were run. The total migration to a changwat from all others was regressed on the characteristics of that changwat. Then the total migration from a changwat was regressed on the characteristics of that changwat.

The results for in-migration are as follows:

\[
\log M_j = -9.39 + 1.02 \log P_j + 0.93 \log I_j -0.04 \log U_j -0.11 \log F_j -0.34 \log UR_j; R^2 = .54, N = 70
\]

Of the economic variables, only income has a significant effect in determining the total volume of in-migration. These results are virtually identical for males and females.

The results for the province of origin are more interesting and have a much higher $R^2$. 
\[ \log M_i = -4.24 + 0.78 \log P_i + 0.25 \log I_i + 0.29 \log U_i + 0.32 \log F_i + \]
\[ (12.33) \quad (2.23) \quad (4.21) \quad (8.82) \]
\[ 0.12 \log UR_i; R^2 = .87, N = 70 \]
\[ (1.17) \]

The economic variables all have a significant relationship with outflow, and the signs are extremely interesting. Income is positively associated with outflow supporting the ability to afford migration hypothesis. Unemployment, however, has a sign that conforms to the initial hypothesis and has more explanatory power (a higher beta value) than income. Thus the higher the unemployment in an area, the greater the outflow of migration. Even stronger is the relationship of farmland to out-migration: the greater the proportion of land farmed, the greater the outflow. Again, the results are virtually identical for males and females.

Thus, the ability to afford migration hypothesis and the push factors of high unemployment and especially limited farmland explain the level of out-migration from a changwat, whereas income seems of primary importance in explaining the level of inflow.

It is interesting to note that the relative model of the specific flows from i to j yields the best prediction of signs, while the absolute model yields expected signs for the destination variables only but gives slightly higher adjusted R^2's. But when total levels of migration to or from a changwat are examined, the characteristics of the origin have a much higher explanatory power. This would seem to imply that migration levels are more a push than a pull phenomenon, but once in motion, it is the characteristics of the potential destination relative to the origin that determine where migrants will go. This gives a clear policy implication: if one wants to reduce migration, one must concentrate on
the conditions at the origin, but if the only problem is where the mi-
grants are going, one must alter the characteristics of alternative des-
tinations.

**Bangkok as a Special Case**

Although the anomalous effect of the characteristics of origin on
migration flows has a tentative explanation, the perverse behavior of
urbanization is more difficult to explain. As mentioned earlier, if mi-
gration causes higher urbanization in the destination and lower in the
origin, any simultaneous equation bias that exists would tend to strengthen
the coefficients in the hypothesized direction and thus cannot explain
the perverse results.

Part of the explanation for the unexpected behavior of urbanization
may result from the fact that Bangkok plays a unique role in migration be-

havior in Thailand. The Longitudinal Study has shown differences in the
characteristics of those who migrate to Bangkok and those who migrate to
other urban areas (Goldstein et al., 1974). These differences might well
be reflected in different relationships between origin and destination
characteristics in migration to Bangkok and to other areas. Bangkok
may cause statistical problems as well because it is very much an outlier
on urbanization. In 1970, for example, 81 percent of its population was
urban, whereas Phuket, the next most urban area, was only 34 percent
urban.17/
Therefore, to separate the effect of Bangkok from that of other areas, the previous analysis was replicated first for all migration flows in which neither origin nor destination was Bangkok, then for flows in which Bangkok was either the origin or destination.

Table 3 shows the results for the relative model. The results for the non-Bangkok areas are essentially the same as those for the total sample, but the coefficients are less significant owing at least in part to the smaller sample size (138 cases for Bangkok versus 4,556 cases for non-Bangkok). In particular, unemployment and urbanization are not significant. The interaction terms show that in Bangkok males are significantly more likely than females to respond to the relative scarcity of farmland.

In the expanded model, the non-Bangkok results are again identical to those for the total sample in both sign and significance. In Bangkok, in addition to the gravity variables, unemployment and income at destination have significant coefficients with the hypothesized signs, but farmland at destination is not significant, contrary to all other results. It seems reasonable that few people migrate to Bangkok for its farming opportunities, but this result also implies that those leaving Bangkok do not tend to go to areas of high farming opportunities.\textsuperscript{18/}

It is also interesting to note that the proportion of land farmed at origin has a significantly positive effect on migration. Although this was hypothesized to be the case, the coefficient for this variable for
Table 3. Regression Results for the Relative Model for Bangkok and Non-Bangkok Migration (1965-1970)

(\(t\) values in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>TOTAL FEMALE</th>
<th>MALE</th>
<th>POOLED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bangkok</td>
<td>Non-Bangkok</td>
<td>Bangkok</td>
</tr>
<tr>
<td>(P_1)</td>
<td>0.659* (6.62)</td>
<td>0.602* (20.46)</td>
<td>0.679* (6.65)</td>
</tr>
<tr>
<td>(P_J)</td>
<td>1.034* (10.58)</td>
<td>0.625* (28.14)</td>
<td>0.996* (9.75)</td>
</tr>
<tr>
<td>(D')</td>
<td>-0.664* (13.38)</td>
<td>-1.35* (66.53)</td>
<td>-0.65* (12.79)</td>
</tr>
<tr>
<td>Income I</td>
<td>-0.373** (2.40)</td>
<td>-0.385* (10.32)</td>
<td>-0.402** (2.46)</td>
</tr>
<tr>
<td>Income J</td>
<td>0.141 (1.38)</td>
<td>0.163* (6.77)</td>
<td>0.133 (1.25)</td>
</tr>
<tr>
<td>Unemployment I</td>
<td>0.159* (3.06)</td>
<td>0.110* (8.89)</td>
<td>0.124** (2.25)</td>
</tr>
<tr>
<td>Unemployment J</td>
<td>0.161 (1.20)</td>
<td>0.154* (4.74)</td>
<td>0.125 (0.87)</td>
</tr>
<tr>
<td>(P_1 \times S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(P_J \times S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D \times S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income I (\times S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment I (\times S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmland I (\times S)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmland J (\times S)</td>
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<td></td>
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</tr>
<tr>
<td>Urbanization I (\times S)</td>
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<td></td>
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</tr>
<tr>
<td>Urbanization J (\times S)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(R^2)</td>
<td>.74</td>
<td>.59</td>
<td>.75</td>
</tr>
</tbody>
</table>

Note: \( S = 1 \) for males
* = Significant at 0.01
** = Significant at 0.05
Table 4. Regression Results for the Expanded Model for Bangkok and non-Bangkok Migration (1965-1970)  
(t values in parentheses)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Signs Implied by the Relative Model</th>
<th>TOTAL</th>
<th>FEMALES</th>
<th>MALES</th>
<th>POOLED</th>
<th>POOLED WITH INTERACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population I</td>
<td>(+)</td>
<td>0.945* (10.35)</td>
<td>0.998* (10.37)</td>
<td>0.951* (9.87)</td>
<td>0.967* (31.07)</td>
<td>0.958* (14.19)</td>
</tr>
<tr>
<td>Population J</td>
<td>(+)</td>
<td>1.520* (14.42)</td>
<td>1.218* (15.75)</td>
<td>1.147* (14.57)</td>
<td>1.336* (36.78)</td>
<td>1.206* (20.05)</td>
</tr>
<tr>
<td>Distance</td>
<td>(-)</td>
<td>-0.466* (9.81)</td>
<td>-1.427* (9.15)</td>
<td>-1.387* (9.99)</td>
<td>-0.481* (67.79)</td>
<td>-1.440* (13.52)</td>
</tr>
<tr>
<td>Income I</td>
<td>(-)</td>
<td>0.230 (1.31)</td>
<td>0.107** (2.16)</td>
<td>0.240 (1.30)</td>
<td>0.183* (3.62)</td>
<td>0.224 (1.27)</td>
</tr>
<tr>
<td>Income J</td>
<td>(+)</td>
<td>0.977* (5.59)</td>
<td>0.866* (17.49)</td>
<td>1.045* (5.63)</td>
<td>0.867* (17.14)</td>
<td>0.913* (5.22)</td>
</tr>
<tr>
<td>Unemployment I</td>
<td>(+)</td>
<td>-0.023 (0.20)</td>
<td>-0.058 (1.79)</td>
<td>-0.019 (0.28)</td>
<td>0.009 (0.21)</td>
<td>-0.023 (2.86)</td>
</tr>
<tr>
<td>Unemployment J</td>
<td>(-)</td>
<td>-0.304* (2.72)</td>
<td>-0.387* (11.96)</td>
<td>-0.285** (2.44)</td>
<td>-0.276* (8.41)</td>
<td>-0.305* (14.38)</td>
</tr>
<tr>
<td>% of Land Farmed  I</td>
<td>(+)</td>
<td>0.303* (4.96)</td>
<td>-0.077* (4.62)</td>
<td>0.260* (4.03)</td>
<td>-0.110* (6.53)</td>
<td>0.355* (5.88)</td>
</tr>
<tr>
<td>% of Land Farmed J</td>
<td>(-)</td>
<td>-0.014 (0.24)</td>
<td>-0.302* (18.01)</td>
<td>0.011 (0.18)</td>
<td>0.284* (16.26)</td>
<td>-0.026 (0.44)</td>
</tr>
<tr>
<td>Urbanization I</td>
<td>(-)</td>
<td>-0.154 (1.00)</td>
<td>0.100** (2.19)</td>
<td>0.167 (1.02)</td>
<td>0.119* (3.32)</td>
<td>0.180 (1.21)</td>
</tr>
<tr>
<td>Urbanization J</td>
<td>(+)</td>
<td>0.168 (1.09)</td>
<td>-0.229* (4.91)</td>
<td>-0.082 (0.50)</td>
<td>-0.155** (2.55)</td>
<td>-0.196 (1.32)</td>
</tr>
<tr>
<td>Variable</td>
<td>Signs Implied by the Relative Model</td>
<td>TOTAL</td>
<td>FEMALES</td>
<td>MALES</td>
<td>POOLED</td>
<td>POOLED WITH INTERACTION</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------</td>
<td>-------</td>
<td>---------</td>
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<tr>
<td></td>
<td></td>
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<td>Non-Bangkok</td>
<td>Bangkok</td>
<td>Non-Bangkok</td>
<td>Bangkok</td>
</tr>
<tr>
<td>Population I * S</td>
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<tr>
<td>Population J * S</td>
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<td>Distance * S</td>
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<tr>
<td>Income I * S</td>
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<tr>
<td>Income J * S</td>
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<tr>
<td>Unemployment J * S</td>
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</tr>
<tr>
<td>% of Land Farmed I * S</td>
<td></td>
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</tr>
<tr>
<td>% of Land Farmed J * S</td>
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<tr>
<td>Urbanization I * S</td>
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<td></td>
</tr>
<tr>
<td>Urbanization J * S</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>$R^2$</td>
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<td>0.65</td>
<td>0.85</td>
<td>0.63</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Note: S = 1 for males
* Significant at 0.01
** Significant at 0.05
the total and the non-Bangkok sample is significantly negative. This result might mean that migration to Bangkok, more so than to other areas, is the result of diminishing agricultural opportunities in the rural sector. Alternatively, it may be a statistical artifact resulting from combining migration to and from Bangkok in the same analysis.

We can test these alternatives by separating the analysis of the two migration streams to Bangkok. The following relationship is found between the inflow and the characteristics of the sending areas.

\[
M_{ib} = -5.71 + 1.01 \log P_i - 0.43 \log D_i + 0.28 \log I_i - 0.02 \log U_i + 0.31 \log F_i + 0.21 \log UR_i; \quad R^2 = .83
\]

Of the economic variables, only the proportion of land farmed in the sending area is significant. This is further evidence of the role of scarcity of agricultural opportunities in stimulating migration to Bangkok.

These results are quite similar to those found for in-migration for all areas combined. One major difference between Bangkok and the total sample, however, is that for the total sample there was no difference between the determinants of in- and out-migration for males and females. Separate equations for male and female migration into Bangkok, however, show that although scarcity of land is significant for both males and females, the effect of such scarcity on males is significantly greater. The coefficient for females is 0.26; for males, it is 0.37. For the total sample, the coefficient was 0.32 (.31 for females and .32 for males).

V. SUMMARY AND POLICY IMPLICATIONS

As fertility rates continue to decline in Thailand, attention is increasingly being turned toward an examination of migration as an important feature of demographic change and one that will undoubtedly have
a major impact on the individual and collective welfare of Thailand's population in the future. The rapid and unplanned growth of Bangkok has highlighted some of the major problems associated with large-scale migration and stimulated the government to include explicit population redistribution policies and programs in the Fourth National Economic and Social Development Plan (1977-1981).

The multivariate analysis undertaken in this paper has identified some important factors that were associated with migration to Bangkok and to all other provinces in Thailand in the 1965-1970 period. The analysis presented above indicates that:

(a) The usual gravity variables (population at origin and destination and distance between changwats) are of paramount importance, but economic determinants of migration are also highly significant.

(b) Economic factors predominate over the attraction of urban areas per se as determinants of migration.

(c) The economic conditions in areas of destination relative to those in areas of origin have significant effects in the direction hypothesized: the higher the per capita income, the lower the unemployment, and the lower the proportion of land farmed in the destination relative to the origin, the greater the flow of migration between areas, holding population size and distance constant. The expanded model also indicates that migrants move to areas of relatively high income, low unemployment and easy availability of farmland.

(d) Male and female migration streams seem to respond to per capita income and unemployment in the same way. Males, however, are more responsive than females to the scarcity or availability of farmland.
(e) Migration to and from Bangkok, and migration to and from other areas respond similarly to relative income and the availability of farmland. In addition, the coefficients for relative unemployment are very similar for Bangkok and non-Bangkok migration streams, but the significance level is lower, probably because of the smaller number of cases in the Bangkok sample.

Thus, it is clear that the relative model predicts significant signs very well, and that economic factors are far more important than the attraction of city lights. The separate roles of push and pull factors are less clear. Characteristics in the areas of destination have significant effects in the direction implied by the relative model, but characteristics in the areas of origin play a more complex role. Although higher income in areas of destination served as a drawing card for migrants, higher income in areas of origin served as a stimulus to out-migration, because people in the poorest changwats may not have had sufficient financial resources to support a move. This implies that the ability to afford migration plans an important role in mobility in Thailand.

The scarcity of farmland in the region of origin has an unclear effect except in migration streams involving Bangkok, where it is an important push factor, especially for males. For migration streams not involving Bangkok and for the sample as a whole, farmland in the province of origin shows different signs depending on the specification used. If one looks at the total migration from a province, scarcity of farmland is a highly significant push factor. However, in testing the expanded version of the gravity model where the dependent variable is the flow between two provinces, we find a greater flow of migrants from areas of less land scarcity.
This anomalous result for farmland may result either from measurement problems (farm opportunities are not well captured by the proportion of land farmed) or from the fact that our modeling has not captured the essence of the decision-making process. Unfortunately, to test more sophisticated models of migration decision making, individual rather than aggregate data are needed.

These findings suggest several implications about the future course of migration in Thailand and possible policies to cope with any undesirable effects of population movements. There is reason to believe that Thailand will continue its pattern of increasing migration as development proceeds. The impetus for migration to Bangkok and other urban areas is likely to increase as uncultivated arable land becomes more and more scarce. Overall, inequalities in the income distribution among changwats will continue to draw migrants to more prosperous areas of the country.

Our analysis indicates that the usual recommendation of rural development projects may not discourage migration to Bangkok or other relatively developed areas of Thailand. The effects of rural development projects on migration are by no means unambiguous. For example, mechanization of agriculture can result in an increased standard of living for some rural residents, but it may also provide an impetus to out-migration by simultaneously reducing the number of farm jobs and augmenting the ability of farmers to afford migration. This does not mean that the government should not pursue rural development
policies, but it is important to consider the possible differential effects of employment creation versus income generation on migration.

In fact, measures to restrict further expansion of income and employment opportunities in areas of destination may be more effective in curtailing undesirable population flows than efforts to develop rural areas. This end could be accomplished, for example, by limiting increases in minimum wages in Bangkok and other crowded areas and restricting development of factories in congested areas. Measures of this type are likely to be only partly successful, however, since a large proportion of jobs available to migrants are in the service sector and are often not subject to minimum wage regulation or other types of government controls.

Whatever migration-related policies and programs are ultimately adopted, both the number of migrants and migration rates will probably continue to increase. Therefore, it would be wise to try to project the direction and magnitude of migration flows in order to adjust for such changes in development plans. The relationships established in the migration regressions above can be useful in constructing population projections at the changwat level. Such projections can help in long-range planning for the provision of public services and in establishing the need for government programs for migrants.

The trend in migration in Thailand also highlights the need for studies of the effects of migration on both origin and destination areas. Present policies take into account some of the disadvantages of migration, such as the strain on urban public services and the brain
drain from rural areas. But little is known about the possible advantages of population movements. To what extent do migrants act as catalysts for the dispersal of modern ideas? Are remittance flows from migrants a major factor in aiding rural development? This paper has contributed to an understanding of the causes of internal migration in Thailand, but much more must be known about the consequences of migration to reach a more complete understanding of population movement and to provide more effective input into the policy-making process.
FOOTNOTES

1/ In 1970, there were 71 changwats in Thailand with an average population of about 500,000 persons.

2/ Although the National Economic and Social Development Board has often expressed the need for population projections for individual changwats, the production of such projections has been hampered by a lack of reliable and timely data on fertility, mortality, and especially migration at the changwat level.

3/ For example, it may be that areas of very low educational attainment may be the ones with the greatest out-migration. But within those areas it might be the most educated individuals who migrate.

4/ Net migration between regions is more difficult to incorporate in the gravity models presented below since the dependent variable can take on negative as well as positive values, and the gravity model requires taking the log of the dependent variable.

5/ The importance of the "bright lights" hypothesis is stressed, for example, in May and Skeldon (1977).

6/ These data include very little temporary migration, since the census was a de jure one and permanent residence was recorded as current residence. People away from home for several months were not counted as migrants.

7/ The measures of land farmed and unemployment are not ideal. Theoretically we would want to include a measure of land quality as well as availability, but an adequate measure of quality could not be found. The unemployment variable includes those waiting for the farm season. This variable is highly negatively correlated with urbanization, but standard unemployment rates are extremely low.

8/ For urbanization, which we expect to increase inflow and reduce outflow, if the city lights hypothesis is correct, we would anticipate that if migration is focused on urban areas, then migration would increase the proportion urban in 1970 and the observed relationship between migration and urbanization would overstate the effect of urbanization on migration. For unemployment, which should reduce inflow and increase outflow, if migration increases unemployment at the destination and reduces unemployment at the origin, the unemployment coefficients would underestimate the effect of unemployment on migration.

9/ Between 1965 and 1970 only five percent of the population five years of age and over moved across changwat boundaries.

10/ The "total," "male," and "female" regressions have 70 x 69 observations on gross migration (less any migration streams that equal zero). The pooled sample has twice as many observations, since both male and female flows are included as separate observations.
urban migration." If the projects are employment creating, they may reduce migration out of an area, but this possibility is only supported in the total outmigration formulation and not in the directional analysis of Tables 2 and 4.

20/ According to the Survey of Migration in Bangkok Metropolis (Thailand, NSO, 1979), 43 percent of recent migrants working in Bangkok were employed in service industries.
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