An Analysis of Interstate Migration in Mexico: Impact of Origin and Destination States on Migration Patterns*

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Se presentan dos teorías competitivas sobre la migración interestatal utilizando el censo de 1980 de México. Una tesis comparativa económica y un modelo de segmentación económica fueron perfeccionados al incorporar una perspectiva sistema-mundial.

Introduction

This paper examines two theories of interstate migration in Mexico as explanations of interstate migration patterns: (1) a comparative economic opportunity thesis and (2) economic segmentation (or dual economy) model. The *economic opportunity* thesis argues that factors such as employment opportunities and salaries are major considerations in any decision to move. Thus, internal migration is held to be an important way by which workers respond to changing economic opportunities and thereby redirect the spatial allocation of labor toward a more optimal pattern (Sovani 1964; Lowry

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1966; Rogers 1968). The economic opportunity thesis, thus, assumes that rural-urban migration is primarily caused by higher paying jobs in urban sectors and shifts the analytical scope onto pull factors affecting rural exodus.

The *economic segmentation* thesis, on the other hand, contains two components. First, micro-social factors (i.e., opportunities and salaries) do not determine the pattern of internal migration but, rather, a dual economy based on differential organizational development is the major determinant of migration patterns. By creating both labor market and economic opportunities, laborers are spatially allocated to meet the changing economic organizational structure (Baron and Bielby 1980).[1] Second, the model also points out the importance of analyzing structural factors at both origin and destination of interstate migrants. While pull factors influence urban migration, structural factors in sending states also may affect urban exodus as well, i.e., organizational development, job availability, and the distribution of occupational reward structures. In general, the economic segmentation theory analyzes how the intrusion and penetration of modern capitalist social relations into the countryside triggers waves of rural migrants to receiving states in spite of the fact that there are few opportunities (such as jobs and housing) (Danesh 1985). The theoretical tenets of the economic opportunity and economic segmentation theses are explored more fully in the next section.

Economic Opportunity Thesis

The economic opportunity theory emphasizes the gap in wage incentives between sending and receiving regions and assumes an unlimited supply of labor which is based on the existence of a permanent, large differential in favor of destination.[2] The existence of an unlimited labor supply suggests that the initiation of migrant flows depends almost exclusively on labor demand in receiving states. Lowry's (1964) analysis of migration flows used a log-transformed regression model with the number of migrants from i to j as the dependent variable. As independent variables, Lowry used airline distance from i to j, for both origin and destination, percentage of population in the nonagricultural labor force, and manufacturing wage rate. Rogers (1968) modified the Lowry model by altering the labor force, unemployment, and distance variables. The results for migration flows between SMSAs in California showed that migration is particularly related to a high wage ratio at *destination* and a large civilian labor force at either origin or destination and negatively related to high wages at origin and distance between i and j.

These early studies paved the way for migration analyses of many geographical units utilizing a variety of techniques. Out of a large body of research, three studies on Mexico are relevant to the present research (Whetten and Burnight 1956; King 1978; Greenwood, Ladman, and Siegel 1981) and one on Costa Rica (Brown and Jones 1985).

Although they did not employ an economic opportunity thesis, Whetten and Burnight (1956) set the groundwork for research on interstate migration in Mexico by using 1940 and 1950 Mexican Census data and analyzing net lifetime migration flows between Mexican states. They suggested that interstate migration in Mexico between 1940 and 1950 was affected by the distribution of economic opportunities. King (1978) found that the effect of distance was dominant and negative. This distance effect is a well known one in many studies, including all of the ones presently reviewed.[3]

1. The economic segmentation model is primarily advanced to explain social mobility and the stratification system from the perspective of organizational structures (Beck, et al., 1978; Kalleberg, et al., 1980; Tolbert et al., 1980; Kalleberg 1981; Zucker and Rosenstein, 1981; Hodson and Kaufman 1982; Tolbert 1982; Jacobs 1983). For example, Jacobs (1983) incorporates the dual economy theory (core and periphery sectors of different organizations) and dual labor market theory (primary and secondary labor markets) in order to explain mobility patterns in the United States.

2. Of several models suggested for the test of the economic opportunity hypothesis, the Lowry-Rogers model appears to be conceptually and methodologically most satisfactory. Their mathematical form can be shown in the following:

$$M_{ij} = k\left| \frac{U_i \cdot WS_j \cdot LF_i \cdot LF_j}{U_j \cdot WS_i \cdot D_{ij}} \right|$$

or in its generalized log-transformed form:

$$\ln M_{ij} = B_0 + B_1 \ln U_i + B_2 \ln U_j + B_3 \ln WS_i + B_4 \ln WS_j + B_5 \ln LF_i + B_6 \ln LF_j + B_7 \ln D_{ij} + e_{ij}$$

where

M_{ij} = number of migrants from i to j;
U_i, U_j = civilian unemployment rate at i and j;
WS_i, WS_j = labor force eligibles at i and j;
LF_i, LF_j = per capita wages and salaries at i and j;
D_{ij} = shortest highway mileage between the major county seats at i and j; and
e_{ij} = error term.

3. The independent variables, at both origin and destination, were minimum wage, average income, unemployment rate, population density, surface road and rail-

Greenwood, Ladman, and Siegel's (1981) study of lifetime interstate migration rates for Mexico in 1950, 1960, and 1970 defined for origin state i and destination state j, as the ratio of persons born in state i and enumerated in state j to the number of persons born in state i and enumerated anywhere in Mexico.[4] The negative effect of distance was the most significant result for all three census years. The second most significant effect, for all three years, was the positive one of the size of population at destination. The results reflect rural-urban migration patterns of the forties through the sixties. A positive significant effect not noted by King was one of earnings at destination. Another very significant effect was one from an analysis of border states versus non-border states as the destination, 1950 and 1960. The positive effect of border destination was attributed to the attractiveness of border states as a destination for staging temporary or permanent migration to the U.S.

A study of Costa Rica by Brown and Jones (1985) modified previous economic approaches by analyzing three different dependent variables and spatially varying parameters,[5] The analysis revealed that: (1) *outmigration* had a positive relationship with

road track rate, urbanization rate, distance between state capitals, and migrant stock. Migrant stock is defined as the number of people in the destination state who migrated from the origin state prior to 1959.

Independent variables for state of origin were home ownership rate, age, literacy, and Indian population rate. An independent variable for state of destination was *ejidario* rate (i.e., ratio of an economically active member of ejidario to total population). Regressions were run for male, female, and combined samples. The results for combined sexes must be discounted because of the extremely high correlation between closely related migrant stock and migration rate. For the combined sample of males and females, the correlation of independent variables was very high and distorted the analysis.

4. Independent variables, for both origin and destination, included monthly earnings, unemploymetn rate, population, a dummy for presence of the Federal District, a dummy for presence of border state, as well as distance between capital cities of origin and destination states.

5. The entire model is based on the equation:

(1) *migration rate* = number of persons migrating from origin to destination canton in a time interval/population at origin.

(2) *outmigration probability of outmigrating anywhere* = 1 − (number of persons remaining at origin/population at origin)

(3) *relocation probability of migrating from origin to destination canton*, in a time period, once the migration decision has been made = number of persons migrating from origin to destination canton/number of persons migration from origin to all other cantons.

The independent variables are distance between the population centroids of origin and destination cantons (DIST ij), population of destination canton (POP j), average monthly per capita wage for origin and destination (WAG i, WAG j), percent of

population pressure and a negative one with secondary/tertiary employment; (2) *relocation* had significant relationships with the following variables in order of importance: destination population (+), distance (−), wages (+), secondary/tertiary employment (−), and population pressure (−), the latter three for destination, and (3) *migration* rate measured as ratio of migrants from i to j to population at i, demonstrated effects basically the same as for (1) and (2).

Past research, thus, suggests that interstate migration depends substantially upon distance and is almost exclusively dependent on labor demand in receiving areas. When such demand exists, migration takes place. Thus, the economic opportunity thesis deemphasizes push factors to focus on the pull exerted by receiving economies.

Economic Segmentation Thesis

There has been a paucity of research examining the relationship between organizational growth and interstate migration. One of the problems lies in the prevalent trend in which studies are limited to the influence of economic infrastructures on migration rather than systematically examining other pertinent factors. For example, interregional migration in less developed countries may be considered as a result of economic penetration through international economic expansionism or imperialism (Chase-Dunn 1975; Robinson 1976; Stack 1978; Evans and Timberlake 1980). Changes in the economic infrastructure of a less developed nation (a peripheral country) are closely tied to the level of the intensive international investment by "core" nations. Differential regional development in a peripheral nation affects the income structure. Interstate migration is then the result of regional income inequality.[6]

The examination of intraregional migration patterns in developing nations can be further refined by incorporating a world system perspective which explains the unique characteristics of both dual

secondary and tertiary sector employment as a percent of total employment origin and destination (PCUJOB i, PCUJOB j), population pressure for origin and destination, i.e., a type of dependency ratio equal to total population/person employed in all sectors. b′ is a constant indicating the whole model as to be calibrated by b coefficients specific for X and Y geographic coordinates.

6. Tolbert (1982) contends that economic segmentation leads to the creation of heterogeneous labor markets which then affect how people move within the stratification system. The present analysis utilizes a causal process in which industrial and organizational sectors function as intermediate variables affecting labor markets and intersectorial mobility.

economies and labor markets (Wallerstein 1979). According to the world system perspective, the most salient characteristic of the relationship between international dependency and intranational economic inequality in developing nations is an intensive penetration of foreign capital and the growth of service sectors (Evans and Timberlake 1980). Foreign capital generates a bias towards the use of capital intensive techniques in industry and agriculture that restricts the growth of industrial jobs, while at the same time pushing and pulling dwellers to urban areas where opportunities for employment are concentrated in the rapidly expanding service/tertiary occupations. For example, in Latin America as a whole, the urban population rose from 29.5 percent in 1925 to 40.1 percent in 1969, while the percentage of active population employed in manufacturing remained practically stable from 13.7 percent in 1925 to 13.4 percent in 1960 (Cardoso 1968).[7]

The growth of the service sector then contributes to income inequality primarily by reducing the bargaining power of unskilled and semiskilled workers, as well as by locking many persons into low-paying service occupations.[8] For example, in Mexico by 1973 the richest five percent of the population shared 29 percent of the national income, while the poorest 20 percent split a meager four percent of the income. That same year, even though Mexico had a per capita GNP of (U.S.) $774, a full 18 percent of the population still

7. This perspective assumes that since the world economy affects the economic infrastructure of a dependent nation, there exists an intertwined relationship between the level of economic penetration by the developed nations and corresponding changes in organizations, occupations, and income distribution in the third world. Economic infrastructure changes in a dependent nation requires spatial redistribution of the population in order to meet the changing structure of both labor markets and income distribution (Amin 1976; Wallerstein 1979; Evans and Timberlake 1980; Danesh 1985). Theoretically, both the dependency school of A. G. Frank and the World System School of Wallerstain which emphasize the process of transfer of surplus value from non-capitalist sectors to capitalist sectors at the regional, national, or international levels can be classified with few exceptions as push theory (Morse 1962; Griffin 1976; Lomnitz 1977, p. 41; Castells 1979, pp. 46–48).

8. Fiala (1983), however, offers a different explanation of the relationship between financial investment by core nations and income inequality in a peripheral nation. Fiala contends that investment dependence leads to income inequality which then affects the growth of service sectors. The service sector is not a mediating link between investment dependence and inequality and has little impact on increasing inequality and indicates that it may even reduce income inequality. Fiala, however, points out three *organizational factors* which affect income inequality: (1) widening productivity and income differentials between large-scale enterprises and small scale firms (dual economic sectors), (2) development of an elite group of professionals and technical workers in large-scale enterprises, and (3) wide income differences within modern enterprises. Thus, from Fiala's point of view, organizational differentiation is the primary element in explaining income inequality in a periphery nation.

had annual income of less than $75 (Portes and Bach 1985). However, regardless of the confinement of many migrants to petty tertiary jobs and greater income inequality in urban areas, migrants perceive an improvement in their overall well being in cities (Danesh 1985; Portes and Bach 1985). That is, the idea of migration (or urban pull) becomes a relativistic concept in relation to the general socioeconomic conditions in the place of origin. The economic segmentation theory, thus, specifically examines how the intrusion and penetration of modern capitalist social relations into a countryside may trigger waves of rural migrants to urban centers even though there are few opportunities (e.g., jobs and housing).

The economic segmentation theory rejects the general assumption of an economic opportunity thesis that rural-urban migration is caused primarily by higher paying jobs in the urban sectors or in the destinations. It argues that the impact of differential income between rural and urban sectors on migration is minimal because despite higher per capita income in the cities, rural migrants are faced with a higher cost of production and reproduction. The significantly higher cost of consumption in urban areas than in rural areas is mainly caused by the demands of the urban economy (Portes and Bach 1985). In rural areas where there is no spatial segretation between the place of residence and place of work, there is no need for public or private transportation. But in cities one has to add the cost of transportation to the family budget. Furthermore, since the money economy is more pervasive in cities than in the countryside, cash payment becomes necessary for the direct consumption of agricultural products in urban regions.

As shown in Figure 1, the analysis of interstate migration from an economic segmentation perspective suggests that financial dependence affects the organizational response to capitalism, changes in the structure of industry and agriculture, and leads to service sector growth particularly in urban regions. The growth of service sectors then affect the structure of the occupational reward system and creates interregional income inequality. The observed disorganization and breakdown of agrarian society is primarily due to: (1) population growth as a consequence of the recent rise in life expectancy, (2) lack of accessibility to income-generating land and its distribution, and (3) the interplay between those two exponents (Castells 1979). Thus, the greater exchange between rural and urban regions under the conditions of high population growth and unproductive land tenure leads to a high rural exodus (Connell et al. 1976; Danesh 1985). Also the greater differential productivity between rural and urban areas leads to a greater level of migration from less productive to more productive sectors and vice versa.

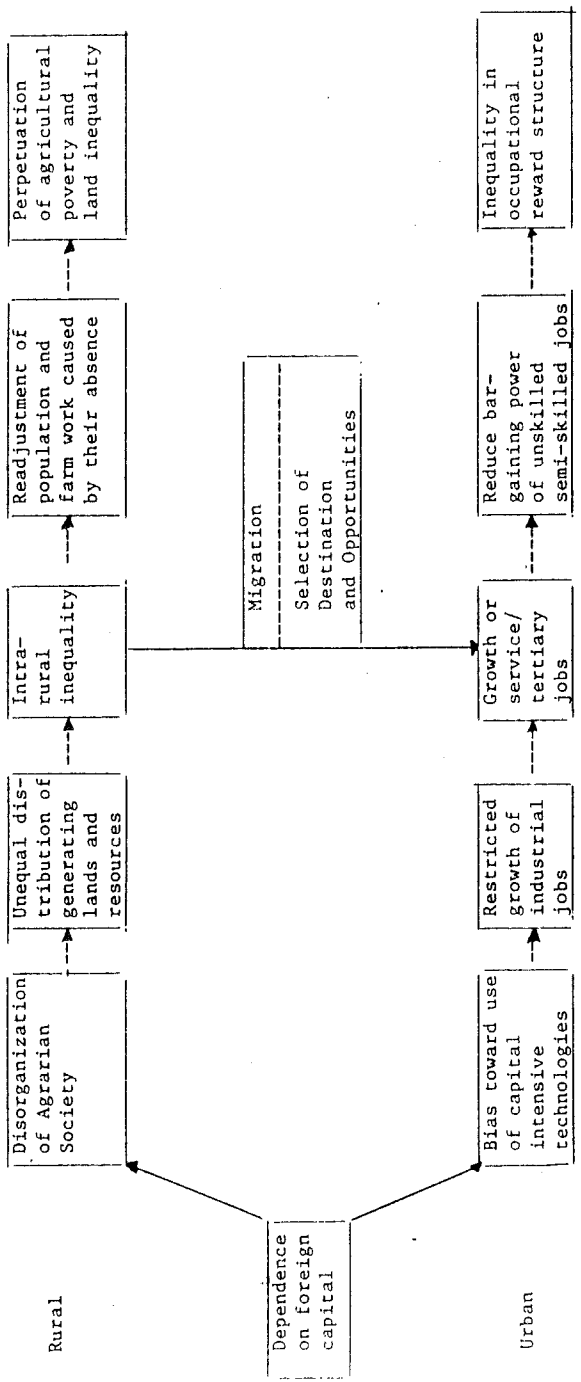


Figure 1 *Diagram of Economic Segmentation Perspective*

A meaningful analysis of interstate migration, according to the economic segmentation perspective, arises when both rural push and urban pull have simultaneously been taken into consideration. Since an economic opportunity thesis focuses primarily on urban (or pull) economic factors affecting interstate migration, it is of great importance that both organizational and labor market characteristics in relation to socioeconomic conditions at both sending and receiving states be examined.

Dual Labor Markets

The economic segmentation thesis is based on the concept of dual labor markets. That is, the generation of an oligopolistic segment by which advanced economies control different facets of production and commercialization. This control is far more extensive than among earlier capitalist firms, i.e., the emergence of oligopolies into primary and secondary economies. The primary sector of the economy is formed by large monopolistic enterprises characterized by bureaucratization of the production process and the creation of an internal market. Oligopolistic corporations are able to create internal labor markets because of their larger size, higher wages, greater fringe benefits, and more desirable working conditions (Stolzenberg 1978; Baron and Bielby 1980; Smith 1983; Portes and Bach 1985).

A secondary sector of the economy comprises smaller competitive firms and resembles structural conditions during the early phase of industrial capitalism. Such firms operate in an environment of considerable economic uncertainty (Baron and Bielby 1980). Enterprises in this economic sector do not have an internal labor market. Wages are not only lower than in the primary sector, but interstate migrants are considered as a preferred labor force used against the organizational efforts of the domestic-minority work force to accept present conditions and their efforts to improve them. The dual economy analysis points out that migrants are used to undercut domestic workers who are themselves politically weak, frequently unorganized, and employed by the most backward corporations. Oligopolistic labor in a primary sector, however, is invulnerable to the competition of new migrant workers and may actually profit from their existence. Competitive labor, on the other hand, is pitted against the new workers and is frequently replaced by them (Portes and Bach 1985).

The development of a dual economy is closely related to the proliferation of service/tertiary occupations. These low level "jobs"

are most likely to be filled by interregional migrants because of competitive characteristics of the secondary segment of the economy and a lack of labor skills by the migrants. Migrant labor has little collective bargaining power and the availability of a potential labor replacement encourages exploitation of unskilled and cheap labor. Meanwhile, the primary oligopolistic corporation further develops the complex structure of internal labor markets in which migrant labor is not crucial for operation. The growing polarization of a dual economy intensifies differences between the primary and secondary segments of the economy and perpetuates income inequality between oligopolistic economic labors and secondary migrant labors. Once the dual economy is well established, income inequality then prevails not only at the destination, but also at the origin of migrant workers, especially in rural areas. Unequal distribution of the monetary reward structure then further promotes interstate migration.

For the economic opportunity thesis, dual economic segmentation at destination is more important than that at origin for interstate migrants. The proliferation of service/tertiary occupations in the secondary economic sector becomes salient at destination, while little significance in labor market characteristics exists at origin. Income inequality is further perpetuated at destination because of (1) expanding service/tertiary sectors, (2) lack of organizational unification among interregional migrants in the secondary economic sector, and (3) further exploitation of migrants due to their lack of bargaining power and reduction of wages.

The economic segmentation theory, on the other hand, provides a different set of theoretical explanations. Economic sectors pave the path by which migrant labors are spatially allocated according to the changing organizational structure at destination. Once interstate migration prevails, a growing polarization between the two economic segments is observed, not only at receiving regions, but also at the sending states. A similar trend is expected in labor market segmentation at both sending and receiving regions. Once interstate migration has taken place, the gap between primary and secondary labor markets widens at receiving areas in which the tertiary sector is primarily unorganized and mainly consists of small and petty commerce, hawkers, travelling salesmen, servants, unskilled and temporary labor—a disguised form of unemployment or underemployment. With respect to the development of income inequality at the initial stage of interstate migration, little difference exists between origin and destination. In later stages of interstate migration, income inequality at receiving states tends to develop rapidly and later such processes permeate at sending states as well.

The main thrust of the remainder of this paper is twofold: (1) to provide a causal model of interstate migration based on the economic segmentation thesis in which pull and push factors (origin and destination) are theoretically integrated and (2) to examine critically the economic segmentation thesis in explaining interstate migration patterns in Mexico. The unit of analysis in this paper is on interstate migration. There are 31 states and the Federal District in Mexico. Other papers examine *interregional* migration (Fukurai et al., 1987) and rural to urban migration using municipio data (Butler et al., 1987). The present methodology makes use of the full sample of 32 federal entities and presents analyses of the special effects of the Federal District and the State of Mexico on national migration patterns. Such analysis would be better done with smaller samples of Mexican regions and inclusion of variables on migration flows not available in the 1980 Mexican Census.

Methods

Mexican census data for 1980 are utilized to examine the relationships among the development of economic segmentation, labor markets, and income inequality and how they affect interstate migration. The 1979–1980 migration flows between 32 Mexican states results in 992 observations.

Several studies have addressed the accuracy of the Mexican Censuses of 1970 (Camposortega 1982) and of 1980 (Lopez 1982; Peach 1984). The 1970 and 1980 Mexican Censuses, like U.S. Censuses, have some problems of undercount and age correction, but not to an excessive degree. For example, the U.S. Census indicates an undercount for the 1980 Mexican Census equal to 3.7 percent, which is not unusual (Peach, 1984). Peach points out two other problems in utilizing the 1980 Mexican Census. One is the 1980 Census enumeration date of June 4. Since the 1970 date was January 28, researchers should be cautious in using seasonal variables. Also, if 1970–80 differences are used for projection purposes, the 10 year time period should be increased to 10.35 years, or an equivalent adjustment made. Another problem is the large proportion of "not specified" responses for certain variables, including income, employment characteristics, and education (e.g., 14.8 percent of responses are not specified for educational level of population, four years and older). As a result, response categories must be carefully accessed. However, our longitudinal analyses of a specific application of Mexican Census data from 1900 to 1980 suggest that either the 1980 Census is fairly accurate or that the errors contained in the

1980 Mexican Census were similar in nature to those contained in the 1900–70 Censuses (see Butler et al. 1987).

While interstate migration can be investigated by utilizing either recent migration data or lifetime migration data, this analysis focuses on recent migration patterns in Mexico. Emphasis on recent migration corresponds to the studies of Lowry (1964), Rogers (1968), King (1978), and Brown and Jones (1985), but differs from the lifetime migration emphasis of Whetten and Burnight (1956) and Greenwood et al. (1981). A model incorporating recent migration is justified since it is intended as a study of Mexican migration around 1980, not as a longitudinal study requiring a more elaborate model.

In the present model recent migration is defined in terms of various characteristics that correspond to the economic segmentation thesis. A latent structural equation (LISREL) methodology is selected because it can account for some of the interrelated effects of independent variables on dependent variables (Joreskog and Sorbom 1985).[9] The present methodology differs from simple flow analysis (Whetten and Burnight 1956); single step multiple regression (Lowry 1964; Rogers 1968; King 1978; Greenwood et al. 1981); or regression incorporating spatial parameters (Brown and Jones 1985), but resembles path analysis (Evans and Timberlake 1980). The current analysis is based on the latent structural equation model presented in a schematic form in Figure 2. By fitting this model to actual observed data, the economic segmentation thesis can be examined.

Variables

The log of the number of migrants from a state i to a state j is used as the dependent variable. The reason that the present analysis does not convert the number of migrants into a ratio is that past research paid little attention to the importance of origin versus destination variables. The dependent ratio variable created by dividing by the population of either receiving or sending region distorts the relative importance of variables of origin and destination because of statistical dependence on the set of related independent variables.

9. A latent structural equation modeling (LISREL) is a specialized implementation of the latent structural equation model which estimates unknown coefficients in a set of linear structural equations. The variables in the set of equations are either observable, measurable variables, or unobserved latent variables. In the present LISREL model shown in Fig. 2, latent structural variables are shown in the center of the figure, with Greek symbols, while observed variables are indicated on the outside with English symbols.

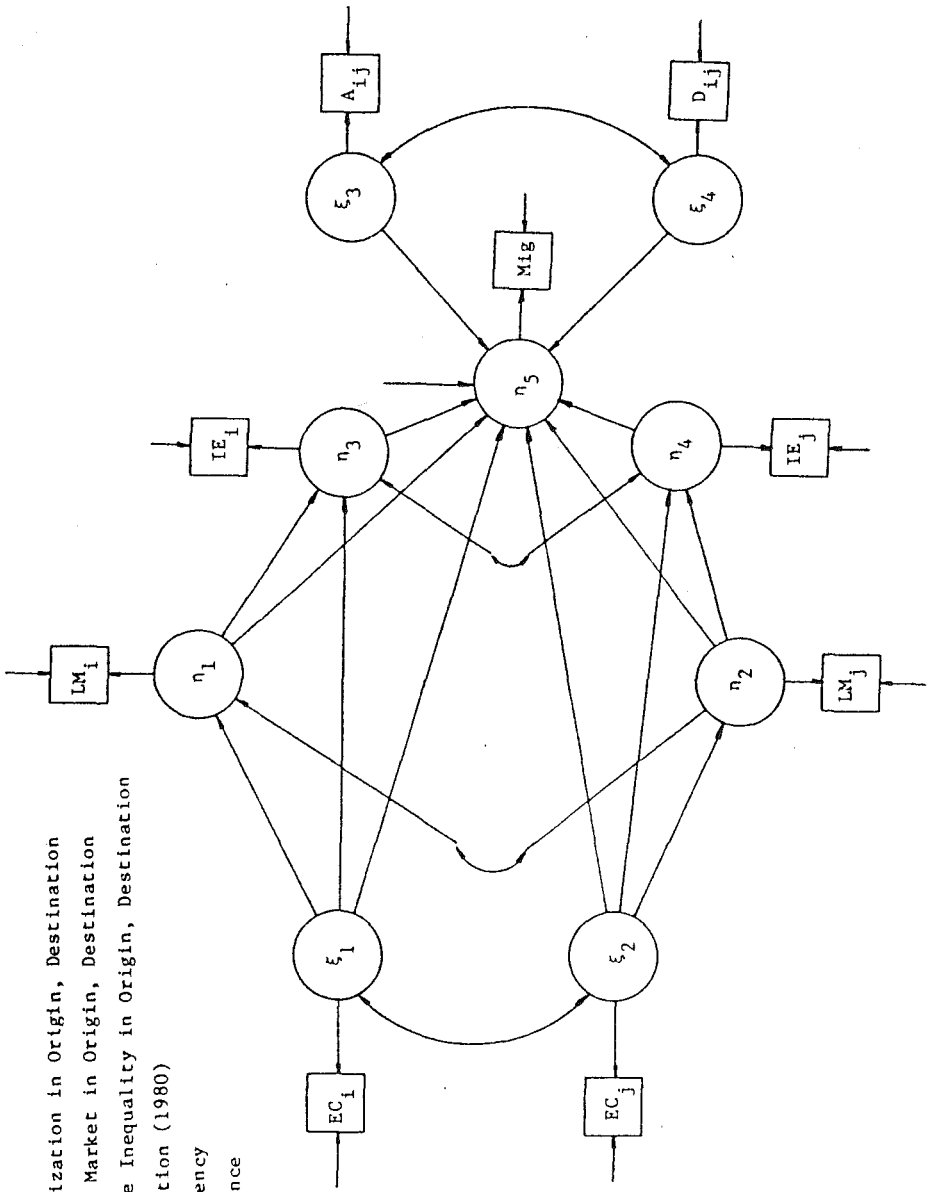


Figure 2 *LISREL Model for Economic Segmentation Thesis*

EC_i,EC_j: Organization in Origin, Destination
LM_i,LM_j: Labor Market in Origin, Destination
IE_i,IE_j: Income Inequality in Origin, Destination
Mig: Migration (1980)
A_{ij}: Adjacency
D_{ij}: Distance

For this reason, the dependent variable of our economic segmentation thesis takes after Roger's and Lowry's use of a natural-log dependent variable.

In addition to migration, the model consists of the following structural variables, each at origin and destination: (1) organizational structure represented by value of S.A.V.C. (corporations), (2) service and support sectors of labor market, and (3) income inequality, represented by the ratio of rich to poor. There are also two control variables, adjacency and distance. Value of corporations (S.A.V.C.) is defined as total value of corporations in a state in pesos divided by the number of corporations in a state. It corresponds in the economic segmentation thesis to the development of organizational structures in a state. This variable has not previously been utilized in studies of Mexican interstate migration. The mean value, standard deviation, and descriptive statistics for the variables, are given in Table 1.

The labor market variable is measured by the number of workers employed in service and support occupations divided by total number of workers employed in a state. In the Mexican Census, service and support occupations are defined to include the following categories: office workers (oficinistas), retail salespersons (vendedores dependientes), street salespersons (vendedores ambulantes), service employees (empleados en servicios), domestic workers (trabajadores domésticos), transportation operators (operadores de transportes), and security workers (protección y vigilancia). Theoretically this variable represents the extent of service/support sectors. Although this measure has not been utilized in prior Mexican interstate migration studies, a similar variable, proportion of secondary and tertiary sector employment, was utilized in Costa Rica (Brown and Jones 1985). Further, refinement of this variable possibly could separate those occupations with steadiness of employment, job security, and benefits from those not having them.

Income inequality is measured as the ratio of rich to poor, defined as the number of persons with monthly income equal to/or greater than 12,110 pesos divided by number of persons with monthly salary less than 1,081 pesos. Average salary has been utilized by several researchers (King 1978; Greenwood et al. 1981; Brown and Jones 1985).[10]

10. King (1978) incorporated minimum wage rates as proxies for ability to finance migration at origin and for expected wage stream at destination. However, it is less relevant in the present study which required a variable to represent income inequality.

Table 1 *Descriptive Statistics for Structural Variables*

Variables	*N*	*Means*	*STD*
1979–80 Migration	992	674.17	2,410.79
Organizational Structure*	32	465,841.28	537,809.77
Labor Market** (percent)	32	25.60	7.40
Income Inequality	32	0.94	1.02
Distance	992	1.01	0.64
Adjacency	992	1.13	0.33

* value in pesos per S.A.V.C. (corporations)
** service and support sectors.
*** 1000 KMs.

Distance and adjacency are included as control variables. Distance between origin and destination states is calculated by measuring the distance between centroids of the two states. Although it has been measured in slightly different ways, this variable is known to be a dominant or highly significant one in prior migration studies in Mexico and elsewhere (Lowry 1964; Rogers 1968; King 1978; Greenwood et al. 1981; Brown and Jones 1985). The adjacency index is a variable which has a value of one if sending and receiving states are adjacent, i.e., share a common border, and the value of zero if two states do not share a common border. The adjacency index is included because it is hypothesized that in many instances in Mexico there are socioeconomic or institutional reasons for state boundaries to affect migration. This hypothesis is based on a variety of results in several studies. For instance, a study of migration interchange between the Federal District and State of Mexico revealed distinctive differences in migration patterns in the two states due to adjacency (Van Arsdol et al. 1976). The adjacency index has not been utilized in this way in prior Mexican migration studies.

In sum, the structural model for interstate migration from an economic segmentation perspective is represented by the following nine structural variables: (1) interstate migration, (2) organizational structure at origin and destination (two variables), (3) service/support sectors of labor market at origin and destination (two variables), (4) income inequality at origin and destination (two variables), and (5) distance and adjacency as control variables (two variables).

We hypothesize that interstate migration will be the result of organizational differentiation at both destination and origin and will show a positive relation with destination's organizational growth and a negative relation at the origin. That is, organizational growth

in the destination pulls migrants while a lack of organizational growth at the origin acts as push. Labor market characteristics at both origin and destination are assumed to have a similar relation to migration, since the proportion of service/support sectors will have a positive relation with migration to the destination. Income inequality at destination is assumed to have a positive relation with interstate migration. For example, a large segment of service/tertiary occupations and a large gap between poor and rich at destination are hypothesized to increase the magnitude of interstate migration from origin to destination. At the origin, however, more extensive service occupations have a negative effect on migration since increased job opportunities can act as an inhibitor of interstate migration. Distance among states is assumed to have a negative relationship with interstate migration since it serves as an ecological obstacle to migration. Adjacency of states is assumed to have a positive relation with migration. The structural model for the economic segmentation thesis can alternatively be articulated in the following mathematical form for linear regression, or its generalized log-transformed form.[11]

In the present analysis of Mexico in 1980, the linear regression formulation is equivalent to the one-measurement representation of a multifactorial LISREL design (Joreskog and Sorbom 1985; Fukurai, Hanneman, and Butler 1986). Recalling that in linear regression, the least squares estimator of beta is $B = (X'X)^{-1} X'Y$, we proceed to derive the parameter estimates for the economic segmentation model.

Correlation coefficients among nine log-transformed variables are shown in Table 2.

There are several notable findings in the relationship among the nine log-transformed variables. First, the magnitude of correlation coefficients for the set of destination variables (i.e., organizational structure, labor market, and income inequality at destination) are greater than for the same set at origin, suggesting that pull factors of economic segmentation, labor market, and income inequality are more important than push factors. Second, the direct effect of distance is a major factor explaining interstate migration. Thus, our analysis supports previous research findings that distance among states is a major predictor of interstate migration ($r = -0.533$). Third, there is also a significant positive effect of adjacency, i.e.,

11. Weede (1980) points out the strong curvilinear relationship between economic development and inequality. Thus, the present analysis utilizing log-transformed variables is more suited to the examination of such relationships.

Figure 3 *Basic Structural Model for Economic Segmentation Thesis*

$$M_{ij} = k \left[\frac{EC_j}{EC_i} \cdot \frac{LM_j}{LM_i} \cdot \frac{IE_j}{IE_i} \cdot \frac{A_{ij}}{D_{ij}} \right] \varepsilon_{ij}$$

$M_{i,j}$ = number of migrants from i to j;
EC_i, EC_j = value of S.A.C.V. (corporations) in pesos per capita at i and j, respectively;
LM_i, LM_j = proportion of service and support occupations at i and j, respectively;
LE_i, IE_j = ratio of rich versus poor at i and j, respectively;
$D_{i,j}$ = distance between states i and j, respectively;
$A_{i,j}$ = adjacency index between states i and j, respectively; and
$E_{i,j}$ = error term.

We have the following generalized log-transformed model.

$$\ln M_{ij} = \beta_o + \beta_1 \ln EC_i + \beta_2 \ln EC_j + \beta_3 \ln LM_i + \beta_4 \ln LM_j + \beta_5 \ln IE_i + \beta_6 \ln IE_j + \beta_7 \ln A_{ij} + \beta_8 \ln D_{ij} + \varepsilon_{ij}$$

Thus, in matrix form, we have

$$y = X\beta + \varepsilon.$$

where

$$y_{m(m-1)\times 1} = \begin{bmatrix} \ln M_{12} \\ \ln M_{13} \\ \vdots \\ \ln M_{1m} \\ \hline \ln M_{21} \\ \vdots \\ \hline \ln M_{m1} \\ \vdots \\ \ln M_{m,m-1} \end{bmatrix} \quad \varepsilon_{m(m-1)\times 1} = \begin{bmatrix} \varepsilon_{12} \\ \varepsilon_{13} \\ \vdots \\ \varepsilon_{1m} \\ \hline \vdots \\ \hline \varepsilon_{m1} \\ \vdots \\ \varepsilon_{m,m-1} \end{bmatrix} \quad \beta_{9\times 1} = \begin{bmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \beta_5 \\ \beta_6 \\ \beta_7 \\ \beta_8 \end{bmatrix}$$

and

$$X_{m(m-1)\times 9} = \begin{bmatrix} 1 & \ln EC_1 & \ln EC_2 & \ln LM_1 & \ln LM_2 & \ln IE_1 & \ln IE_2 & \ln D_{12} & \ln A_{12} \\ 1 & \ln EC_1 & \ln EC_3 & \ln LM_1 & \ln LM_3 & \ln IE_1 & \ln IE_3 & \ln D_{13} & \ln A_{13} \\ \vdots & & & & & & & & \\ 1 & \ln EC_1 & \ln EC_m & \ln LM_1 & \ln LM_m & \ln IE_1 & \ln IE_m & \ln D_{1,m} & \ln A_{1,m} \\ \hline 1 & \ln EC_2 & \ln EC_1 & \ln LM_2 & \ln LM_1 & \ln IE_2 & \ln IE_1 & \ln D_{21} & \ln A_{21} \\ \vdots & & & & & & & & \\ \hline \vdots & & & & & & & & \\ \hline 1 & \ln EC_m & \ln EC_1 & \ln LM_m & \ln LM_1 & \ln IE_m & \ln IE_1 & \ln D_{m,1} & \ln A_{m,1} \\ \vdots & & & & & & & & \\ 1 & \ln EC_m & \ln EC_{m-1} & \ln LM_m & \ln LM_{m-1} & \ln IE_m & \ln IE_{m-1} & \ln D_{m,m-1} & \ln A_{m,m-1} \end{bmatrix}$$

where m-32.

Table 2 *Correlation Coefficients Among Nine Structural Variables**

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
1. Migrants		0.047	0.038	0.302	0.292	0.294	0.268	−0.217	0.289
2. ECi	0.020		−0.032	0.252	−0.008	0.321	−0.010	0.089	−0.058
3. ECj	0.065	−0.032		−0.008	0.252	−0.010	0.321	0.089	−0.058
4. LMi	0.071	0.373	−0.012		−0.032	0.975	−0.031	−0.129	0.030
5. LMj	0.157	−0.012	0.373	−0.032		−0.031	0.975	−0.129	0.030
6. IEi	0.157	0.458	−0.015	0.745	−0.024		−0.032	−0.095	0.002
7. IEj	0.222	−0.015	0.458	−0.024	0.745	−0.032		−0.095	0.002
8. Dij	−0.533	0.157	0.157	0.110	0.110	0.165	0.165		−0.419
9. Aij	0.487	−0.065	−0.065	−0.044	−0.044	−0.059	−0.059	−0.570	

* Correlation coefficients for raw values are shown above diagonal; correlation coefficients for log-transformed values are shown below diagonal.

neighboring states are likely the destinations of interstate migrants. This finding suggests migration patterns among adjacent states rather than cross-regional migration. Not surprisingly, adjacency has a strong inverse relationship with distance (r = −0.570).

Figure 4 shows the economic segmentation model with path coefficients generated from latent structural estimation. As pointed out earlier, these are identical to parameters estimated by a generalized least square approach.[12]

The variables for both adjacency and distance are included as control factors affecting interstate migration patterns.[13] Several findings from the causal model are noteworthy. First, the distance effect is the major factor in explaining interstate migration. Our analysis supports findings from other interstate migration studies that distance between states is a major factor explaining migration and is negative in direction (King 1978; Greenwood et al 1981; Brown and Jones 1985).

Second, there is also a significant positive effect of adjacency, i.e., neighboring states are the most likely destination of interstate migrants. This finding points to the presence of shorter-distance migration flows between adjacent groups of states beyond simple distance effects.

Third, organizational structure used as a proxy for intensive foreign capital investment or dependency has a significant positive effect upon the extent of service and support sectors. As other research has indicated, an intertwined relationship is observed between the magnitude of foreign finance penetration and the development of service occupations in the labor market (Evans and Timberlake 1980). Fourth, the size of service/support sectors significantly affects income inequality. This finding coincides with a plethora of previous research (for example, see Jakobson and Prakash 1971; Barnet and Muller 1975; Peattie 1975; Timberlake 1979; Evans and Timberlake 1980; Danesh 1985). At the same time, the organizational structure also has a significant effect in creating greater income inequality. For example, its direct effect on income inequality is 0.209 and the indirect effect is 0.249, i.e., organizational effects on income inequality which are intermediated through

12. Figure 4 shows the model, including path coefficients for allowable causal pathways among the latent structural variables. These coefficients were generated by the LISREL, utilizing maximum likelihood estimation.

13. Because of the generalized least square estimation, path coefficients among a set of six variables (i.e., economic segmentation, labor market, and income inequality) remain the same for both destination and origin of migrants. For further reference, see Joreskog 1985, Fukurai et al. 1986.

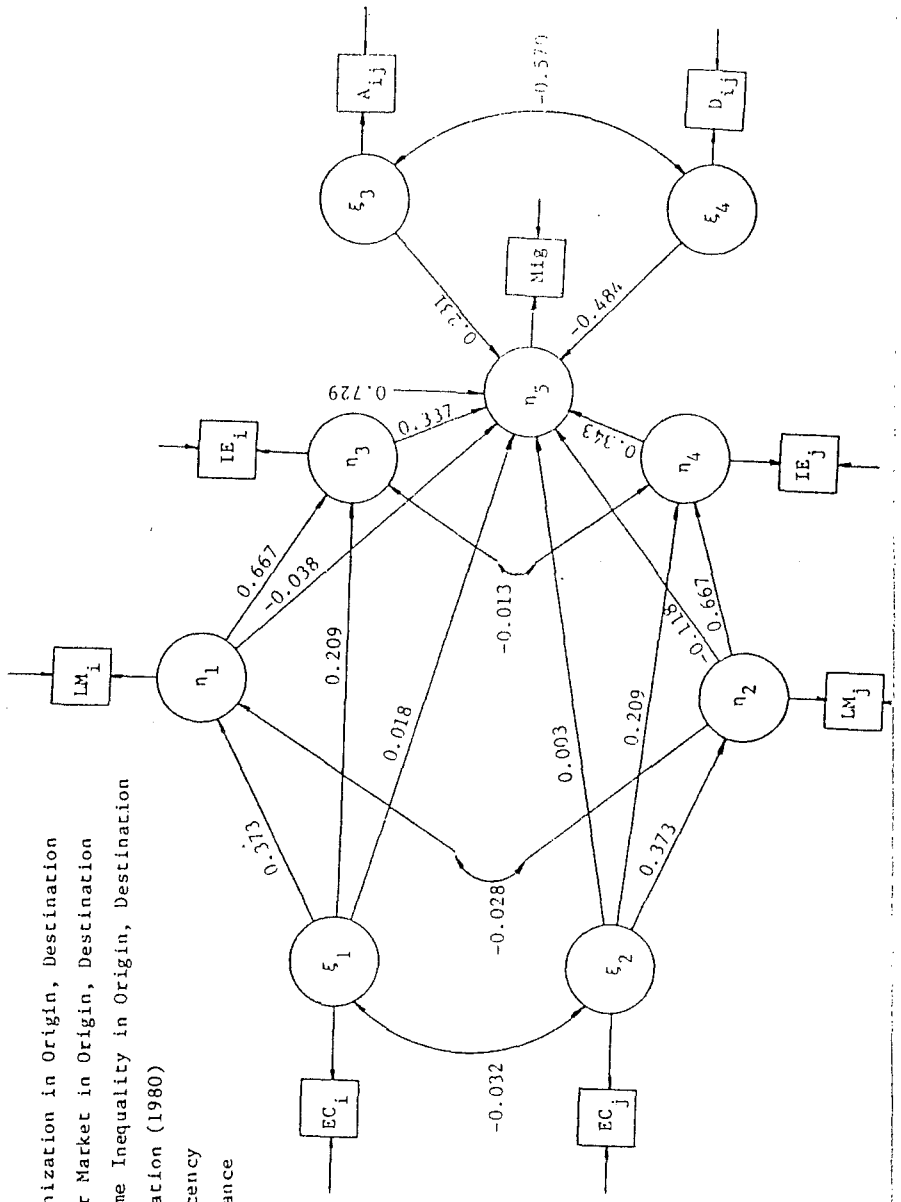


Figure 4 *LISREL Model for Economic Segmentation Thesis*

EC_i,EC_j: Organization in Origin, Destination
LM_i,LM_j: Labor Market in Origin, Destination
IE_i,IE_j: Income Inequality in Origin, Destination
Mig: Migration (1980)
A_{ij}: Adjacency
D_{ij}: Distance

labor markets. The indirect effect is computed by subtracting the direct effect (0.209) from the correlation coefficient (0.458) between organizational structure (EC) and income inequality (IE).

Fifth, the analysis shows that the level of income inequality in both sending and receiving states significantly affects interstate migration. Note that after controlling for organizational and labor market characteristics of destination and origin states, the magnitude of the effects of income inequality on interstate migration remains almost identical for both destination and origin states (0.337 and 0.343 respectively). This finding has not been previously noted in the Mexican migration literature. In contrast to King (1980), the inclusion of the minimum wage yielded insignificant results.

Table 3 shows the comparison of regression coefficients between the 1979–1980 and 1975–1979 migration patterns. As pointed out earlier, for the present model, the generalized least square estimations are equivalent to the iterative maximum likelihood estimations for LISREL. The relative importance of distance and adjacency remains the same. At the same time, the effect of labor market segmentation and growing income inequality at both origin and destination also remains relatively stable over five years. For both periods, more than fifty percent of the total variation of interstate migration patterns are explained by structural variables in the model. These findings suggest that economic segmentation variables are effective in accounting for the migration process irrespective of different time spans, and accentuate the significant contribution of the model's latent structural variables in explaining interstate migration patterns.

Table 4 shows the chi-square goodness-of-fit test of alternative economic segmentation models of interstate migration. Model (3) is further elaborated in this paper for the examination of an economic segmentation model.

The unconstrained model (1) shown in Figure 2 did not fit the data well. That is to say, there was a greater discrepancy between the observed covariance matrix and reproduced covariance matrix. Model (2), however, showed greater improvement toward the goodness-of-fit by allowing four exogenous latent variables (i.e., distance, adjacency, and organizational growth at both origin and destination) to be correlated with each other. Since we are not interested in the relationship among these four exogenous variables, such constraints were performed strictly for the sake of fitting a model to data. Model (3) has the constraint that the latent income inequality variables are equal. It explains 99.14 percent of total var-

Table 3 *Regression Coefficients in 1979–80 and 1975–79 Migration in Mexico*

Independent Variables	*Coefficients*			*Statistics Summary*
	b	*beta*	*T Value*	
	*Migration 1979–1980**			
ECi	0.035	0.019	0.730	
ECj	0.005	0.003	0.105	n = 992
LMi	−0.199	−0.039	−1.150	r = 0.709
LMj	−0.621	−0.122	−3.594**	r^2 = 0.502
IEi	0.593	0.348	9.796**	
IEj	0.604	0.354	9.971**	
Dij	−1.134	−0.499	−17.579**	
Aij	1.706	0.238	8.685**	
	Migration 1975–1979			
ECi	0.056	0.030	1.182	
ECj	−0.018	−0.010	−0.383	n = 992
LMi	−0.330	−0.064	−1.907	r = 0.709
LMj	−0.518	−0.101	−2.996**	r^2 = 0.502
IEi	0.658	0.385	10.870**	
IEj	0.531	0.310	8.762**	
Dij	−1.132	−0.496	−17.530**	
Aij	1.756	0.244	8.936**	

*Slight differences between beta coefficients and LISREL estimated coefficients shown in Figure 5 are due to the methodological differences of beta estimations, i.e., generalized least square estimations for the present table and iterative maximum likelihood estimations for LISREL.

**indicates that the variable is significant at the .05 level or better.

Table 4 *Chi-Square Goodness of Fit Test Economic Segmentation Model of Interstate Migration*

Model	*Degree of Freedom*	X^2	*P Level*	*RHO (%)*	*Delta (%)*
(1) Model in Figure 2	21	81.94	0.000	95.92	97.47
(2) Model with CORRs among Control VARs and Economic Segmentation VARs	17	27.98	0.045	99.09	99.14
(3) Model ($P_{3,4} = P_{4,5}$)	18	28.00	0.062	99.22	99.14
(4) Null Model	45	3243.43	0.000	—	—

iation of the chi-square value.[14] This model also allows a test of the impact of income inequality at both destination and origin on migration. The difference between Models (2) and (3) indicates that making the magnitude of pull and push income effects equal does not change the overall fit of the model, i.e., 0.01 with one degree of freedom. Thus, (1) organizational and labor market characteristics are prior factors equally affecting income inequality regardless of sending or receiving states of interregional migrants and (2) macrosocial factors cancel our origin and destination differences in income inequality. This finding further suggests that the critical examination of economic segmentation and labor market characteristics is equally important for both the sending and receiving states. Model (3) is selected for use in this paper because of its good fit and fewer constraints than Model (2).

The direct effects of income inequality on interstate migration are almost equal (0.337 and 0.343 for origin and destination) in contrast to different spurious effects of income inequality on migration (-0.180 and -0.121 for origin and destination). The different magnitude of negative spurious effects on migration has two types of implications. One is that the inclusion of organizational structure and labor market variables enhanced the effects of income inequality, e.g., zero-order correlation coefficients for income inequality with migration are 0.157 and .022 for origin and destination in contrast to the direct effect of 0.34 when other variables are included. That is, the inclusion of the two exogenous factors of organizations and labor markets enhances the model's ability to explain interstate migration patterns substantially more than income inequality alone. Another implication is that the extent of income inequality at origin influences migrants' decision to migrate more strongly than that of destination income inequality. That is, when economic segmentation is included in the analysis, the structural condition in origin (push factors) becomes relatively stronger than that of destination

14. Two indices, delta and rho, are calculated in the following equations.

$$\text{delta} = \frac{\text{Chi-square (null)} - \text{Chi-square (model)}}{\text{Chi-square (null)}}$$

$$\text{Rho} = \frac{\dfrac{\text{Chi-square (null)}}{\text{df (null)}} - \dfrac{\text{Chi-square (model)}}{\text{df (model)}}}{\dfrac{\text{Chi-square (null)}}{\text{df (null)}} - 1.0}$$

For further reference, see Bentler and Bonett (1980).

(pull factors) (i.e., -0.180 of origin as compared to destination's -0.121). This finding further points to *the importance of examining structural factors at interstate migrants' origin rather than only those at destination.*

With respect to the effect of income inequality on interstate migration, the economic opportunity thesis stresses the importance of an occupational reward system at destination by luring interstate migrants from origin states. However, when income inequality at both destination and origin is controlled for by organizational and labor market characteristics, the effect of income structures in pushing migrant labor becomes as important as the effect of pulling migrants from the origin state.

Lastly, the direct effect of organizational structure at both origin and destination has an insignificant effect upon migration after controlling for other variables (0.018 and 0.002 as opposed to .002 and .063 for indirect effects through other variables). At the same time, its effects are mediated through labor market characteristics and the level of income inequality in both migrant's origin and destination.

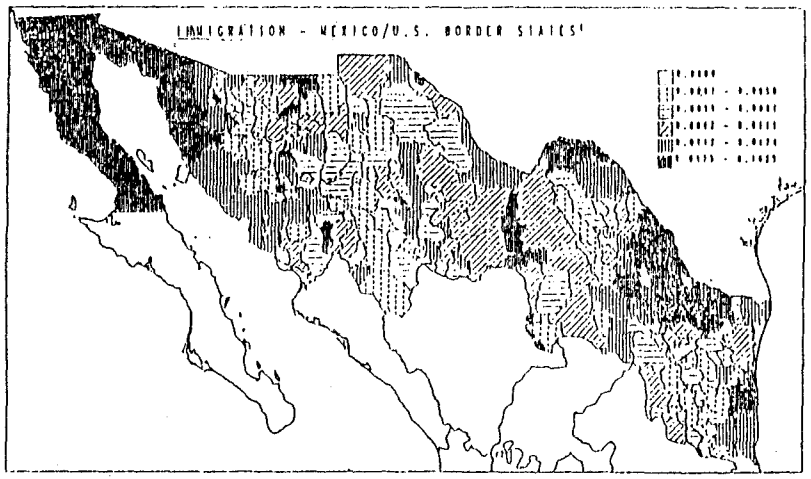
Residual Analysis

An economic segmentation model provides an empirical model explaining interstate migration patterns in Mexico. However, several shortcomings of the model need to be examined. First, our unit of analysis is at the state level, while migration can be captured at either regional levels (e.g., north western and west central regions in the Mexican World Fertility Survey of 1976–77), intraregional levels (e.g., *municipios* of respective states), or at the rural to urban levels. For example, Map 1 shows imigration ratios of six Mexico/U.S. border states at the municipio level (total number of immigrants divided by the total population of receiving municipios). The heterogeneous distribution of inmigration ratios clearly suggests that *migration patterns vary within states.*

There were 2,331 municipios in Mexico in 1980. While the analysis at the municipio level might be ideal, the large number of municipios poses methodological problems for the analysis of migration patterns at that level.

A second problem of our model is our assumption that organizational structure constitutes a proxy for the degree of foreign capital penetration. While past research and the present analysis substantiate the intertwined relationship between organizational growth and the proliferation of service/tertiary occupations which is closely tied to the degree of foreign capital dependence, the in-

Map 1 *Inmigration—Mexico/U.S. Border States*[1]



[1]Total Migrants/Total Population

clusion of such variables does not necessarily capture the effect of foreign capital penetration or degree of dependency.

One of the most effective ways to examine possible effects of other extraneous variables is to spatially display the residual of interstate migrants by controlling for various structural variables in the model, that is, unique migration patterns can be observed by examining the spatial distribution of unexplained residuals for migrants in each state. The residual distribution of Map 2 suggests two key findings. First, proximity to the U.S. border has no bearing on the residual variance, or rather the economic segmentation thesis tends to slightly underestimate interstate migration patterns (except Baja California Norte). While other research points to the importance of adjacent effects of border states on migration patterns, our structural variables explained away most of the variance. To be more specific, the economic segmentation model explained most of the variation of migrants to Coahuila (−3.74 to 2.49) or overestimated for Nuevo Leon (−19.70 to −4.72), while the model slightly underestimated migration to Sonora, Chihuahua, and Tamaulipas (2.63 to 7.47).

A second finding is the effect of possible foreign capital penetration upon certain states and the model's underestimation of their interstate migrants. For example, states adjacent to the Federal District are characterized by various foreign invested industries, including automobiles and other industrial products, many of which are influenced by multinational corporations. The spatial examination of residuals, thus, suggests separate influences of foreign capital dependency on organizational and labor market growth in Mexico. Further refinement of an economic segmentation model, therefore, requires the inclusion of variables for foreign dependency in order to allow an explanation of the more elaborate interstate migration patterns in Mexico.

Map 2 *Sum of Residuals*

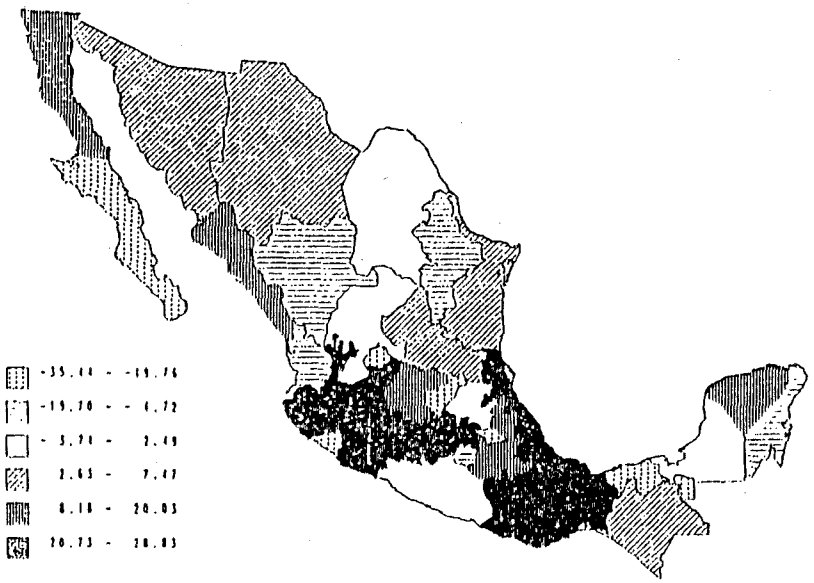


Table 5 presents the model's residual values for interstate migrants in the 32 states. Not only is there variation among states, but also there are migration differentials within states. For example, of six states with the largest positive residuals (i.e., the Federal District, Jalisco, Mexico, Michoacan, Oaxaca, and Veracruz), the economic segmentation model underestimated the migrants from Baja California Norte (2), Oaxaca (2), Sinaloa (1), and Mexico (1) and overestimated interstate migrants from Queretaro (3), Aguascalientes (2), and Morelos (1). Of five states with large negative residuals (i.e., Aguascalientes, Baja California Sur, Colima, Queretaro, and Tlaxcala), the economic segmentation model underestimated the migrants from Oaxaca (2), Federal District (1), Hidalgo (1), and Mexico (1), and overestimated interstate migrants from Tlaxcala (2), Baja California Sur (1), Jalisco (1), and Nayarit (1). The interstate variation among and within states suggests that extraneous variables other than dual sectors or labor market characteristics need to be incorporated in the model in order to present a more elaborate explanation of interstate migration in Mexico, such as, the intensity of foreign capital investment and its effect upon migration patterns or state-specific migration characteristics.

Table 5 *Economic Segmentation Model: Residuals of Interstate Migrants in Mexico, 1979–80*

Destination State	Mean	STD	Minimum	Maximum
1. Aguascalientes	−1.05	1.05	−3.28(3)*	0.65(15)*
2. Baja California Norte	0.49	1.38	−2.08(3)	2.98(14)
3. Baja California Sur	−0.92	1.19	−3.21(29)	1.26(20)
4. Campeche	−0.12	1.28	−2.90(2)	2.45(30)
5. Coahuila	0.03	0.88	−1.61(4)	1.33(24)
6. Colima	−0.98	1.16	−2.68(14)	2.85(13)
7. Chiapas	0.08	0.93	−1.66(3)	1.96(9)
8. Chihuahua	0.24	0.99	−1.97(23)	1.97(32)
9. Districto Federal	0.74	1.00	−1.44(17)	2.80(20)
10. Durango	−0.15	0.89	−2.31(18)	1.42(2)
11. Guanajuato	0.30	0.94	−1.77(22)	2.24(2)
12. Guerrero	0.04	0.76	−1.78(22)	1.41(30)
13. Hidalgo	−0.06	0.85	−2.43(22)	1.46(21)
14. Jalisco	0.85	0.99	−0.99(1)	3.17(2)
15. Mexico	0.92	1.03	−1.31(22)	3.41(20)
16. Michoacan	0.69	0.90	−1.13(22)	2.82(2)
17. Morelos	−0.62	0.89	−2.44(22)	1.18(12)
18. Nayarit	−0.46	1.28	−3.38(29)	2.32(2)
19. Nuevo Leon	−0.26	0.97	−2.05(3)	1.50(32)
20. Oaxaca	0.67	1.03	−1.47(1)	3.24(25)
21. Puebla	0.65	0.74	−0.92(17)	1.84(8)
22. Queretaro	−0.92	0.77	−2.30(29)	0.33(9)
23. Quintana Roo	−0.48	1.12	−2.32(1)	2.08(30)
24. San Luis Potosi	0.14	0.87	−1.74(22)	1.78(15)
25. Sinaloa	0.26	1.00	−1.31(22)	2.37(20)
26. Sonora	0.24	1.18	−3.27(29)	2.24(14)
27. Tabasco	−0.62	1.11	−4.01(3)	1.04(30)
28. Tamaulipas	0.12	1.05	−2.66(29)	1.87(30)
29. Tlaxcala	−1.14	0.89	−3.26(18)	0.27(20)
30. Veracruz	0.93	0.79	−0.82(22)	2.42(15)
31. Yucatan	0.30	1.12	−1.80(1)	2.34(30)
32. Zacatecas	0.08	1.18	−3.16(29)	1.97(15)

*The number in parentheses refers to the origin state with extreme residual values.

Conclusions

The economic segmentation model was examined utilizing generalized least square and maximum likelihood estimations. The analysis suggests that the economic segmentation model for 1979–80 Mexico interstate migration, which incorporates organizational and labor market characteristics, is superior to one based on the economic opportunity thesis. The effect of economic segmentation and dual labor markets has a significant impact upon the level of regional income inequality which then affects the magnitude of interstate migration. The direct effects of income inequality upon interstate migration, controlling for dual sectorial and labor market characteristics, are about equal for origin and destination.

The examination of effects of structural variables in the economic segmentation model on interstate migration shows the importance of push factors (i.e., organizational and occupational characteristics and an occupational reward system at origin). This finding points to the future importance of analyzing the effect of interstate inequality, its influence upon the flow of interstate migration, and the degree to which foreign capital penetration affects the infrastructure of destination and the effect on the infrastructure of sending states (Connell et al. 1976). Furthermore, the residual analysis of the economic segmentation model identified six largest residual states, which are characterized by heavy foreign capital investments, and suggested the possible independent processes between the degree of foreign capital dependence and dual economic and labor market growth.

The present study has proposed an economic segmentation model on interstate migration by incorporating the world system perspective, i.e., the change in infrastructural structures (i.e., organizational, occupational, and income inequality) in a less developed region and the relationship with world economy, e.g., foreign capital investment. A further examination of peripheral interstate migration patterns is necessary in Mexico in order to assess the extent of the model's reliability in explaining the patterns of interregional migration.

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