MEXICAN MIGRATION

Edited by

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Preface

This report represents the United States' portion of a binational project funded jointly by the National Science Foundation and Mexico's Consejo Nacional de Ciencia y Tecnologia.

The purpose of the project was to establish a comprehensive view of migration of Mexicans. We investigated the patterns of movement of migrants within Mexico (between states and regions) and between Mexico and the United States and the social and economic factors correlated with these movements which might assist in predicting future migrations. We restricted this phase of the project to analyses of previously collected data, placing highest priority on designing models and performing analyses based on information available from private and public agencies and census material. We focused on the following specific tasks:

1. A review of migration theory and hypothesis, and the compilation of an extensive bibliography on Mexican migration,
2. An analysis of trends in internal migration in Mexico,
3. An analysis of the movement of Mexicans to the United States,
4. The analysis of changes in economic sectors,
5. The exploration of indirect measures of intercensal population change, and
6. The development of a computer simulation model of migration.

This report summarizes the rationale for undertaking such a project, the theoretical underpinnings of our approach to the study of migration, the research tasks developed to meet the project objectives, and a preview of project results.

Seven collaborative meetings were held in Mexico City, San Francisco, and Tucson, to review the progress of the Mexican and the American teams, coordinate plans for future work, and exchange information. The Mexican research group divided into two teams. One team, lead by Fernando Camara, concentrated its efforts on a bibliographic search and analysis, collecting and abstracting over 400 items from libraries in Mexico City. Assistants filled out bibliographic computer forms for keypunching in Tucson. Since our bibliographic sources consisted mostly of literature in English, it was vital for similar work to be done on Spanish sources and literature only available in Mexico. The second Mexican team, headed by Margarita Nolasco, in addition to collecting and analyzing demographic data, also made important contacts with various Mexican research organizations regarding concurrent studies of migration in Mexico. Data analyses included a rank ordering of municipios which sent migrants to the United States, by birth and place of last residence, a list of municipios and states indicating the percentage of migrants who reach that municipio, a list of places where Mexican braceros preferred to go in 1972, and an analysis of migrant streams. Also, data was analyzed from two questionnaires which were given by Mexican officials to migrants returning to Mexico from the United States.

Because each team has unique advantages, it was expedient to work together in many areas. Our access to computer facilities and experience with computers was used in the analysis of the data. Simarily, the intimate understanding that the Mexicans have of their own country, its specific problems, the demographic situation, and their proximity to the data sources were utilized successfully. Another feature of our trips to Mexico was the opportunity presented for exchanging information on migration with other colleagues. Rodolfo Stavenhagen, Claudio Stern and Jorge Bustamante of the Colegio de Mexico felt that the annotated bibliography and migration hypotheses should be important early-project publications useful to other researchers. Giorgio Berni, Carlos Michelson Terry, and Asensio Carrion Serna of the Instituto Tecnologico de Monterrey described collaborative work with the University of Houston under a Tinker Foundation funded project.

We wish to thank our Mexican colleagues Fernando Camara Barbachano and Margarita Nolasco Armas for their cooperation, sharing of knowledge, hospitality, and general good will. They are producing reports and a bibliography which will

ultimately be integrated with our efforts. Different funding dates and other logistical problems precluded a closer integration of the reports at this time. The two teams have shared project reports, interim essays, and bibliography throughout the project and this is reflected in this report.

We also wish to thank the research team members working directly on the United States' portion. The authors of this report were obviously integral links in carrying out the study as conceived and directed by the two co-investigators. Our bibliography team was an important element in the research, running down and procuring sources just when they were needed. The cover design was adapted by Linda Mayro from Jorge Enciso, Sellos del Antiguo Mexico Mexico: Imprenta Policolor 1947.

The reports went through several drafts after the outline and ideas were discussed extensively with the co-investigators and edited by them. The final polishing and editing task would not have been nearly as good without the help of our veteran editorial consultant Carolyn Niethammer. We have learned to work with her and to take all of her comments and suggestions seriously. An often neglected, yet crucial part of any project is the office staff who answer phones, make travel arrangements, write letters, keep files, type reports, and numerous versions of "final" drafts of reports. Our head secretary, Grace Clark; our proof readers, Bette Stoddard, Teresa Brice, and Palma Bickford; and our typists Anne Spencer and Barbara Ketchum, all added their expertise to the production of the research and the report. Finally, because of her importance, we must single out for thanks the project secretary, Barbara Gigstad, whose attention to detail, typing skills, organization, and the good will she generated with all team members added to the success of the project. We also wish to thank Dr. Eduardo Fellers of the National Science Foundation, Drs. Jorge Vargas and Carlos Peña of the Consejo Nacional de Cienca y Tecnologia, and Dr. A.R. Kassander of the University of Arizona for courtesies extended in connection with the funding of the project.

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CHAPTER I

AN OVERVIEW OF MEXICAN MIGRATION

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The past, present, and future of Mexico and the United States are inescapably linked. Americans go to Mexico as tourists, to hunt and fish, and retire. They also import Mexican raw materials such as copper, coal, and oil, and foods and vegetables. By the same token, Mexico imports more manufactured goods from the United States than from any other country. Mexicans frequent San Francisco, Washington, New York, and border towns for recreation, shopping, and higher education. Drugs in the United States come chiefly from Mexico and such illicit merchandise as guns in Mexico are furnished by illicit merchants from the United States. A part of this complex relationship which has attracted widespread attention has been the hundreds of thousands of Mexicans who come to the United States, legally or illegally, to work in agriculture and industry. What explains this massive flow of humanity across an invisible line called the border? The answer to this question is complex, requiring an investigation which stretches beyond the border, deep into the interior of Mexico. The answer calls for comparison of the relative importance of people crossing the border to established and developing migrant streams within Mexico. The answer demands an understanding of migration theory, history, demography, and Mexican and United States culture. Above all, the answer requires an understanding of the movement of persons within Mexico and between Mexico and the United States.

During 1975, two research teams -- one from the United States, another from Mexico -- focused attention on the movement of Mexican people. They investigated the patterns of movement of people within Mexico (between states and regions) and between Mexico and the United States, looking for social and economic influences which might help to predict future migrations. A pilot project was designed to probe for information relating to migration and to explore several methods for predicting and estimating the movement of people. From the start, the approach was interdisciplinary, bringing economic, sociological, and anthropological perspectives into a traditionally demographic problem.

A survey of Mexican migration studies led the researchers to decide that they had to incorporate a new perspective if the results of their efforts were to help decision-makers in public and private sectors cope with the problems of migration. The findings of many migration studies are based on information collected in special one-time surveys, unique to the problem being investigated, or they are based on data gathered in censuses. Although these studies often contribute to our theoretical and general understanding of migration, they tend to become a dormant part of academic history rather than providing long range benefit to planning agencies. In contrast, this project attempted to overcome this problem by trying to incorporate information normally collected on a periodic basis by public and private agencies.

How the Study was Conducted

The research effort was divided about evenly between gathering information to help us understand the theory and fact behind Mexican migration and using this same theory and information for the construction of a computer simulation model. The construction of the computer simulation model depended heavily on the outcome of almost all phases of the project. The most obvious requirement was the data base gathered by various members of the research team in four areas: Mexican demography, internal migration in Mexico, migration from Mexico to the United States, and economic factors. One of the primary objectives of the review of the literature on migration was to search for hypotheses suitable for inclusion at various

operational stages in the computer simulation model. The use of hypotheses allowed for the incorporation of migration theory into the research design, and the identification of those areas which have been poorly explored in the literature. Clearly, the collection of data on past trends in internal migration of Mexicans was essential to the testing of hypotheses. A thorough analysis of internal Mexican migration required that accurate and reliable estimates of intercensal population be made for each state. Finally, estimation of population size through the use of indirect measures may be compared to estimates derived from the simulation model and other methods.

Review of Migration Literature

The review of previous research began with an extensive survey of the international literature in migration theory and narrowed to a more intensive search for patterns of the movement of Mexicans. The review of the literature in migration theory had the prospect of fulfilling three functions: (1) to increase the general knowledge of the research team by making abstracts, bibliography, and short reports available, (2) to serve as possible input for the simulation model, and (3) to form a library of hypotheses abstracted from empirical and theoretical studies with the idea that they could be tested in future research.

An overview of the very extensive literature in migration had to consider such previous reviews as those of Mangalam (1968), Mangalam and Schwarzweller (1968, 1970), Olsson (1965), Rogers (1965), and Lee (1969). Our review was organized into two main categories: qualitative research and quantitative models. Most of the work on migration by anthropologists fits into the qualitative end of the typology, that is, research which is concerned more with the quality of life, the feeling and humanistic elements rather than the quantitative or numerically representative aspects. The most important advances, however, seem to be by sociologists and demographers in the area of mathematical and simulation modeling, and these are summarized in Chapter II.

While acknowledging the breadth and scope of contributions to the descriptive study of migration by sociologists and the insight provided by their work on social problems, we found their attempts to come to grips with a theory of migration the most pertinent work for us. Lee complained in 1969 that little new ground had been broken in theory formation since the work of Ravenstein in 1885 and 1889 (1969: 283-284). However, even while wondering whether a theory of migration was possible, Lee was proposing another ordering of ideas about migration in line with Ravenstein's thinking. Meanwhile, others had been busy working with computers and statistics in the area of migration modeling. The most promising of these, perhaps, have followed directly on the work of Zipf (1946) and Stouffer (1940) on gravity or size-distance models. Especially important has been the use of multiple regression analysis which clearly built on the early work of gravity models. Here, researchers were more concerned with the attractive and repulsive characteristics of the areas of origin and destination. These are summarized in Chapter II along with contributions in the area of probabilistic modeling using Markov processes, and simulation models of the type attempted in the present study on Mexican migration.

Hypotheses were extracted and placed on forms along with test results, criticisms, and bibliography. It soon became apparent that this final task was enormous because of the many stated and implied hypotheses present in over 100 years of literature. Many hypotheses could be found both negatively and positively stated. Although much of this work was useful in connection with the computer simulation model, it was decided to abandon the goal of creating a library of hypotheses. An example of this was our detailed analysis of hypotheses related to selectivity differentials of age, sex, income, education, occupational sector, and rural-urban status among Mexican migrants. We used this analysis to establish migration potential curves for use in the computer simulation model. A review of this library of hypotheses revealed that relative age had a strong bearing on the movement of people. Hoover (1971:174-175), for example, proposes that "age remains the characteristic most distinctly associated with migration rate differentials." Lee (1969) in similar fashion suggests that "the heightened propensity to migrate at certain stages of the life-cycle is important in the selection of migrants." These hypotheses were tested and confirmed by empirical data on the age selectivity of Mexican migrants. A relationship was established wherein specific age-cohorts were given a fixed probability of migration and this became one criteria in the computer model of migration.

One of the by-products of our research has been a computerized bibliography, which consists of approximately 2,000 items. Material was initially collected through such standard reference bibliographies as the Reader's Guide, UNESCO publications, the Social Science and Humanities Index, Business Periodicals Index, and others. Bibliographic information was transcribed to computer coding sheets, selected items were abstracted, and all items assigned keywords for computer retrieval. A separate report will include the bibliography.

Internal Migration

The work on internal Mexican migration addresses two interrelated objectives: the delineation of the major migration streams within Mexico and the general relationship of these streams to various economic, political, social, and historical parameters. Briefly, this involved collecting census data, including in- and out-migration figures for each state for 1950, 1960, and 1970. In addition to providing information for comparison with the output of the computer model, the data on migration streams helped interpret the historical context of internal migration in Mexico.

Focusing primarily on the post-revolutionary period, for which we have better data, our review found high rates of out-migration from the more agricultural regions of Mexico into the more industrialized, urban centers of Mexico City and its adjacent areas, Monterrey, the border cities, and a few isolated pockets on the western coast. The overall pattern of Mexican internal migration is similar to that found in other rapidly developing countries. A few major urban areas begin to expand rapidly attracting thousands of migrants from the countryside. Mexico's situation is somewhat unique because of its proximity to the United States and policies of the Mexican government encouraging the settlement of its northern frontier.

The majority of internal Mexican migration is from rural to urban areas. Whetten and Burnight (1956) found that 88.7 percent of the interstate migrants between 1940 and 1950 were living in urban areas. However, their definition of "urban," which includes any community over 2500, masks many general patterns by including large agricultural communities in their sample. Furthermore, economic factors and the distribution of opportunities favor a rural to urban movement. The average monthly income of an urban family in 1968 was 1,706 pesos while the average rural family income was 738 pesos a month. But, it is not only in economy that the rural sector lags behind the national figures. The illiteracy rate in urban areas is 24 percent, whereas the corresponding rate for rural areas is 68 percent (Ducoff 1968).

In contrast to national perspective on migration, other scholars have taken a more microscopic view of the effect of migration on urban centers. Campbell (1969) found that Latin American cities act as integrative mechanisms to bring marginal settlements into the national social structure. However, he recognized the negative consequence of barrio formation for the lower classes, inhibiting their integration into the national structure. Few published studies pertain specifically to the history of migration in Mexico and few general theoretical statements apply to the overall Mexican situation. The studies that exist are either limited to specific areas (e.g. Monterrey) or time (e.g. for the period from 1950 to 1960). In what must be considered one of the most comprehensive surveys of Mexican internal migration, Browning, Jelin, and Feindt (1969) describe some selective factors which differentiate male migrants to Monterrey. This study provides one of the few detailed local glimpses of the national phenomena we are considering, although Muñoz, de Oliveira, and Stern (1971) conducted a study of 2500 households in Mexico City which supports the information obtained in the Monterrey study. On the basis of information given in the tables in Chapter III showing the flows of inter-state migrants, further analysis is in progress to determine the veracity of many of the migration hypotheses suggested in the review found in Chapter II. This data should prove also helpful to other investigators wishing to test their own hypotheses.

In retrospect, Chapter II could be strengthened by quantitative tests of the trends it purports to have found. Subsequent research will be concerned with conducting specific tests of internal migration hypotheses. Our work makes it

apparent that isolating causal and concomitant factors which influence migration may be exceedingly difficult. Migration not only responds to economic and social development differentials, it also creates certain conditions which have a feedback effect on subsequent migration. A migration of any proportion alters the area of origin, making it appear different to the next wave of migrants. Moreover, the economic dualism brought about by disproportionate rates of development has complicated the analysis of Mexico's internal migration. It appears likely that a different explanation will be needed for small scale rural-to-urban migration in traditional agrarian regions, like Chiapas and Oaxaca, in contrast to the more industrial urban economies such as in Monterrey and Mexico City.

Mexican Migration to the United States

An analysis of census and immigration data revealed new trends in the migration of Mexicans to the United States. First, there has been a large increase in the numbers of immigrants. Twenty-five percent of all legal entries to the United States have occurred during the time period from 1960 to 1974 alone. Secondly, the destination for many migrants in recent years has shifted away from the southwestern United States, where there has always been a large Mexican American population, to the rest of the country. Third, migrants to the United States are coming from more widely dispersed areas of Mexico.

In the southwestern United States, there were over five million people of Mexican or Spanish colonial origin in 1970, compared to 3.5 million in 1960 (Galarza, Gallegos, Samora 1970; United States Census 1969). During the same period, the Spanish surname population in the United States increased to almost 10 million. Grebler (1966) compares the relative significance of this migration to that from Canada and other Western Hemisphere countries showing that Mexicans are more numerous than either Canadian migrants or all other Western Hemisphere migrants combined (Table 1.1).

Table 1.1: Number of Immigrants from Western Hemisphere Countries, 1955-64[a]

Fiscal Year	Mexican	Canadian[b]	All Other	Total
1955	50,772	23,091	22,468	96,331
1956	65,047	29,533	31,683	126,263
1957	49,154	33,203	33,587	115,944
1958	26,712	30,055	35,060	91,827
1959	23,061	23,082	28,389	74,532
1960	32,684	30,990	34,449	98,123
1961	41,632	32,038	45,188	118,858
1962	55,291	30,377	53,150	138,818
1963	55,253	36,003	61,368	152,624
1964	32,967	38,074	73,034	144,075
Average 1955-64	43,257	30,645	41,838	115,740

[a]By country or region of birth
[b]Includes Newfoundland

Source: Grebler 1966.

The rapid development of the southwestern United States, especially in agriculture, mining, and industry, appears to be partially responsible for the attraction of low-cost labor from many parts of Mexico. The Mexican government's encouragement of development on the northern border and the United States - Mexico border industrial program are also factors in this movement. Other frequently suggested reasons for this continued high rate of Mexican migration have included

population pressure from within Mexico, a liberal United States immigration policy, and the secondary effects of Mexican Americans urging their relatives to join them.

Whatever the causes of the Mexico to United States migration, the resulting rapid growth of urban centers and border towns along both sides of the United States - Mexico border has generated a multitude of unique problems in the United States (Weaver and Downing 1975). Some of these problems are (1) a loss of human resources by Mexico, (2) the growth of the Mexican origin population in the United States, (3) the competition of migrant labor with Mexican American and other unskilled labor populations in the Southwest, and (4) the social and political impact of these factors on the native-born Mexican American population.

The large scale migration has also had an impact on the internal structure of Mexico. Some demographers have suggested that the high Mexico-to-United States migration of males might have potential disruptive social effects in parts of rural Mexico. The effects of returning migrants on the social and political atmosphere in Mexico are as yet undefined (Hancock, 1959). Some debate seems to have arisen over what might be the relative social and economic benefits of the massive influx of return migrants to Mexican cities and villages. Have they taken back innovations or money? What is their effect on the balance of payments? Have they become "politicized" in an alien culture? These are questions which need to be addressed in empirical studies.

However, the most sensitive problem concerns the phenomenon of illegal immigration. Many illegals are apprehended and returned to Mexico by the United States Border Patrol, but it is difficult to know how many remain in the United States undetected. A recent study by the Immigration and Naturalization Service indicates that nearly eight million Mexican illegals may be inside the United States borders, although official statements indicate far fewer.

There are also Mexican citizens who reside in Mexico and legally commute each day to work in the United States, called "green card holders" by United States officials. In 1960, commuters accounted for over 48,000 laborers in San Diego, Calexico, Nogales, Eagle Pass, El Paso, and Brownsville (Grebler 1966). From the viewpoint of some United States labor leaders, these migrants are in competition with the permanent migrants for the same jobs, require social services in the border town, and are a potential source of skilled or semi-skilled manpower transfer between countries.

Internal Mexican migration and Mexico-to-United States immigration are related by the shifting loci of the origin of the Mexico-to-United States migration. In 1930, 60 percent of migrants from Mexico came from the States of Michoacán, Guanajuato, Jalisco, and Nuevo León (Gamio 1930). In 1951, Saunders and Leonard indicated that 70 percent of the migrants came from the states indicated by Gamio and with the addition of San Luis Potosí. The latest estimate by Julian Samora (1971) is that 73 percent of the migrants are from all of the states mentioned previously plus Chihuahua, Durango, and Zacatecas. Thus, it would appear that the source of Mexico-to-United States migration has become more widely diffused. The reason for this diffusion has not been adequately explored, but is is anticipated that a continuation of the research on Mexican internal migration initiated in this project will assist in finding an explanation.

Finally, the contribution of Mexican immigration to the increase in the Mexican American population in the United States remains unclear especially since it is claimed that this population was undercounted in the 1970 United States Census. Equally nebulous are the reasons for the historical high rates of migration, the effect of changing "green-card" policies on illegal migration, and the effect of differential economic conditions within the United States and Mexico on all forms of international migration. One definite fact emerges from this glimpse of Mexican internal and Mexico-to-United States migration: the laws, decision, and policies independently promulgated by governments and private entities of either country influences the socioeconomic conditions of both countries and effect the movement of both populations. An artificial division and isolation of studies into Mexico's internal migration and Mexico-to-United States migration violates an attempt to understand the nature of these closely related phenomena.

Economy and Migration

Cauthorn and Hubbard performed a detailed analysis of the economic sector data from the 1960 and 1970 population census to determine the shifting importance of economic sectors and to ascertain the influence of these shifts on internal migration patterns. Like Wright (Chapter III), they assumed that states with the strongest development outside the agricultural sector would be those most likely to attract migrants.

Mexico has experienced an enormous decline in the size of its agricultural labor force: in 1960, agriculturalists comprised 51 out of every 100 members of the national labor force; by 1970, this proportion had declined to 29 out of every 100. In absolute terms, this represents a loss of almost a million agricultural workers in the decade. When coupled with the fact that many people entering the labor force during this time were from farm families and rural areas, it can be seen that this displaced sector is the source of much internal migration and expansion in the non-agricultural sectors. However, this has not meant a decline in agricultural production, rather it represents a wider gap between the dual sectors of Mexico's agriculture: one based on commercial, mechanized agriculture with production for export outside the local region and the other based on subsistence level agriculture where export is of limited importance. Most of the nations' agricultural workers were confined to only a few states: Veracruz, Puebla, Oaxaca, Michoacán, Jalisco, México, Chiapas, and Guanajuato. Evidence from this data and others (Browning and Fiendt, 1969; Barkin, 1971) suggests that ex-agriculturists make up a large proportion of the populations in migrant streams. They also note that an exodus from the agricultural sector was less frequent in states with commercialized agriculture than in more subsistence-oriented agricultural states. They suggest that the agricultural states will continue to contribute heavily as sources of out-migrants during the seventies.

Dualism also is apparent in the manufacturing sector, where a sharp contrast occurs between states with medium and large scale firms and those with extremely small, often single-family manufacturing firms. Our findings show that states which were dominant in attracting in-migrants such as Nuevo León and the Federal District, seem to be undergoing a saturation effect, with the rate of growth in manufacturing, construction, and other sector activities decreasing relative to other states in Mexico. Subsequently, areas adjacent to these traditional magnets of migration are experiencing some of the same high rates of in-migration previously characteristic of the Federal District. Combining observations on the agriculture, manufacturing and construction sectors with that of the services sector, Cauthorn and Hubbard conclude that six states show economic conditions which are highly attractive to in-migrants: Baja California, Jalisco, México, Morelos, Guerrero, and Sinaloa. Five other states show the necessary economic diversity and infrastructure which may stimulate an economic take-off and a corresponding attraction to migrants. They are Guerrero, Guanajuato, Michoacán, Puebla, and Veracruz. In contrast, the Federal District, Nuevo León, Oaxaca, Chiapas, Tlaxcala, San Luis Potosí, and Aguascalientes appear to be likely sources for out-migration. The first two states appear to be reaching an equilibrium following accelerated growth since 1930, while the latter states are primarily agrarian, lacking the economic diversity necessary for sustained economic growth.

The Cauthorn-Hubbard study is a tantalizing prelude, whose results suggest the potential benefits which could come from a more complicated analysis. If the same type of sector analysis could be performed for smaller geographic units, such as Mexico's 107 economic regions, we could achieve an even more detailed estimation and projection of the importance of economic factors on migration. Likewise, the discovery of the enormous increase in the "insufficient" data category between the 1960 and 1970 censuses merits further consideration. This puzzling pattern suggests that a considerable proportion of the Mexican population may be undergoing shifts between economic sectors. Sector shifting can be considered an alternative to inter-state migration. It may be the case that many Mexicans prefer to shift sectors, thus changing their source of livelihood, rather than migrate. We desperately need further information on this phenomena, since, if this is the case, it would require a serious revision of the current views on internal migration in a dualistic, developing economy.

Migration Estimation and Projection

The estimation of migration refers to the analysis of the results of the movement of people in a previous time period. Projection, in contrast, refers to a justified guess of migration for a population beyond a known set of data. Estimation is commonly accomplished by three or more techniques (Bogue 1969:579). First, the vital statistics method consists of incrementing a known population by the number of births occurring over a time period and then subtracting the number of deaths. The resulting difference between this figure and the observed population at the end of the time period is the estimated net in- or out-migration. The vital statistics method is inappropriate for making projections. It requires not only apportionment of births, deaths, and population among the subregions, but also a battery of assumptions on inter-regional migration. For this reason, it is seldom used for migration projections. The survival ratio method estimates net migration, but fails to assist in migration projection. This method is based on calculating how many people in an age cohort will be alive at the end of the next census period. It then takes the difference between the expected number of survivors and the actual population observed in the second census and assumes this difference is the net migration. A more direct method of estimation is based on place of residence in a decimal census or sample survey. This method, like the vital statistics and survival ratio methods, provides useful estimates of previous migrations. Responses to residence questions may be used for projection if many assumptions are made concerning population change. The most objectional of these assumptions is that the conditions and factors influencing past migrations will not change in the future. Another method used in the United States is periodic, intercensal sample surveys. Mexico does not have anything analogous to the Current Population Survey used by the United States to estimate the general patterns of mobility.

Most of the previous literature on Mexican migration focuses on estimation of previous migrations, not on projection (Whetten and Burnight, 1956). Projections of internal migration by the Mexican Census Bureau, however, make it obvious that the current techniques are inadequate. To complicate matters further, it has long been apparent that migration patterns are not constant flows between specific regions, but are subject to periodic change in volume and composition. It thus becomes important to discover a projection method which is more closely related to exogenous variables already known to influence migration. Given the situation in Mexico where (1) intercensal sample surveys of migration are not conducted, (2) the social and economic conditions influencing migration are changing at an accelerated pace, and (3) projections based on vital statistics, survival ratio, or place of residence can not be relied upon because of the rapidly changing character of Mexico's migration; we felt that some alternative estimation and projection techniques werenecessary.

Estimating Intercensal Population

Intercensal population estimates may be made by using symptomatic variables or social indicators as proxies for population counts. This method is based on the assumption that changes in population are indirectly reflected in the utilization rate of certain goods and services. If the ratio of the utilization of goods or services to the population is known, a crude approximation may be made of the size of the population demanding the particular goods or services. We argue that by using annual vital statistics in combination with many of these symptomatic variables, it should be possible to project the size of the net migration into or out of the area.

The Bureau project explored this technique by testing the usefulness of numerous potential indicators. The vast majority of these proved too insensitive to indicate population changes. Less than a dozen were finally chosen as relatively sensitive indicators of population changes. It was clear from the onset of this work that no single indicator would suffice to make population estimates with precision. Instead, a group of indicators was used in a composite index. It was also apparent that, given the extreme regional variance in the relationship between indicators and population in Mexico, each state would have to be considered independently.

Calculations of the ratio of each of 23 indicators to the population in each state for 1960 and 1970 have been made. In almost all cases, the per capita consumption rates have tended to increase over time, so the selection of indicators

must involve choosing indicators that increase with population at a rate close to the national rate of increase. An indicator's value in population estimation is inversely proportional to the difference between state and national consumption change. Each indicator for each state was weighted on a scale of zero to five. From here, algorithms were formulated to transform indicators into population estimates for each state for the intercensal years between 1960 and 1974.

The application of such a method requires caution, since rates of consumption may change in response to increased demand, thereby not necessarily reflecting an increased population. The method was tested by adjusting the per capita consumption rates by the observed shift in demand over a ten-year period. Furthermore, we noted regional differences in the correspondence of an indicator series to population changes; some indicators worked in some states, but not in others. Consequently, a set of indicators were selected for each state. The necessity of refining the indicator sets to regional differences and aligning the indicators to known changes in population required the use of both 1960 and 1970 population figures.

Subsequently, an independent test of the methodology's accuracy, compared to the component and assumed rate of growth method, proved impossible. We hope to use this method to make a population projection for the intercensal period from 1970 to 1980 and a 1980 projection for each state. The 1980 census will show the relative worth of this approach. A more serious short coming of this work is immediately apparent; we did not develop a symptomatic indicator series for estimating net migration. This required additional investigations for which we had neither time nor money.

A Computer Simulation Model

Another method for making migration projections and estimates involves building an analogue model of Mexican migration in a computer. This model, known as a simulation, is designed to project the rates of internal migration given certain expected economic developments. In reality, it consists of a when-to-migrate set of decisions which are performed by groups sharing common characteristics, such as age, sex, urban or rural residence, income, and education. Previous studies have shown the migration potential of a group is strongly dependent on these selected characteristics as well as on the socioeconomic conditions of the place of origin and destination.

The approach used in the computer simulation model is fundamentally different from the traditional multivariant regression approach which uses migration rates as dependent variables and attempts to correlate them to relevant characteristics of the population and area under study. Regression analysis employs hypotheses about migration in the selection of the variables to be included in the equations. Regression analysis is essentially a curve fitting method which imposes the limitation that predicted rates are based on regression coefficients calculated from previous movements of the population. Therefore, it is very difficult to incorporate rapid new changes in economic or social conditions into the projection or estimation of migration rates.

In contrast, the simulation model, using migration rates established by empirical studies, allows populations and regions to be assigned specific characteristics, such as a particular labor force distribution, income distribution, housing availability, sex, and age structure. Then, by establishing the differential migration potential of people and the ability of regions to attract and repel migrants, the simulation model moves population groups between different regions. The program was designed to allow instantaneous changes in the socioeconomic and population characteristics of a region by specifying the relative importance of characteristics which influence migration. The model can produce migration streams and rates as a sum of many previous movements of population groups by simulating these rates and movements. The advantages to this approach are numerous: local geographic effects can be included in a fairly realistic way; the results of related research may be readily incorporated, and the characteristics of the population and area under study can be varied according to known or anticipated changes through time. Moreover, this technology is readily transferable to the study of migration in another nation.

To accomplish this computer task required considerable team effort including a survey of the literature, reformulation of statements and theories on migration into mathematical format, and design of an on-line computer model that would permit rapid experimentation and manipulation of its assumptions and input data. To forestall technical difficulties in this complex task, a simplified or mock-up model was developed early in the project. Experimentation and study of this early model allowed us to determine basic structural problems, data requirements, and technical computer programming problems that would face the final computer model. Weeks were spent debugging, coding, collecting data, and preparing the model for the initial test runs. Next, the mock-up model was transformed into a data-based computer program capable of simulating migration in Mexico. After the data had been placed into the program, several algorithms for calculating migration potential, destination criteria, and border crossings were evaluated. A solution is being developed experimentally by aligning the model to duplicate the 1960-70 interstate migration streams.

The most powerful use of this model will be its experimental potentials, that is, it will be possible to test different migration hypotheses and theories against the Mexican data and the simulation program. Unfortunately, time and research funds have allowed only limited exploration of this potential. It should be stressed that the resulting model is a macro-theory of migration, representing a synthesis of all that is known, hypothesized or suspected about migration between Mexico and the United States.

Summary

The increased mobility of man is a theme of the twentieth century. Development is characterized, if not defined, by urbanization and industrialization, both of which are forces related to increased mobility in Western European development. Vance Packard has observed that this mobility has brought about major social changes, leading him to proclaim the United States a "nation of strangers." Could it be that Mexico will also soon deserve this epitaph? Undoubtedly, many people migrate for economic reasons and the demographic measures designed to study national migration do not lend themselves to the inclusion of some of those cultural dimensions of the problem that are non-quantifiable. Our work has demonstrated that Mexico may not be cast into the same mold used to explain migration in the United States. We found indications that the study of migration could benefit from a closer examination of its social and cultural context.

This project had modest, although important goals. Basically, we wanted to become more familiar with the many varied contributions to the study of migration and try to create an experimental computer simulation model. In accomplishing this, we completed:

(1) a survey of the theoretical literature,

(2) a review and contributions in estimation and projection,

(3) a summary of data on internal migration, Mexico-to-United States migration, economy and migration, and simulation models.

(4) research on economic sector activity for each state, and

(5) a simulation model of migration.

The tangible results of this project include the present summary report, and a computerized bibliography on Mexican migration.

CHAPTER II

EXPLANATIONS AND THEORIES OF MIGRATION

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AND

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Human migration is one of the major forces reshaping the world's economies and social institutions. The redistribution of people in the developing nations is having a profound effect on regional development, on the institution of the family, on the social-psychological development of the individual, and ultimately on national policy-making. It is therefore practical that we seek a broader understanding of human migration in all of its aspects. This paper presents no new theory of human migration; rather, it is a compendium of the work of others, an attempt to summarize a number of different contributions in migration research.

The collection and evaluation of hypotheses about migratory behavior was undertaken with two purposes in mind: (1) to gain a fundamental awareness of assumed regularities in migrant behavior in order to construct and calibrate a computer simulation model of internal migration in Mexico, and (2) to aid in an increased understanding of migration in general. Approximately nine months were spent reviewing several hundred articles and books in a wide variety of fields -- anthropology, sociology, history, demography, geography, economics, psychology, and political science -- abstracting hypotheses at every level of generality, from simple relational statements to formal mathematical equations. Taken from their original context in the literature, the hypotheses often are not meaningful or, worse, contradictory. The task of testing each abstracted hypothesis proved nearly impossible and so that endeavor was postponed. Hypothesis collecting enabled us to reduce the diversity in the literature to manageable proportions. It is clear at this point that the computer simulation model developed by the Mexican Migration Project team stands on at least 35 years of research by other scientists. While in some instances we accidently re-invented concepts and procedures already reported in the literature, our work appears to be in the mainstream of migration research.

The following summary is organized into two main subdivisions: qualitative research and quantitative models. The first part considers the non-quantitative contributions to the study of migration, mostly from anthropology, demography, and sociology. The second part explores two different sets of studies under quantitative models, one relating to differential aspects of migration and the second to explanatory models.

Any attempt to summarize or review the extensive literature on migration in the social sciences would be presumptuous. Mangalam's (1968) bibliography, for example, contains 2,051 entries of which 385 are annotated. Contributions in demography, sociology, psychology, and other related fields are voluminous and varied. Chief among the reviews or partial reviews of the literature on migration have been those of Bogue (1969), Gade (1970), Olsson (1965), Mangalam (1968), and Mangalam and Schwarzweller (1968, 1970), Bunge (1969), Rogers (1965), and Lee (1969). These sources have helped set the basic parameters of our discussion, but we have modified and incorporated to suit the needs of the project.

Definition of Migration

As in any field which has been worked by a variety of disciplines, migration has been defined in many different ways. Some restrict the term to permanent movement (Weinberg, 1961); others restrict it to the movement of individuals and not groups (Thomlinson, 1962). Some incorporate psychological, economic, social, or distance variables in their definition (Thomas, 1959). Demographers generally distinguish between local movement (not migration), internal migration (within national boundaries), and international migration (between nations) (Bogue, 1969).

Lee has defined migration more generally as: "a permanent or semi-permanent change of residence. No restriction is placed on the distance of the move or upon the voluntary or involuntary nature of the act, and no distinction is made between external and internal migration" (1969:285). However, Lee excludes from this broad consideration some types of spatial mobility, such as temporary moves such as vacation trips, and the continual movements of nomads and migratory workers, for whom there is no long-term residence. Most sociologists would also exclude social mobility and micro-temporal and micro-spatial moves such as visiting. Social mobility, in the sociological and anthropological sense, does not generally refer to physical movement, but rather to social movement: a person moves from a lower socioeconomic class to a higher or from a higher to a lower class. The physical movement of people is migration; the social movement of people is social mobility.

This brings us to the center of our theoretical problem. We believe that previous workers have overly narrowed their theoretical perspective in the study of migration. For this reason, we prefer to use the term geographic mobility to refer to the movement of people in space for whatever reason and without consideration for the length of time or distance involved. The rationale behind this is that migration, a permanent or semi-permanent change of residence, is a part of the total continuum of a behavior which is at one end a state of complete stasis and at the other, continual movement. We would, of course, include social mobility, because one of its concomitants is physical movement; change in status, whether up or down, generally involves a change in residence. Likewise, we would not restrict the study of geographic mobility by the political boundaries of nation, state, or city. Thus, internal and international migrations are included in the purview of the inclusive term suggested here. Psychological or motivational concomitants, before or after migration, and economic factors are dependent variables to be related empirically to geographic mobility, and are not part of the definition.

In summary, if geographic mobility is taken to refer to the movement of people in space, and if we are interested in assessing its social and cultural concomitants, then our model must be expanded to include social variables, such as social mobility, and micro-movements, such as visiting and hosting, for it is during these latter activities that information about geographic mobility is exchanged. The definition of migration is purposefully conceived broadly to help comprehend the wide range of migration phenomenon under a holistic framework.

Qualitative Studies

Sociological Perspectives

Because the qualitative contributions of sociologists are extensive and have been well-reported elsewhere, we touch only briefly on this work. The rich body of literature in sociology and related fields includes, among other topics, international migration, internal migration, immigration to the United States, migration in developing countries, regional flows, urban-rural migration, migration incentives (social and psychological), differential migration, characteristics of origin and destination points, selectivity characteristics of migrants (including studies of age, sex, education, occupation, income, marital status, social class, race, and mental health characteristics), assimilation and acculturation, social mobility, social and economic adjustment, internal population growth, relationship to business and economic cycles, longitudinal (cohort) migration, and studies of vital statistical records (see Bogue, 1969; Mangalam, 1968; Jackson, 1969).

Attempts to constrain all of the foregoing research into one unified theoretical package have met with general failure. This shortcoming has been noted by Jackson:

> The amount of empirical evidence available in the field of migration is enormous and the range and coverage of the statistical data is constantly improving. In spite of this, . . . there has been only a relatively slight attempt to order the confusion with the development of theoretical propositions and models which would lend both elegance and understanding to this large and important subject.
>
> (Jackson, 1969:6)

Jackson's disappointment over the lack of order in migration research is shared by Mangalam and Schwarzweller (1968:3) who also cite the need for a sociological theory of migration "systematic in its approach and relevant to the concerns of behavioral scientists." Much of their interest lies in the creation of a model of individual motivations similar to that proposed in an earlier work by Thomas and Znaniecki (1927). Consequently, Mangalam and Schwarzweller want to consider as migration variables the attitudes and aspirations of migrants, elements of community identification, and other social and psychological factors. In a second article (1970), Mangalam and Schwarzweller return to the same thesis by emphasizing redefinitions of migrants, the migratory process, and decision-making. They opt for a new model linking systems of social organization at places of origin and destination.

While not in themselves theories of migration, typologies have a bearing on model building. It is conventional, for example, to divide migration study between international migration (the movement of people between nations) and internal migration (the movement of people within nations). Although this separation in some senses represents nothing more than a scalar difference rather than a qualitative one (see Bogue 1969 for a discussion and comparison of international and internal migration), it nevertheless persists in the literature. Fairchild (1925), Davis (1949), Heberle (1955), and Peterson (1958) have all developed classificatory schemes for international migration. These include such phenomena as forced and free migration, invasion and colonization, and purposeful and wandering migration. Typologies of internal migration, on the other hand, are included in Gupta (1959) and Kant (1962) and encompass such phenomena as localized and interregional migration, rural-urban and urban-urban migration.

An interesting, but seemingly unique attempt to develop a descriptive model of migration based on the conceptual framework of general systems theory is found in Mabogunje (1970). In describing the nature of rural-urban migration in the developing world -- in particular, Africa -- the author ties the phenomenon to a flow apparatus of institutional sub-systems and social economic adjustment mechanisms. The individual decision to migrate is framed in light of various flow regulators such as the family, the village community, inheritance laws, and the partibility of land. The choice of destination is further regulated by urban administrative policies and employment agencies. Although Mabogunje's scheme is laudable for its holistic overview, it remains a static model. The flow diagram is useful as a visual display of a mass of data. However, in itself it does not constitute a theory, since it neither supplies explanations or predictions of migratory flux, nor can it deal with structural growth in the system.

Although as yet sociology has offered no wide-ranging qualitative theory there is, of course, the possibility that such a model of migration can be constructed -- one that critically examines the role of individual motivations as filtered through a screen of kinship and other social obligations. MacDonald and MacDonald (1964) and Johansen (1967) have already given us leads in this area. However, these efforts appear to be isolated from the mainstream of sociological research which is moving in the direction of quantitative models of migration.

Anthropological Perspectives

In contrast to the large amount of sociological work in migration, the corresponding efforts of anthropologists have been meager. Immigrant ethnic populations in the United States, for example, were represented by only "twenty-odd titles" in 1955 when Spiro surveyed the literature. Although this situation has improved somewhat in recent years following Lewis' examination of the "culture of poverty" and increased interest in urban anthropology (Weaver and White 1972), anthropologists have lagged behind sociologists in their ability to handle statistical and demographic data and methods. However, research in recent years has begun to close the gap.

Until the 1940's cultural anthropologists restricted their interest in migration to descriptive studies of the movements of peasant and primitive groups over a specific region. They included the study of nomadic groups, swidden agriculturalists and the prehistoric movements of peoples as they explored and populated different regions of the world. With the rise of acculturation as a

topic of investigation, anthropologists began to focus on problems of concern to the present study. The outstanding contributions have been in urbanization, labor migration, urban adjustment, squatter settlement, and kinship.

Gonzales (1961, 1969) examines family organization and labor migration, producing a typology of migratory labor which includes the following categories: seasonal, temporary (non-seasonal), recurrent, continuous, and permanent removal. She correlates these with familial organization and stability, behavior of kin members, and acculturation, in a cross-cultural sample. Time, distance, occupational base, and permanency seem to be the major criteria which underlie her typology. Migrant labor has received attention from a few other Americans (Goldschmidt, 1947; Dobyns, 1950; Padilla Seda, 1957), but considerably more from the British anthropologists (Mitchell, 1956; Gulliver, 1957, 1960).

Mayer (1962) indicates the necessity for studying migrants in their place of origin as well as in the place of settlement in order to provide a clear understanding of the process of migrancy. For the migrant moving from rural to urban areas, these two systems comprise a field of action, which Mayer argues should not be studied without consideration for the unitary social system. Mayer raises the methodological point that the easiest and most practical place to begin the study of migrants is in town, because of the availability of different groups and the denser concentration of migrants compared with the rural areas. Three models are suggested by Mayer which variously characterize the impact of town life on migrants. The first, an "alternation" model, sees the migrant moving between town and rural roles. This may correspond to physical moves from hinterland to town and back or it may be triggered by changing social contexts within daily life cycles. A second, more culturally oriented model of one-way assimilation, focuses on the cumulative change of the rural migrant as he develops into an urban proletariat, "along a one-way track starting from the tribal condition as zero point and ending with complete detribalization" (Mayer, 1962:579). A third model of the alternation type emphasizes the importance of situations which involve the individual in differing sets of relations and require that he enact urban or rural roles accordingly.

Two related areas of anthropological study have dealt with migrants in cities: voluntary associations and squatter settlements. Voluntary associations are viewed as mechanisms of adaptation in the city (Little, 1957, 1962) and as ways of channeling aid to the community of origin (Doughty, 1970; Mangin, 1967, 1970). Migration has also received attention, although sometimes tangentially, in the contributions to acculturation and urbanization studies, and particularly in the rapidly growing volume of studies of the adjustment of American Indians to urban environments (Martin, 1964; Ablon, 1964; Hurt, 1961; Price, 1968; Waddell and Watson, 1971; Hirabayashi et al, 1972). Martin examines the adjustment of three groups using the variables of years of schooling, military experience, prior arrests, tribal identification, and degree of Indian genetic inheritance. Hackenberg and Wilson (1969) describe a pattern of movement over time and examine social and economic mobility in a study of Papago Indians. Graves (1970) reports on Navajo migrants to Denver and focuses on problem drinking as a gauge of non-adjustment. Lewis (1952) and Butterworth (1962) relate the patterns of change in post-migration life style to those of the pre-migration culture. Fried (1959) is one of the few anthropologists who has studied problems of mental health related to migration.

Kinship has long been one of the major concerns of the anthropologist. Three studies are selected as representing the concern for its relationship to geographic mobility (Piddington, 1965; Whitten, 1969; Aiken and Goldberg, 1969). Most of the papers in the book edited by Piddington examine the processes of urbanization and migration and their effects on kinship ties. Recent studies by Whitten (1969) and Aiken and Goldberg (1969) demonstrate the interplay between family organization and social geographic mobility. Whitten uses a developmental cycle model to demonstrate how kinsmen work within the bilateral kindred or extended family to facilitate mobility for themselves or their families. Aiken and Goldberg demonstrate the relationship between visiting patterns, social and spatial mobility, and religious affiliation in middle- and lower-class Detroit families.

Decision-Making

Although not limited to anthropologists, decision-making studies have been used to discover and describe information sharing networks in migratory behavior. These studies have been concerned with such questions as: How do people find out about migration opportunities? Who is involved in this information-sharing network? On what social occasions does sharing of information occur? Are these networks associated with specific migration locations? Are the networks related to formal as well as informal institutions? How rapid is the flow of information along such networks? These studies are also concerned with the social and cultural aspects of information sharing, with family structure, with economic choices available before migration, and with political organization.

In the case of migration, we must account for individual decision-making, although we may expect to find people moving as aggregates. Southhall (1961) in examining the relationship between a network analysis of personal relationships and a formal economic analysis of individual options, concludes that both analyses are necessary:

> The former analysis permits one to describe the existing parameters within which choices are made, and only on the basis of such a description can one analyse (sic) quantitatively what factors affect choices. Before being able to predict the effect of changing parameters one must also proceed to the level of analysing (sic) individual choice options, but the predictions one makes can only be put into specific descriptive form if one knows the nature of existing networks. While network analysis alone may remain descriptive and provide only post facto explanations, without network analysis a formal economic analysis is not possible; both analyses, when combined, yield a balanced picture of the dynamics of migrant urban behavior.
>
> (Southhall, 1961:25)

In an analysis of the decision-making process among migrants, we want to know what kinds of economic choices are available to the migrant at the time he decides to migrate, who is more likely to migrate, why do they migrate, who returns, why do they return. An analysis of personal economic strategies not only throws light on the dynamics of migratory behavior, but also allows the prediction of migratory behavior in situations of change, such as the decline in the availability of unskilled labor, changes in wage scales, and other broad societal changes such as caused by changes in national policies.

The value of combining network analysis with investigation of decision-making is further established by Richard and Mary Salisbury (1972) in a study of the migration of Dene-speaking villagers to Port Moresby, New Guinea. Network analysis was used to identify the information network among migrants; a decision-making approach was used for studying the substantive element of the problem. The qualitative aspect of the information network was determined by questioning migrants as to why they moved to Port Moresby, what they expected to gain, and what kinds of alternative choices they had before they came to Port Moresby. The conclusion was that people moved to the city not to assimilate, acculturate or to live permanently, but to gain information, income, or knowledge which would help them when they returned to their village. With regard to decision-making, they found that people in the village had two alternatives: they could go to a plantation or to Port Moresby. If they went to a plantation to work, the plantation owner paid transportation costs and housed them, but they received less total income. The second choice was to migrate to Port Moresby and find a job on their own. The income they could make was greater, but less certain, and they had a better chance of learning skills they could use back home.

It will be noted that reference is to "decision-making" rather than to "decision theory" or "game theory," with the main difference being in the rigorous mathematical analysis required. Anthropological studies have tended to rely more on the theory of decision-making, thus minimizing the importance of its quantitative methodology. According to Selby (1970) a problem in decision theory involves the

subjectivity of the players, requires the analyst to be involved in a more active way with his subjects, and demands that he formalize their picture of what they are doing in a thorough fashion. The use of game theory is worth the effort, states Selby:

> The usefulness of such conceptual devices as game theory does not end with the magical solutions they present us. Indeed, the point might be made that the restrictions that the model imposes upon our data, and the tortuous maneuvers that we go through in order to make our data fit the necessities of the model render the solutions only partially useful in any case. Conceptually these models have the advantage of leading us to think of our data in a less "commonsensical" and more imaginative way; they force us to explicate our assumptions, and they lead us to more abstract and general theories about the nature of cultural behavior.
>
> (Selby, 1970:35-53)

Denitch (1970) identifies some of the interconnecting factors in a rural-urban move in Yugoslavia. The variables are discussed from the viewpoint of a series of choices among perceived alternatives, and stem from factors in the villagers' background as well as the political and social features of the forming industrial society. These are:

1. Leaving the village. Major variables brought to bear on this decision include the amount and quality of land owned by the village household, the number of sons remaining in the household, and the amount of exposure the individual has had to city life.

2. Finding a job in the city. Various interpersonal channels are used for communication about where to find jobs.

3. Finding a place to live. The new settler's first lodging is nearly always a temporary one, since finding a permanent home is a long-range and complicated process due to the endemic housing shortage. It is usually necessary to spend several years rooming with relatives or friends, or in a privately rented room.

4. Deciding upon the extent of one's political activity.

5. Attaining of permanent housing. Building a house often coincides with the final severance of economic ties with the village, since the sale of village land is often essential to raise money for construction of the house.

6. Attaining of material goods. This has a dual function, serving to raise the standard of living in an objective sense and providing symbols of high status defined by the urban culture.

Graves discusses the study of migration using three alternative models: the decision model using principles of game theory, the assimilation model, and the economic adjustment model. Only the decision model is relevant to the present discussion. The decision model assumes that the migrants' decision to migrate to the city was based on a rational weighing of the alternatives. Thus, for example, a Navajo's decision to leave the reservation and migrate to Denver should be explained by his belief that he is choosing the alternative that will give the "highest subjective expected utility." Graves further speculates that the prime reason for leaving the reservation must be found in the area of economics. Thus, he is able to hypothesize:

> . . .that migrants will be more oriented toward material goals than non-migrants, and less oriented toward social love-and-affection goals or other rewards of traditional reservation life. Furthermore, this should be truer of migrants who remain in the city than of those who return home. Finally, this difference in values should be reflected in higher <u>expectations</u> among migrants than among non-migrants for the achievement of personal goals in the city, with those remaining in the city having even higher expectations than those who return home.
>
> (Graves, 1966:296)

Taylor (1969) presents another scheme for the analysis of migration at three levels: an objective, a normative, and a psycho-social level.

> Either we accept the migrant's own statement of motives, or we infer motives from a study of objective structural determinants and then impart these motives to the migrants. The third possibility is that we combine the migrant's subjective account of motives with our own account based on objective inference.
>
> (Taylor 1969:99)

Taylor argues that the objective structural approach, upon which the economic "push-pull" model is based, cannot be pursued alone, as it subsumes all motives under an assumption of want-satisfactions. Thus, we must also seek to gain knowledge of the migrant's own understanding of the situation and his underlying motives. Taylor's study of the west Durham coal mining area characterized migrants by qualities of dislocation and aspiration.

Taylor (1969:120-124) postulates four different migrant types based on motivational structure:

1. Resultant (56.2 percent). These include persons interested in transferring jobs or getting a new house to continue living in the same previous manner.

2. Aspiring (21.3 percent). This class includes persons dissatisfied with mining village life, and who want something different and better for themselves.

3. Dislocated (18.3 percent). They are dislocated from primary and secondary groups, have been outside Durham for at least a year, may have married someone from another part of the country, or through the death of close relatives their ties to Durham have been loosened.

4. Epiphenomenal (4.2 percent). These include those who migrated for a variety of personal reasons. This category "is not offered as an unfortunate appendage, signifying classificatory defeat, but rather as a necessary recognition of the inevitable diversity of individual motivation."

Taylor generalizes the process of decision-making involved in migration as beginning with a period of "germination" during which husband and wife conduct a sporadic debate on the advantages and disadvantages of migration. The discussion may be joined by relatives, workmates, neighbors, and even the children. This debate continues until the perceived advantages of migration outweigh the perceived disadvantages. In some cases a decision may be precipitated by one or an accumulation of incidents, which Taylor refers to as "triggers" or "precipitating factors" (1969:124-125). Although Taylor is unable to provide a complete decision-making model for migration, he enumerates some of the constituent elements of such a model:

1. A degree of structural conduciveness, or strain.

2. The individual's perception and evaluation of this strain.

3. The presence of long or short term aspirations.

4. The presence of a degree of dislocation.

5. The generalized belief that conditions are better elsewhere.

6. The objective feasibility of migration.

7. The presence of precipitating factors or "trigger."

Taylor concludes that these elements have an orienting rather than a prescriptive function (1969:133). Furthermore, these elements are "value-added," or stochastic by virtue of their cumulative nature. Taylor's approach appears to be suitable to

the holistic interests of the anthropologist in that an objective structural account is combined with consideration of the migrants' stated motives for movement.

Ravenstein's Laws

The migration laws first proposed by Ravenstein (1885, 1889) anticipate the various formal models to come, but in themselves are limited heuristically. They were based on migration regularities expressed in the British census of 1881, and later in similar data for a score of European nations. Ravenstein's laws of migration are summarized by Lee (1969). They are briefly stated as follows:

1. Migration and distance: most migrants move only a short distance.

2. Migration by stages: persons living near large cities migrate to take advantage of economic opportunities; migrants from more remote communities take their place in the originating towns.

3. Streams and counterstreams: a counterstream exists for every stream of migration.

4. Urban-rural differences: urban populations are less migratory than rural populations.

5. Predominance of females: females predominate over males in short-distance moves.

6. Technology: technological development promotes greater rates of migration.

7. Economic motive: although there exists a variety of reasons for moving, the desire to improve economic conditions is the predominant motive.

All of Ravenstein's laws arose from empirical data but were in large measure only migration averages as seen, for example, in the observation that "migrants proceeding long distances generally go by preference to one of the great centers of commerce and industry" or "the natives of towns are less migratory than those of the rural parts of the country" (1885:199).

Lee (1969), building on Ravenstein and others, provides a general schema for migration with a related set of testable hypotheses. His own work has gone far in recategorizing Ravenstein's laws into a more unified framework. Lee suggests four factors that enter into the decision to migrate and the process of migration: the area of origin, the area of destination, intervening obstacles, and personal factors. He then formulates a series of hypotheses about the volume and rate of migration, the development of streams and counterstreams, and the characteristics of migrants. In considering the volume of migration, Lee makes the following points:

1. The volume of migration within a given territory varies with the degree of diversity of areas included in that territory.

2. The volume of migration varies with the diversity of people.

3. The volume of migration is related to the difficulty of surmounting the intervening obstacles.

4. The volume of migration varies with fluctuations in the economy.

5. Unless severe checks are imposed, both volume and rate of migration tend to increase with time.

6. The volume and rate of migration vary with the state of progress in a country or area.

Lee makes the following points regarding stream and counterstream:

1. Migration tends to take place largely within well defined streams.

2. For every major migration stream, a counterstream develops.

3. The efficiency of the stream (ratio of stream to counterstream or the net redistribution of population affected by the opposite flows) is high if the major factors in the development of a migration stream were minus factors at origin.

4. The efficiency of stream and counterstream tends to be low if origin and destination are similar.

5. The efficiency of migration streams will be high if the intervening obstacles are great.

6. The efficiency of a migration stream varies with economic conditions, being high in prosperous times and low in times of depression.

In considering characteristics of migrants, Lee suggests that:

1. Migration is selective.

2. Migrants responding primarily to plus factors at destination tend to be positively selected.

3. Migrants responding primarily to minus factors at origin tend to be negatively selected; or, where the minus factors are overwhelming to entire population groups, they may not be selected at all.

4. Taking all migrants together, selection tends to be bimodal.

5. The degree of positive selection increases with the difficulty of the intervening obstacles.

6. The heightened propensity to migrate at certain stages of the life-cycle is important to the selection of migrants.

7. The characteristics of migrants tend to be intermediate between the characteristics of the population at origin and the population at destination.

Lee and Ravenstein have been cited extensively because of the relevance and primacy of their work to the general theoretical framework of recent research. Others who anticipated Lee's lead, though in a less global manner, include Heberle's (1938) summary of German theories about movement throughout Europe; Alers' and Applebaum's (1968) hypotheses about migration in Peru, and Brunner's (1957) generalizations about 50 years of rural-urban migration in the United States.

A major liability in generalizing about migratory behavior as Ravenstein and his successors have done seems to be a tendency to treat generalizations as universally applicable. Both Browning and Feindt (1971) and Stoltman and Ball (1971) have found that various of Ravenstein's laws do not apply to migrants in certain regions of Mexico. Browning and Feindt discovered that many rural-urban migrants to Monterrey do not conform to the predicted stage migration model; Stoltman and Ball criticize Ravenstein's emphasis on the predominance of the economic motive. Even in the United States, where a close correspondence between Ravenstein's predictions and the empirical reality might be expected, Thomas (1938) has found considerable evidence to the contrary. It would not be unreasonable to conclude from the studies cited here that the patterns of migration might be related to different national political structures, or to different stages of regional development and therefore not amenable to gross generalization.

Aside from criticism of the lack of general applicability of Ravenstein's theories, it should be noted that there is nothing predictive about a generalization, except where the law is a prediction itself, for example "each main current of migration produces a compensating counter-current" (Ravenstein 1885:199).

Also, there is no mechanism by which the migration "laws" may be combined in a systemic framework. Finally, it is one thing to simply note the reciprocal nature of certain phenomena (stream-counterstream); it is quite another to operationalize this information. If migration laws have any value at all, it would certainly be in their utility as predictors of expected migration behavior.

Summary

Efforts to achieve a purely qualitative model of migration have not proved very successful. Indeed, many researchers in the social sciences have dismayed of ever being able to synthesize the confusing welter of descriptive data now present in the migration literature without recourse to more formal quantitative means. In some sense, this is unfortunate. There exists a need for a general sociological theory of migration -- a theory that systematically handles the interrelationship between a migrant, his family and extended kin group, his communities of origin and destination, and the social institutions that surround him. Ravenstein and Lee with their migration laws provide a base for such a theory, although their generalizations seem to hold up better in the industrialized nations of the world than in the developing nations. Mabogunje's complex flow diagram for rural-urban migration in Africa is also of potential significance for current needs. However, until means can be found to program change into the system, it remains a static, descriptive construct.

For these reasons, and others, many social scientists have largely limited the scope of their research to an analysis of the numerical behavior of migrants. They have reduced their concerns to predicting, for instance, how many persons will migrate and how far they will go. The fact that different individuals move for a wide variety of social and psychological reasons becomes unimportant so long as the movement of <u>individuals in groups</u> can be predicted by recourse to quantifiable demographic and economic variables.

Quantitative Models

Up to this point we have been using the word "model" in a general sense. In recent years, the word "model" has been raised to such a high plane because of its association with various explanatory devices that it has tended to become reified. Our use of "model" involves selecting certain critical factors or variables from empirical situations and combining them to form a counterpart or model of the problem with a degree of predictive or explanatory power. A model can be a simple and informal codification of ideas about a subject on which some everyday decision is required and acted upon. However, if the situation involves quantitative or measurable variables, then there are strong indications for selecting a mathematical representation of the model. It is in this latter sense that the term is used in what follows.

The most important class of migration models, the formal quantitative models, treat migration as a regular, predictable process amenable to testing and verification. The first such models were developed around 1940. Today, there are many quantitative models reflecting a variety of different purposes. Rogers (1965:1) has divided quantitative models roughly into two groups -- those concerned with migration streams and those concerned with migration differentials. The first class of models places greatest emphasis on the volume and direction of place-to-place movement as it is influenced by environmental conditions at places of origin and destination. The emphasis on migration differentials, on the other hand, is primarily an attempt to predict on the basis of certain characteristics, such as age, sex, income, and race, the migration potential of groups.

Rogers' division is somewhat artificial in that the ideal migration model should account for both migration streams and migration differentials. An important distinction made here is between models of migration based on abilities to answer five basic questions: who moves, how many move, why do they move, how far do they move, and where do they move. Each of the approaches that follows provides answers to one or more of these questions with the simplest model -- the gravity model -- considering only rate and distance. The last model to be discussed, the computer simulation model, addresses all questions in one package.

It will be noted that the ontogenetic aspects of migration research are only generally sketched in, since there is a tendency for such work to progress from a relatively simplistic to a relatively sophisticated state. Furthermore, each discipline has staked out areas of interest with the result that there are as many diverging as paralleling lines. Nonetheless, it appears that the simulation model may come closer to achieving a holistic multi-disciplinary methodology for the study of migration behavior.

The Gravity or Size-Distance Models

The earliest and most fundamental mathematical expression for human mobility is the gravity model. As a sociological construct roughly analogous to the Newtonian law of physics ("bodies attract one another in proportion to their masses and inversely in proportion to the square of the distance between them"), it traces back to the work of H.C. Carey during the first half of the nineteenth century and reappears in the subsequent writings of Ravenstein, Young, Reilly, Stewart, and Dodd among others (see Carrothers, 1956 for a survey of early gravity models).

The gravity model most familiar to migration theorists is Zipf's $\frac{P_1 P_2}{D}$ hypothesis (1946) which postulates that "the attractiveness of two places for the flow of migration between them can be defined as a simple inverse function of the distance," or more simply: the rate of total migration between two points attenuates as the square of the intervening distance. While Zipf's elementary distance decay formulation has been tested in the United States with significant positive results (Folger, 1958; Anderson, 1956), a number of researchers have tried to increase its predictive capabilities by adding other variables to its content. Bowing to the original Newtonian principle, ter Heide (1963) rephrases Zipf to include the effects of population size at points of origin and destination ("Migration . . .is directly proportional to the product of the populations of the two regions involved, and inversely proportional to the distance between the regions"). Hoover (1971:171) notes that "realism" can can be added to this modified model by multiplying the population size variable by some quantifiable differential factor such as unemployment rates at origin and destination points, mean summer or winter temperatures, percentage of sunny days, average education or income levels of the two populations, percentage of housing in good condition, crime rates, insurance rates, or atmospheric dust content.

The chief criticism of Zipf and his successors has been directed at concept of "distance." Several researchers have suggested that the "frictional" impact of distance is not uniform and that its relationship is not simply inverse, but one in which distance is raised to some power other than unity. Consequently, various exponents from 0.5 to 3.0 have been added to the model. Anderson (1956) has suggested that the exponent itself is a variable, inversely related to the size of the population. Conversely, Carrothers (1956:97) proposes that the exponent may be a variable function related inversely to distance: "friction per unit of distance against interaction caused by short distances is disproportionately greater than friction per unit of distance caused by longer distances."

Other researchers argue that no amount of statistical manipulation of the gravity model will improve its predictive power. Ter Heide (1963:61), for example, suggests that migration distance refers to more than sheer physical distance alone. What should be calculated in his opinion is the decline in information available to migrants as distance increases. In this sense, he is saying that migration is dependent upon communication and transport facilities, status inequalities, and linguistic barriers:

> . . .Wide social distances between communities and regions (that is, great heterogeneity) tend to restrict migration flows to those individuals who can most easily make the required adjustments. With the improvement of communications and travel, social distance in space tends to lessen; but it is still a factor, for example, between French and English Canada, between the North and the Deep South in the United States, or between farm and city.
>
> (ter Heide 1963:61)

This author also notes the phenomenon of the "well-beaten path" wherein pioneer migrants make it easier for successive waves to follow. Ter Heide's concern for informational distance has found similar expression in Hoover's (1971) dual concepts of social distance and functional distance ("a measure of all factors impeding migration between points of origin and destination") and in Burford's (1962) psychological distance. Lee (1969) has also developed a theory of "intervening obstacles" which relates more closely perhaps to push-pull models, but which can also be viewed in light of the functional distance argument.

Largely for the reasons just mentioned, a second gravity model, Stouffer's (1940) hypothesis of intervening opportunities, has succeeded Zipf's in much migration research. Indirectly circumventing the distance variable by substituting as its proxy the distribution of economic opportunities, Stouffer's modified formula reads: "the number of persons going a given distance is directly proportional to the number of opportunities at that distance and inversely proportional to the number of intervening opportunities." Stouffer appears to be saying that people move for explicitly economic reasons and that they tend to move only so far as the nearest available opportunity. If opportunities were proportional to the population of the area and if the population were uniformly distributed in space, then Stouffer's hypothesis would reduce to Zipf's (Stewart 1960:348). However, the value of Stouffer's model is that it assumes a lack of homogeneity in the first place -- that is, it assumes that opportunities are not distributed randomly. Thus, an empirical dimension is added.

In making this model operational, Stouffer has been limited by the availability of data and has resorted to a curious circular reasoning. Instead of defining opportunities in terms of some quantifiable indicator of economic well-being, such as number of jobs, unemployment rates, and wages, Stouffer defines them as the total number of migrants residing in places of origin and destination. Intervening opportunities, on the other hand, are defined as the cumulated number of migrants residing between these two points. In short, Stouffer has assumed a relation between migration and opportunities in defining opportunities, and then measured the relation between migration and opportunities (Folger, 1958). Even with this shortcoming, in comparative tests Stouffer's model has proved a better description of migration than Zipf's.

Bright and Thomas (1941), using a slightly different operational definition for opportunities (the actual number of persons born in other states who were residing in a given state) and intervening opportunities (the cumulated number of native-born persons settling in all states between the state-of-origin and the state-of-destination) have shown good results in relating Stouffer's model to migration flows in the United States. Isbell (1944) has similarly been successful with a Swedish test of Stouffer, and Strodtbeck (1949), using census data on out-migration from Kentucky prior to 1930, finds general support for the model, although he includes an equal-opportunity interval in his calculations as a function of what he calls the migrants' imperfect knowledge of opportunities.

The most general criticism of Stouffer's formulation seems to be centered on two issues: (1) the model does not account for differences in rural-rural, rural-urban, and urban-urban flows, and (2) it does not consider the relevance of different kinds of opportunities to different categories of migrants. Rose (1958), for example, has proposed that "higher status persons, seeking better jobs or 'opportunities,' must move a greater distance to find them, on the average, than do persons whose skills or aspirations direct them to look for less desireable opportunities." (See Stub 1962 for a corroboration of Rose's hypothesis.) Both issues are dealt with in the next class of models discussed, the "push-pull" models.

In summing up the gravity models, it can be said that both Zipf's distance decay formulation and Stouffer's intervening opportunities hypothesis are essentially deterministic with Zipf's tending more toward physical reductionism than Stouffer's. Zipf's hypothesis, even for its failure to account for causality, remains a fair approximation of empirical behavior especially with the addition of the population variable and the distance exponent. It is probably as close to being a "law" as anything we have in migration research, and continues to occupy a place of importance in the work of many geographers.

Stouffer's hypothesis is really the first formal mathematical statement of the economic thesis in migration research, although his operational definitions of opportunities and intervening opportunities limit the strength of his argument somewhat. More realistic than Zipf's formulation, Stouffer's hypothesis combines the ability to handle lack of homogeneity in the distribution of migration incentives with a stochastic framework allowing for each prediction to be based on the previous prediction. The determinism in Stouffer, on the other hand, lies in his assumption of "energy conservation"; that is, one moves only as far as the nearest available opportunity.

This variation of the gravity model has been reiterated by Levy and Wadycki (1974) who have expressed concern over the competitive effects of alternative opportunities (larger populations, higher wages, and lower unemployment rates) at alternative destinations. Alternative opportunities are defined as the "best" opportunities available in states which are at least as close to the origin state as is the destination state, that is, states which lie within a circle with the distance D_{ij} as the radius and the origin state as the center. Wadycki's proposal can be viewed as an attempt to produce a full field model of migration from the elementary gravity model. Using Swedish census data, Olsson (1965) has retested the economic thesis correlating with distance the independent and dependent effects of levels of income, levels of unemployment, and population size at places of origin and destination. All three variables were found to relate positively to migration distance, although economic (wage) factors appeared to be more causally related to long-distance movements than to short-distance movements.

The Push-Pull or Multiple Regression Models

Largely because of the shortcomings revealed in the gravity models, a different class of migration models surfaced during the 1960's. These so-called "push-pull" constructs tended toward a view of migration causality, treating mobility as a combination of expulsive forces at a point of origin and attractive forces at a point of destination. Bogue (1969:753-754) has summarized a number of the push factors as decline in a national resource, loss of employment, oppressive or repressive discriminatory treatment, alienation from a community, retreat due to lack of personal opportunities, and retreat due to catastrophe. The pull factors are summarized as including superior opportunities for employment, opportunities to earn a larger income, opportunities to obtain desired specialized education or training, preferable environment and living conditions, dependency, and the lure of new or different activities, environments or people. Most formal push-pull analyses of migration rely on multiple correlation and regression techniques to sort out the relative explanatory contributions of individual push and pull factors bearing on the flow rate or distance between origin and destination points. For clarity's sake, these have been condensed into three main categories: (1) economic characteristics of origin and destination including wage structures, unemployment rates, and industrial growth potentials; (2) social and demographic characteristics of origin and destination including educational facilities, conditions reflecting on the quality of life (climate, housing) population size, and population density; and (3) the personal characteristics of the migrants themselves including age, sex, education, income, occupation, race, marital status, parenthood, intelligence, and mental health. These latter characteristics are included as it is commonly believed, for example, that younger, wealthier, and better educated people tend to move farther and in greater numbers than those who are older, poorer, and less educated (migration differentials are early dealt with by Thomas 1938; see also Beshers and Nishiura 1961). Also treated in some push-pull analyses is (4) a category of explanatory factors representing differences in migrant streams: rural-rural, rural-urban, urban-rural, and urban-urban.

Operationalized, push-pull models seek to gauge both the individual and joint explanatory effects of the categories numbered 1-4 above on the rate of migration between two points and/or the distance traversed. This end is accomplished by a two-stage statistical process. In the first stage, the strength of association between each of the independent variables (economic, social and demographic, and personal factors) and the dependent variable (migration rate or distance) is calculated by means of a simple technique which produces a correlation coefficient

(r) for each relationship. The variance accounted for in this relationship (the extent to which the independent variable explains the variation in the dependent variable) is calculated as a coefficient of determination (r^2). The next stage is to incorporate the joint contribution of successively larger numbers of independent variables in explaining the variation in the dependent variable. A regression line is established by the least squares technique, adding the independent variables one at a time until all of the variation in migration rate or distance is accounted for, or until it levels off. In this fashion, the researcher can hope to discover which economic, social, demographic, or personal selectivity factors bear most heavily, both individually and jointly, on changes in the dependent variable.

Before proceeding, it should be acknowledged that the technique does have its disadvantages (see Bogue 1965:69 for the best discussion). It is conceivable, for instance, that the addition of new, previously unconsidered, independent variables could alter profoundly the significance of the original variables, either taking from them explanatory power or bringing to light new dimensions of interconnectedness. Further, low levels of significance for variables are not to be taken always as a measure of their unimportance. As Bogue (1969) points out, some variables tend to "hold conditions constant" permitting other variables to assert their importance. In fine, the issue of interconnectedness is very complex and reflects basic limitations in the statistical method discussed. A push-pull analysis of the type described is included in Bogue and others (1957). Using 1930-40 census data for 13 state sub-regions cross-cutting the United States, Bogue calculates the independent explanatory contributions of 12 economic and social variables. Bogue's findings include those concerned with migrant streams independent of causes and those concerned with differential pushes and pulls. In terms of the latter, Bogue clearly cites employment differences between origin and destination points as the "driving and guiding force" behind migratory movement. Metropolitan areas with high rates of unemployment showed correspondingly high rates of out-migration and low rates of in-migration. Non-metropolitan areas with high rates of unemployment experienced even more profound net migration losses. In conclusion, Bogue states categorically that "the flow of migration streams during any particular interval of time is conditioned by the fundamental changes that are taking place in the regional division of labor, technology, and status in the national economy at that particular time" (1957:76).

A similar study by Tarver (1961), incorporating 11 economic and 13 social and demographic variables in its regression framework, charts variations in the 1940-50 intercensal migration rates for two groups, Whites and non-whites, in the total population of the United States. The results show that for the total population, economic factors alone explain 77 percent of the variation in migration rates, the combined social and demographic variables explain 80 percent, and the three sets taken together explain 95 percent of the variation. Although Tarver's findings continue to point to the predominance of the economic motive in migration, the high combined explanatory power of non-economic variables must also be acknowledged. Even more significant, a comparison of results for White and non-white populations showed a wide difference (72 percent and 40 percent, respectively) in the explanatory power of economic variables.

Other multiple correlation and regression analyses both do and do not support the economic thesis, although a variety of equivocating factors hamper any final interpretation. Lowry (1966) and Rogers (1965) both find support for the predominance of the economic motive, but limit their analysis to United States migrants already in the work force. Peterson (1958) while supporting the thesis generally, suggests that recent census polls in this country indicate an increase in the number of migrants leaving for reasons of housing, health, climate, and education and a corresponding decline in the number leaving for economic reasons. Outside the United States, Stoltman and Ball (1971) have found that local economic conditions explain less than 50 percent of the variation in migration rates between Mexican municipios. The authors speculate that the remaining explanatory power is embedded in social and psychological variables. Using Swedish census data, Olsson (1965) has retested the economic thesis correlating with distance the independent and dependent effects of levels of income, levels of unemployment, and population size at places of origin and destination. All three variables were found to relate positively to migration distance, although economic (wage) factors appeared to be more causally related to long-distance than to short-distance moves.

The equivocal nature of these findings, while initially disconcerting, will have an effect on prevailing notions about migration stimuli. The traditional formulation, set forth by Bogue, is one in which migration is seen as a means for attaining a state of spatial equilibrium in income and unemployment:

> There are situations in which a migration flow from one area to another persists for many years because of a prolonged disequilibrium of a particular type. We assume that migration will continue to flow in a particular way as long as the disequilibrium exists and will cease when it disappears.
>
> (Bogue 1965:754).

Yet Bogue admits that a minimal or zero movement between origin and destination points does not necessarily mean that the population's needs are being satisfied. In many cases, people "find themselves unable to escape from a very uncomfortable setting that threatens them with starvation because they lack skills and opportunities for other employment in another setting." Other non-economic impediments to migration include physical barriers (mountain chains, bodies of water) and political barriers (immigration laws and regional borders). Hoover proposes that while the attractive stimuli at a point of destination is more often than not economic in nature, the original impulse to move may be otherwise:

> Rather surprisingly, it appears that in most cases the so-called push explaining out-migration from an area is not primarily the economic characteristics of the area (such as low wages or high unemployment) but the demographic characteristics of the population of the area. Areas with a high proportion of well-educated young adults have high rates of out-migration regardless of local economic opportunities.
>
> (Hoover 1971:171)

Even if we accept the notion that people tend to move primarily for economic reasons, we certainly need to remain cognizant of the possibility that this situation may vary in time within a single country (see Peterson above) or may vary in importance from one country to the next (Stoltman and Ball).

Push-pull models, despite the shortcomings noted, are among the most useful constructs available to students of migration. Highly empirical, they provide us with the capability to distinguish in relative fashion among the causes of migration as mitigated by the characteristics of the migrants and the characteristics of origin and destination points. These results in turn can be reinterpreted in terms of flow rates or estimates of distance moved by the various migrant cohorts. The very empiricism expressed in such models, furthermore, provides a check against over-generalizing as when researchers consistently cite economic factors as the overriding stimulus to migration. As we have already mentioned, various regression studies indicate that causes may vary from one region or country to the next or they may vary in the same region or country over a long period of time. Therefore, we must be cautious when we speak of universal types of behavior.

Probabilistic Models

The probabilistic model bears little resemblance to the push-pull constructs. In its most commonly-used format, the Markov chain, it predicts the distribution of future populations over a migration field on the basis of a flow matrix of transition probabilities. The migration rates that hold for one period are assumed to remain constant for future periods, with only the initial state and the flow matrix being determined empirically. Simple Markovian schemes are based on deductive reasoning requiring strict assumptions of logical consistency which may not correspond to the empirical situation. (A good description of the mechanics of such a model is included in Rogers 1965:34-43.) Consequently, they have been the object of considerable scrutiny by several researchers (see especially Ginsberg 1972a). Nevertheless, in the opinion of Kelley and Weiss (1969:180),

"the popularity of the Markov model is derived from its appealing simplicity in describing dynamic processes . . .and from its focus on the results, as distinct from the causes of social and economic change."

There have been several uses of Markovian and other probability models in anthropology. Buchler and Selby (1968), for example, have demonstrated their utility in the determination of Iban residential patterns, and White (1973) has used a probabilistic framework to analyze data on Andros Island households. Gilbert and Hammel (1966) and others are pioneers in the use of computer simulation methods in analyzing marriage patterns; their later models being refined through stochastic processes. More recently, Thompson (1970) has employed a Markovian framework in his analysis of social stratification and mobility in a Yucatec Maya town. Other probabilistic and mathematical work in anthropology is reviewed by White (1973).

For examples of applications in migration research, however, we must depend on the contributions of social scientists outside the discipline of anthropology. Blumen, Kogan and McCarthy (1955) in a much-cited work have applied a Markovian process to the analysis of inter-industry movement for workers in the United States. Tarver and Gurley (1965) have projected population totals for U.S. Census divisions using probabilistic means. Rogers (1965) provides us with a study of inter-regional migration in California using both regression analysis and Markovian processes. Perhaps the most interesting analysis to date is that of Kelley and Weiss (1969) in which the authors compare the predictive abilities of a Markov chain probability model with that of two economic (push-pull) models using inter-regional wage differences as the equilibrating variable. Their conclusions, based on a test using 1955-60 Census data for California, suggest that the purely probabilistic formulation is a less accurate predictor of mobility than the more empirically-oriented wage model. The stationary Markov model consistently underestimated population changes in the growing regions and overestimated them in the declining regions. This is similar to Rogers' conclusion (1968:85-86) wherein he states that what at first appeared to be a powerful new technique for temporal analysis has not shown adequate results. Rogers adds that Markov chain models may be more useful in the analyses of past migration flows than in forecasting future population movements.

The best critique of probabilistic models in migration research is found in Ginsberg (1972a). As presently used, probabilistic models are strong where regression analysis is weak, namely in the specification of random components and analysis of the system as a whole. Even though probabilistic models explain more about the random aspects of migration than regression analysis, Ginsberg argues, the probabilistic models have many more parameters and more data is required to generate predictions. On the other hand, the basic criticism of Markovian processes is that they are too far removed from reality to accurately account for true migratory movement. Unlike regression analyses which "use knowledge of the mechanisms underlying the process and exogenous information about the states," the models considered here "draw an elaborate probabilistic reasoning" (Ginsberg 1972a:71). Therefore, as Ginsberg notes, they do not account for the fact that migration is both cause and effect of other processes such as urban growth, industrialization, and regional differentiation. Ginsberg's general conclusion is that probabilistic models are not likely to be of much scientific or practical value unless they are extended to include causal structure and information which affects the migration process such as social, economic, and geographic variables. He suggests an integrated approach which uses the best part of each method to fulfill the necessary explanation and analysis of migration processes. (See Rogers 1968:85-86 for a similar discussion of the limitations in Markovian models.)

Because of these problems, several researchers, including Ginsberg (1971), have proposed modifications to the basic stochastic model. Among the more common of these is the inclusion of a duration-of-residence component. Taeuber, for example, has noted that "An individual's changes of residence are not independent of previous changes of residence, neither are the migrations of a given year independent of the changing residential patterns of the nation" (1961:130). A considerable body of literature following Taeuber has been developed to handle what has subsequently been restated as the Axiom of Cumulative Inertia (Cornell Mobility Model): "A person's propensity to move declines as his duration of residence increases" (Morrison 1967:553; see also Myers, McGinnis, Masnick 1967

and McGinnis 1968). Similar modifications of the basic model attempting to control for the differential characteristics of migrants are discussed in Blumen, Kogan, and McCarthy (1955). None of these solutions, however, involve the addition of empirical content to the stochastic process.

Models of Spatial Interaction

A special class of probabilistic models remains to be mentioned. These are the spatial interaction constructs of the human geographers, especially those of the Scandinavians. The best summaries are found in Gade (1970), Olsson (1965), Morrill (1965) and also in the monograph series Lund Studies in Geography published at the Royal University of Lund, Sweden. Spatial interaction models of migration have been ignored by American researchers, other than geographers, because their chief focus is the growth of regions, including the development and spacing of towns and cities, rather than the migratory process per se. That the growth of regions does involve population redistributions, however, means that migration is a salient feature of all such models. We are interested in spatial interaction models because many overlay the stochastic probability process previously discussed with deterministic elements including the distance decay function and complicated location principles.

A commonly-cited model incorporating both probability and deterministic elements in its framework is Hägerstrand's model for the diffusion of technological innovations (discussed in Gale 1972). Basically, the model redistributes a homogeneous population in successive transition states over a migration field by recourse to Monte Carlo simulation methods -- that is, the description of the state of the population is drawn from a uniform distribution of random numbers. Hagerstrand's model diverges from the probability construct, however, in that constraints on movement in any direction (between cells) are imposed by a distance decay function similar to Zipf's. Thus, the average frequency of contact between any two locations is the same for all locations separated by an equal distance and, further, the expected frequency of contact is higher for nearer locations than it is for more distance ones. What is produced is a law-like description of the diffusion process.

Hägerstrand's model has been co-opted by geographers as a spatial representation of migratory behavior, (see for example, Thomlinson, 1961; Bailey, 1968; and Olsson, 1965). Other stochastic characteristics are added to the model by Olsson and Gade (1968) with the addition of two new sets of probabilities, one specifying the number of opportunities already reached and accepted by the migrant, and the other specifying the proportion of migrants going beyond a certain distance to reach an acceptable opportunity.

An even more sophisticated spatial model involving the axioms of central place theory is employed by Morrill (1965) in an attempt to recreate the development of an entire region in Sweden between 1860 and 1960. Pioneered by Cristaller (1933) and Lösch (1940) and elaborated by Berry (1964) and others, central place theory describes the spatial process of regional development by focusing on the economically efficient arrangement of towns, cities, and hinterlands. The concept employs the dual concepts of range -- the implication that consumers tend to minimize travel, and threshold -- the population density or industrial wealth necessary for a specific type of business to be profitable. For a homogeneous area in a state of economic equilibrium, the interplay of these concepts results in an ideal hexagonally-shaped pattern of hierarchically-ordered places, the larger places incorporating the functions of the smaller places. For a more detailed discussion of central place theory see Hoover (1971:119-160).

Morrill's simple growth model of regional development in Sweden is modified somewhat from the archetypal central place construct in that it includes transport and industrial location principles. Research has shown that there are differences in the locational aspect of certain activities, there are "non-central place" activities, and some goods flow across the urban hierarchy. In the end, a comparison of predicted outcomes with empirical facts show a fair degree of correspondence. The simulated set of urban places matched very closely the actual ones in terms of size characteristics and hierarchy. Distance structures (spacing) in the simulation were a bit too regular as were patterns of population gain and

loss, although the appropriate flows from rural to urban locations were closely paralleled. In the final analysis, Morrill relates such distortions to historical change and the underestimating of the effects of such non-central place activities as the location of manufacturers and transport routes.

Reviewing the contributions of the human geographers, we must admit their success in mimicking the spatial redistribution of peoples. The gravity formulations and the more complex concepts such as central place theory clearly reflect some order of human spatial organization and cannot be denied. However, they suffer from the same shortcomings as the earlier deterministic and probabilistic models -- they admit of no variation in the pattern except that wrought by chance alone. And here is the real difficulty: because the model views the spatial distribution of places as the result of a set of "regulated accidents" in which chance has affected the outcome from the otherwise deterministic one (the rectangular or hexagonal matrix of central place theory, for instance). There also exists a strong urge to explain away any disparity between the real and the anticipated as chance alone. Olsson and Gade suggest that:

> Implicit in this approach to description is the idea that the real world represents only one of the many possible realizations of a specified stochastic process. If this realization has had a small likelihood of occurrence, it in itself becomes difficult to understand without reference to the underlying probability matrix from which chance happened to pick an unusually small figure.
>
> (Olsson and Gale 1968:223)

In summing up the models, it must be reiterated that most tend to view movement as a simple phenomenon wherein population units undergo changes according to a set of transition probabilities. A major advantage of the approach over earlier models is its emphasis on movement over an entire field, that is, unlike the gravity and push-pull formulations which only control for movement between two points at one time, the probabilistic and spatial interaction models move all elements in the population simultaneously. The importance of this capability can not be overestimated.

At the same time, however, the probabilistic and spatial interaction constructs are limited in lacking a causal structure. This has prompted both Rogers (1965) and Ginzberg (1972a) to call for a more synthetic approach in which exogenous variables (social, economic, and demographic factors) are included as part of the probability framework to produce a closer correspondence to events in the external world. The complexity of the task precludes an easy solution. However, admittedly, encouragement is found in advances in modern computer technology and especially in computer simulation methods.

Computer Simulation Models

The explicit recognition of the importance of computer technology in migration research came about in the late 1960's, although one proposal (Price 1959) dates 10 years earlier. Computers help the researcher to handle large bodies of data, to analyze complex relationships, and to simulate the migration process by analogue. They allow the scientist to experiment on the system under "laboratory conditions"-- to predict what will happen to the system in a future state if certain conditions are altered and to retrodict, or look backwards, as a test against reality (for example, we model migration to Mexico for the years 1960-70, then retroduct to 1950-60 as a test). Ultimately, the computer simulation model leaves the researcher in full control of the system -- he can modify it as desired, model in random occurrences, and make events time dependent. Such a model goes beyond functional explanations.

We have already mentioned the work of Morrill (1965) in simulating regional growth in Sweden over a 100 year period by recourse to spatial principles inherent in central place theory. A similar computer simulation model has been proposed by Norris (1973) as a teaching tool for geography students. Much simpler than Morrill's construct, Norris' model simply simulates a spatial interaction process in which

one-fifth of an hypothetical population is moved about in yearly intervals contingent on the assumptions of the gravity formula and central place theory (population moves only from smaller to larger places). Norris considers four categories of information for each place -- population, economics, social, and political factors -- but in its closed format his model cannot be applied to the real world. A third simulation model proposed by Beshers (1967) accounts for births, deaths, migration, and social mobility as social processes in a non-stationary stochastic process (Markovian). Population age by cohorts and transition probabilities are calculated each time by age and state distribution. He also proposes that such effects as saturation or queuing be represented by a market mechanism, that is by job supply and labor markets. Within metropolitan areas, migration can be represented as invasion and succession processes with acceleration curves. He also believes the model can forecast future trends, analyze and interpret historical trends, and estimate alternative policy effects on social systems.

A proposal for a computer simulation model by Price (1959) comes as close perhaps to the "synthetic" definition as any model to date. Working with the idea of eventually simulating migration in the continental United States, the model breaks down the migration phenomenon into three components: (1) the mobility potential of individuals based on characteristics of age, sex, race, marital status, and employment status (for males, the author plans to add education, occupation, and family size); (2) the characteristics of places of origin and destination, including population density, urban or rural status, and contiguity; and (3) a rough interaction component between (1) and (2) since "a sunny climate may hold little attraction for a person age 30, but at age 65 or 70 such a place may exhibit tremendous attraction" (1959:666).

The advantage of the Price proposal over others is that it allows for the inclusion of probability figures gained empirically that correlate with mobility potential (personal characteristics of migrants and the characteristics of origin and destination points). Thus, the computer first calculates the probability that an individual of certain characteristics will migrate across a state border during a one-year period and then partitions this first probability into the probabilities that he would migrate to each of the other 47 states. He uses a table of random numbers for both purposes. The procedure is repeated for all members of the sample and then all population totals and state characteristics are computed on the basis of the net migration that has resulted. This is then adjusted for aging by year, deaths, and changes in marital status. The major constraint of the Price model is that it assumes an eventual equilibrium distribution wherein a population will redistribute itself in proportion to the populations of the sub-areas, modified by contiguity. For various reasons which remain unclear, the Price model was never implemented. The simulation developed in our project, while not stemming directly from Price's research, is similarly oriented and carries some of his expectations to fruition.

Conclusion

In considering attempts to generalize about the condition of human migration, we have distinguished between qualitative research and quantitative models. Actually, the qualitative-quantitative distinction is somewhat misleading in that it appears to imply a lack of rigorous methodology in the former instance. This is clearly not the case. However, the distinction does suggest a difference in intent, a difference in direction, which we have duly noted.

In summarizing the qualitative contributions then, we attribute to these the traditional concerns of anthropology and sociology: the construction of typologies, social problems analysis, studies in social mobility, decision-making theory, studies in acculturation, and research into the impact of migration on the migrant, his family, and his community. Many such studies operate at the theoretical micro-level -- at the level of individual motivations and actions. As such, they complement the quantitative models, since the latter tend to focus on group motivations and actions. To date, no encompassing sociological theory of migration has surfaced in the literature, although a need for such a theory has been indicated.

Quantitative models of migration are initially represented by the gravity formulations of the 1940's and 1950's. New models -- the push-pull and probabilistic constructs -- have gained in importance since around 1960. Complicating the task of developing an evolutionary scheme for quantitative research is the reality that all of these models, in one form or another, persist to the present time. The gravity model, for example, remains embedded in the geographical literature concerned with the spatial distribution of peoples. The push-pull model with its emphasis on causality is represented mostly in the writings of economists, sociologists, and demographers. Combined in nearly all of this research are probabilistic elements. So where do we begin to summarize the field of formal quantitative analyses of migration?

There are, in fact, several unifying threads that run through the literature. In purely mechanical terms, we can see a general progression from simple bipolar constructs to more sophisticated multipolar field models. Moreover, we can see an increasing tendency to process larger amounts of data and to tackle more complex problems. Let us return to the five questions posed earlier in the paper.

1. Who moves?

2. How many move (in terms of volume or rate?)

3. Why do they move?

4. How far do they move?

5. Where do they move?

The gravity models deal, in the main, with questions 2 and 4; the push-pull models, 1, 2, 3, and 4; the probability models, 2, 4, and 5; and the synthetic models, 1, 2, 3, 4, and 5.

Perhaps the most significant issue reflected in the search for a predictive, quantitative model of migration is the constrast between universalism and relativism. The determinism in the earlier gravity models has been noted and reflects broadly Ravenstein's contention that migratory behavior can be reduced to a series of universal principles. The issue is further kept alive in the economic thesis, the belief in the overarching importance of regional wage and employment differentials in the decision to migrate. Accepted implicitly by Stouffer in his modified gravity model, the economic thesis has generally withstood empirical testing by regression procedures and has been compared favorably against a pure Markovian model. The economic thesis also figures heavily in our own simulation model. For all of this, considerable skepticism remains over ever being able to reduce human behavior to a simple formula or formulas. Migration, as the critics of universalism see it, is a phenomenon forever tied with national economies, political structures, and developmental stages. It is also a phenomenon that varies by state, by region, and with the individual migrant. Consequently, a call has gone out for increased empiricism and the exercise of relativistic thinking. The present research and overview will be followed by more intensive studies in Mexico and other countries to help meet the needs identified in this study.

CHAPTER III

INTERNAL MEXICAN MIGRATION

ANNE WRIGHT

Historical analyses are particularly appropriate to the study of migration, for it is only within an historical framework that some of the causes of migration can be understood. Migration represents a response to social, political, and economic factors; as these factors change over time, so do patterns of migration.

Although the history of migration in industrial countries such as the United States has been studied (Kuznets and Thomas 1958; Bogue 1969) few detailed studies have been conducted concerning the history of the movement of peoples in countries which have modernized during the past century. A major reason for this is that sources are unavailable or unreliable, and even when their accuracy is unquestionable, the type of information which is collected frequently varies from year to year. This problem is further compounded when the aim is historical research, for statistics tend to decrease in reliability as one searches back into the past.

Mexico is a case in point. Although some data has been collected in recent decades in the Mexican census, much information which might be useful for a discussion of characteristics of migrants (age, sex, education, income) remains unavailable. The first Mexican census was taken in 1940; at that time respondents were asked if they were born in the state in which they resided when the census was taken. It was only after 1950 that respondents were asked to name their state of birth. Therefore, only after 1950 is it possible to calculate both the number of out-migrants as well as lifetime migrants, or those individuals who were living in a state different from the one in which they were born. Place of birth statistics are the only figures that are consistently available regarding internal Mexican migration, with change of residence figures available only for 1970. As a result, most analyses of internal Mexican migration have summarized available census data (Whetten and Burnight 1956) without considering either the history or causes of migrant streams.

This chapter shifts the focus from the more traditional analyses of migration streams to the historical context of migration by looking at the social, economic, and political factors which seemed to prompt people to migrate from one state to another at a certain time. The patterns of migration are treated as dependent variables, as the response to differential regional well-being. The correlation of migration with historical circumstances demonstrates both the advantages and limitations of hindsight; although suggesting factors which may motivate people to migrate in the future, the argument includes only those forces which have motivated them in the past. Nevertheless, the history of science suggests that the ability to predict future patterns relies on the precision of the general theory which in turn is constructed on the strength of historical analyses (Burch's comments on Germani 1964a:331).

The Historical Context of Internal Migration

Overview

Internal migration is often a response to differential economic opportunity associated with different locations. Whether people tend to maximize opportunity or minimize risk, the result is the same: migration functions as an adaptive response to regional differences in economic, political, or social well-being. Further, internal migration accounts for most of the population redistribution that is indispensable to economic growth.

The history of Mexico since the Revolution of 1910 encompasses a number of interrelated trends which can be broadly termed "development": urbanization, economic development, industrialization, increasing political stability, modernization, and the rise of the middle class. Development is here defined as "the

better use of natural and human resources, changes in the structure of an economy, and the enhanced capacity to increase . . . a society's productive base" (Hansen 1971:43). Migration has operated in the historical context of development as both cause and effect for it operates as a response to differential well-being and consequently changes these patterns. It represents a major contributor of labor for economic development; since economic development is concentrated in urban centers, migration tends to be rural to urban (Balan and Jelin 1972). Political stability has increasingly created a climate in which migration is a viable response to better known opportunities and risks. Modernization and the rise of the middle class have provided opportunities for increased social well-being.

Table 3.1 illustrates some of the separate demographic and social consequences of these developmental trends. It provides a statistical summary of the trends which will be discussed in the following sections. This table demonstrates that the fortunes and living conditions of Mexicans since the turn of the century, in terms of literacy, social class, and Gross Domestic Product, have gradually improved. The number of people who are migrating within Mexico has steadily increased from the time the first figures were available, 1940 to 1970. Additionally, the rate of migration, that is, lifetime migrants as a percent of the total population, has continually increased, from 10.6 percent to nearly 15 percent.

The following sections, organized by time periods, discuss the general conditions which existed at various times in Mexican history. Following a brief national outline of relevant trends for each time period, the differences in regional development will be discussed in terms of social, political, and economic conditions which have affected migration.

Pre-Revolutionary Mexico

It has been suggested (Ball 1967:5) that during prehistoric times, Mexico was the scene of almost constant migrations. However, with the arrival of the Spaniards in the sixteenth century and the imposition of a colonial rule, these migrations of native people were brought to a halt. The most significant deterrent to mobility was undoubtedly the hacienda system. Hansen (1971:22) has characterized the hacienda system as including:

1. Large areas under the ownership of a single landlord, rarely less than 1,000 hectares in size,
2. Relative self-sufficiency in crops as well as other products needed for agricultural operations,
3. A permanent, resident labor force, usually tied by debt bondage,
4. Absentee ownership,
5. Cautious management,
6. Backward production methods.

Despite some regional differences in the workings of the hacienda system, the hacienda population was virtually tied to the land as indentured labor.

In addition to the hacienda system, two other factors inhibited migration before the Revolution of 1910. First, the Mexican economy was operating at a near subsistence level, with the exception of those areas where mining was carried on. Thus, few employment opportunities attracted workers from one area of the country to another. Second, lines of transportation and communication were so weak between isolated villages that information on employment opportunities was largely unavailable to the general population.

The causes of the Mexican Revolution were numerous and preceded the initiation of the military phase of the Revolution in 1910. The turn of the century had marked the end of a 25 year period of slow but steady economic growth. However, beginning in 1910, international demand for Mexican products decreased. A diminished market was particularly difficult for Mexico to bear because the

Table 3.1: Population Characteristics by Census Year

	1910	1921	1930	1940	1950	1960	1970
Total Population	15,160,369[1]	14,334,780[1]	16,552,722[1]	19,653,552[2]	25,791,017[3]	34,923,129[3]	48,225,238[4]
Total Lifetime Inmigrants[a]	Unknown	Unknown	Unknown	2,081,193[5]	3,305,608[6]	5,200,089[6]	6,984,483[7]
Rate of Migration[b][8]	Unknown	Unknown	Unknown	10.6	12.8	14.4	14.5
Percent of Population[c] that is Urban (2500+)	22.3[9]	25.3[9]	34[9]	35[9]	42.6[10]	50.7[10]	58.0[11]
Percent Increase in Population Since Previous Census[12]	11	-6	15	18.7	31.2	35.4	38
Percent Literate	20[13]	34[13]	39[13]	48[13]	56[13]	62[13]	72[14]
Percent of Work Force Engaged in Agriculture[15]	68.1	?	?	65.4	58.3	54.1	52.3
Percent of Population in Middle Class[d][16]	?	?	?	15.87	25.0	33.5	?
Growth Rates in Per Capita Domestic Product[17]	2.2	2.4	0	3.9	3.0	2.7	1.9

[a]Total population born in a state other than the one in which they reside at the time of census

[b]The number of lifetime migrants as a percentage of the total population

[c]A more accurate cut-off between rural and urban would be a population of 10,000 (See Ball 1971:8). However, 2500 or more inhabitants will be considered "urban" here because this data is consistently available since the earliest census.

[d]"Middle class" includes professionals, technicals, office workers, small tradesmen, and artisans (Hansen 1971:99).

Sources:
[1]Quinto Censo de Poblacion, 1930, Resumen General:x
[2]Sexto Censo de Poblacion, 1940, Resumen General:1
[3]Octavo Censo General de Poblacion, 1960, Resumen General:xxii
[4]Noveno Censo General de Poblacion, 1970, Resumen General:3
[5]Sexto Censo de Poblacion, 1940, Resumen General:1 - 39
[6]Octavo Censo General de Poblacion, 1960, Resumen General:244
[7]Noveno Censo General de Poblacion, 1970, Resumen General:151
[8]Calculation based on total lifetime migrants as a percentage of the total population
[9]Cumberland 1968:367
[10]Octavo Censo General de Poblacion, 1960, Resumen General:1
[11]Noveno Censo General de Poblacion, 1970, Resumen General:7-11
[12]Calculation based on percent difference between population at two census times
[13]Cumberland 1968:367
[14]Noveno Censo General de Poblacion, 1970, Resumen General:273
[15]Hansen 1971:42
[16]Hansen 1971:99
[17]Reynolds 1970:22

external orientation of the economy rendered it more sensitive to international trade cycles (Reynolds 1970:21). Industry continued to be dominated by foreign capital.

More importantly, President Porfirio Diaz' attention to economic growth was not balanced by substantive amelioration of social conditions. Myers (1965:135) comments that:

> Mexico's emergence as a modern nation was begun by Diaz, but the industrial capital formation that took place during his tenure was inappropriately matched with retrogressive changes in the social structure, particularly in the rural areas. Railroads, mining, petroleum, and manufacturing were encouraged, but so were haciendas, debt peonage, and contempt for the Indian population of the nation

By 1910, the population was increasing faster than the demand for labor; more people were unemployed each year. Wages were not rising as fast as prices; food shortages occurred with increasing frequency (Hansen 1971:21-22). The production of corn, the staple of rural Mexican diets, decreased between 1877 and 1910 by 50 percent per capita while export production of this crop increased (Cumberland 1968:204).

Social inequality was further exacerbated by increased concentration of real and financial assets and income in the hands of a small group of investors. "The strains on the Mexican social system induced in part by the developments in rural Mexico, . . . combined with an emerging challenge to the Diaz political system to precipitate a revolution which bled Mexico for 14 years" (Hansen 1971: 27).

From Revolution to World War II

The years between 1910 and 1940 were crucial ones in Mexican history, greatly influencing everything that has followed. During that time, Mexico evolved from a dictatorship, through a costly civil war, to become a modern nation experiencing impressive economic growth. Revolution permitted reform; reform initiated development.

1910-30. The immediate consequences of the Revolution were disastrous. There was tremendous destruction. "Class was pitted against class, army against army, region against region, and Mexicans against foreigners" (Reynolds 1970:26). The population actually fell from 15,160,369 in 1910 to 14,334,780 in 1921. Many of the deaths resulted from starvation and disease as well as from direct military action. As might be expected, agricultural production fell during this decade, as did mining and manufacturing.

There were, however, some more positive consequences of the Mexican Revolution as the Revolution became a process rather than a series of battles. Certainly one of the most important consequences was the initiation of agrarian reform. Unlike previous periods in Mexican history, the end of the military phase of the Revolution witnessed the beginning of an actual change in the structure of the land tenure system rather than a superficial reworking of details within an archaic frame. One aspect of this reform, treated in greater detail later, has been the government's more recent policy of encouraging large-scale commercial agriculture. A second aspect of this agricultural reform is the redistribution of land. This involved the breakup of haciendas into ejidos, that is, land owned by Indian villages, minifundias, or private plots under five hectares in size. Redistribution began with the Carranza decree of 1915 which stated that communal lands alienated since 1856 should be returned to their former owners. It has been speculated that "one of the major elements in the ferocity of the Revolution was a deep and passionate desire for land on the part of those whose very subsistence depended on agriculture in one form or another" (Cumberland 1968:240). The peasants quickly occupied the 1,301,749 hectares distributed by 1924 (Hansen 1971:30); the anticipation of redistribution of more land placated many more peasants despite the tremendous deprivation they were experiencing. Consequently, the years from the

Revolution to the 1940's were ones of transition in agriculture, marked by insecurity of land tenure and low levels of investment and production.

Despite low production, however, other aspects of land reform had important social and demographic consequences. As hacienda land was redistributed, a free labor force, no longer tied by debt to the hacienda, was created. "The breakup of the hacienda system and the creation of ejidos removed many obstacles to social mobility, encouraged industrious activity on the part of the Indian peasant, and resulted in a significant increase in the size of the middle and upper income group" (Hansen 1971:35).

Thus, the Revolution had a major indirect impact on the movement of Mexicans as the economic, social, and psychological bonds to traditional Mexico were released. The immediate demographic consequence of the military phases of the Revolution was increased mobility as thousands of peasants left villages and haciendas to join the Revolutionary armies. Although this mobility represented a major change from the static hacienda situation, it can not be viewed as permanent migration. It was, rather, an expression of transition, of demographic as well as political instability. Myers (1965:68) suggests that the decision to leave the villages was prompted by the danger of remaining there or by the call to arms. Only after the Revolution did the peasants leave the countryside for reasons more directly related to poverty and to the growth of opportunities elsewhere.

Unfortunately, there are no reliable figures on migration for the 1910's and 20's. It can be safely assumed, however, that as their land was redistributed, if not before, land owners, who possessed a degree of skill and education which ensured their success, migrated to the city or out of the country (Hurtado 1960:53). Other sections of the rural populations may have followed. It is likely that what urbanization did take place during the 1920's was less the result of new opportunities and rising expectations than of rural deprivation. Although there is some controversy over when urbanization began, it is evident from Table 3.2 that urbanization was well in progress for all classes by 1940. Given the fact that the 1920's in rural Mexico were years of economic depression, it is quite possible that people attempted to escape their suffering by moving to the cities.

Table 3.2: Changes in Proportion of Urban and Rural Populations, by Class

Social Class	1895 Number	1895 Percent	1940 Number	1940 Percent	Proportional Change
Total Population	12,698,330	100.00%	19,653,552	100.00%	
Upper	183,006	1.44	205,572	1.05	-27.1
Urban	49,542	0.39	110,868	0.57	+46.2
Rural	133,464	1.05	94,704	0.48	-54.3
Middle	989,783	7.78	3,118,958	15.87	+104.0
Urban	776,439	6.12	2,382,464	12.12	+98.0
Rural	213,344	1.66	736,494	3.75	+125.9
Lower	11,525,541	90.78	16,329,022	83.08	-8.5
Urban	1,799,898	14.17	4,403,337	22.40	+58.1
Rural	9,725,643	76.61	11,925,685	60.68	-20.8

Source: Hansen 1971:36

1930-40. Despite the deprivation which Mexico experienced in the 1920's, by the end of that decade the country was ahead of her 1910 production in mining, petroleum, and electrical power generating. Labor conditions were improved and the government was encouraging education (Reynolds 1970:31). Although this recovery from the chaos of revolution was impressive, the institutional basis for sustained growth was not established until after the 1930's (Reynolds 1970:31).

The world-wide economic depression beginning in 1929 set back Mexico's struggle to recover from the Revolution. For a second time, Mexico faced a decline in demand for exports. The economic situation was not only difficult for those in a position to invest; the depression affected the lives of the poor at least as much as the lives of the rich: "The great mass of the population remained, materially, in conditions worse than those for which the Diaz regime has been so bitterly castigated. The average peon ate measurably less in 1936 than in 1896, and the low real wage paid to him in 1910 would have looked magnificant in 1934. But during those years of deprivation, a vast array of institutional changes were in the making" (Cumberland 1968:275).

These institutional changes, as well as external forces, aided in the gradual economic recovery which Mexico experienced during the middle and late 1930's. Internal structural reforms included the nationalization of the railroads in 1935, the acceleration of land reform, the expropriation of the petroleum industry in 1938, and the encouragement of manufacturing and other sectors serving the domestic economy. Agricultural and manufacturing production slowly increased, and literacy rose from 39 percent in 1930 to 48 percent in 1940 (Cumberland 1968:258). External forces, especially the outbreaks of the Spanish Civil War and the hostilities which preceded World War II in Europe, also influenced Mexico's recovery by gradually increasing demand for Mexican products. Trade, during the decade, was still less, on the average, than during the Porfirian period, with the volume of exports, as well as imports, lower than in 1910.

Mexico's gradual recovery was expressed in demographic changes. Again, the lack of data requires that patterns of migration be inferred from census data available in 1940. Given poor transportation and the unestablished nature of migrant streams in the nation as a whole, migration required considerable initiative and was especially selective in favor of educated people, who were more likely to be aware of opportunities elsewhere, and more likely to succeed.

As of 1940, some 10 percent of Mexicans were living in states other than the ones in which they were born. Table 3.3 which ranks the states according to rates of in-migration, illustrates the type of states to which migrants were attracted. More urbanized states, signified by "*," were clearly preferred by migrants. In fact, between 1921-30, the combined population of the Federal District, Guadalajara, and Monterrey increased by 58.3 percent, which is almost four times the average national rate of increase (15.5) for Mexico as a whole (Myers 1965: 68). The greatest number of migrants, 820,894 or five percent of the entire population, took up residence in Mexico City. The northern border states also attracted substantial numbers of migrants.

Figure 3.1 graphically exhibits the relative rates of lifetime in-migration for 1940.

Rapid Growth: 1940-50

The 1940's mark the beginning of rapid economic growth in Mexico. Three interrelated trends became apparent during this decade, all of which had direct relevance for internal migration: industrialization, modernization, and urbanization.

During the decade 1940-50, the Gross National Product rose at the rate of 6.7 percent per year, while the population increased only at a rate of 2.8 percent (Reynolds 1970:36). World War II served as a major force in Mexican development triggering a sudden awakening of foreign demand for Mexican exports. Both imports and exports increased tremendously during this decade. By 1940, more than half of the land to be redistributed had changed hands, with 49 percent of land being cultivated under ejido ownership (Hansen 1971:30). Government policy under President Avila Camancho (1940-46) encouraged industrial growth in the form of infrastructural investments such as expanding public utilities, irrigation metworks, roads, railroads, and communications, with less emphasis on social welfare in the form of land distribution. The road system was doubled, and the amount of agricultural land which benefited from public sector investments nearly tripled (Griffiths 1972:19).

Figure 3.1: Rates of Lifetime In-Migration Relative to the National Average, 1940

United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Lifetime In-Migration

National Rate:	10.8%
Average Range:	8-12%
Greater than average rate:	12+ %
Less than average rate:	8- %

For method of calculations of "rate," see Table 3.1, note b.

Table 3.3: Number of Lifetime In-migrants to Mexican States and Percentage of the Number of Residents, 1940

State	Number	State	Number
Baja California*	37,957 (48.1%)	San Luis Potosí	48,086 (7.1%)
Federal District*	820,894 (46.7%)	Zacatecas	37,508 (6.6%)
Quintana Roo T	4,887 (26.1%)	Sinaloa	31,345 (6.4%)
Tamaulipas	109,708 (23.9%)	Querétaro	13,244 (5.4%)
Colima	17,970 (22.8%)	Tlaxcala	11,740 (5.2%)
Coahuila*	119,243 (21.6%)	Jalisco	64,121 (4.5%)
Morelos	37,876 (20.7%)	Baja California T	2,278 (4.4%)
Aguascalientes	29,609 (18.3%)	Hidalgo	34,118 (4.4%)
Nayarit	33,328 (15.4%)	Puebla	57,566 (4.4%)
Nuevo León*	79,414 (14.7%)	Guanajuato	39,243 (3.7%)
Chihuahua	70,532 (11.3%)	Michoacán	44,153 (3.7%)
Durango	53,611 (11.1%)	México	39,769 (3.5%)
NATIONAL AVERAGE	(10.6%)	Tabasco	9,314 (3.3%)
Sonora	36,698 (10.1%)	Chiapas	13,569 (2.0%)
Veracruz	135,586 (8.4%)	Guerrero	14,734 (2.0%)
Campeche	6,447 (7.1%)	Yucatán	7,623 (1.8%)
		Oaxaca	19,022 (1.6%)

"Lifetime in-migrants" refers to the people who reside in a state at the time a census is taken who were born in some other state within the country.

*Heavily urbanized states

Source: Sexto Censo de Poblacion 1940, Resumen General:1-39

The shift in governmental priorities from land redistribution to land development is crucial to development since private investment is channeled into those sectors and regions where there has been public infrastructural expenditures. In Mexico, the redirection of investments in the 1940's was paralleled by an increase in the proportion of domestic as opposed to foreign investment. These trends reflect the difference between growth, which had occurred before, and development, or changes in the structure of an economy, which began around 1940 (Hansen 1971:43).

Agricultural production during the 1940's continued to grow at an annual rate of 5.8 percent, slightly lower than growth of the industrial sector at 8.1 percent. Agricultural growth during this period was unquestionably related to public investments in irrigation, better transportation facilities, and gradual mechanization and modernization. Industrial sectors were expected to buy the products of the domestic agricultural sector and to produce manufactured items in exchange. Further, this bright economic picture was not diminished by the coming of peace as President Miguel Aleman stimulated internal demand in the immediate postwar years through a full scale program of import substitution. Nationalization thus stimulated internal trade and specialization. The major bottleneck for continued growth was how quickly new equipment could be obtained and put into production. This accounted for a substantial amount of the increase in imports for the decade. The economy also benefited from improved techniques which were associated with the new capital goods. In summary, by the end of the 1940's, extensive industrialization had occurred and the economy was booming. Labor of all types was in demand and communication and transportation services were vastly improved. Finally, the attraction of the cities was increasing at the same time that the difficulties of getting there were decreasing (Myers 1965:68-69).

This generalized picture of national economic growth and prosperity, however, glosses over significant regional differences in the degree of development and rate of growth. Myers (1965:136) notes:

> A few regions of Mexico had advantages prior to rapid economic growth and are the most developed today. Others had fewer advantages and experienced less growth. The leading regions have been and are the Federal District and the northern border states. The poorest and least developed are the Southernmost states on the Pacific. Disparities between the advanced and least advanced regions are large and, in many instances, have been increased by the rapid development since 1940.

It is at this point that internal migration occurs, operating in response to differential rates of development.

It is clear that migrants were selective in their choice of destination during the decade from 1940 to 1950 (Table 3.4). Sanders (1974:5) cites the policy focus on industrialization and population pressure on land and water resources as stimulants of migration to the cities. The program of industrialization increased the nonagricultural labor force and stimulated the expansion of the population to urban areas. Table 3.5 demonstrates the substantial difference between rates of in-migration to selected rural and urban states. In fact, lifetime net migration to the Federal District is almost 10 times as large as the lifetime net migration to the next most

Table 3.4: Lifetime Net Migration, 1950

State	Number	State	Number
Federal District	1,303,343	Campeche	-2,507
Tamaulipas	169,159	Chiapas	-4,969
Baja California	125,807	Aguascalientes	-12,291
Chihuahua	51,389	Baja California T	-12,315
Nuevo León	41,796	Sinaloa	-20,373
Morelos	36,693	Tabasco	-21,930
Coahuila	31,836	Yucatán	-25,670
Sonora	22,392	Guerrero	-34,087
Nayarit	18,276	Tlaxcala	-35,010
Colima	10,801	Durango	-46,416
Veracruz	5,883	Querétaro	-69,030
Quintana Roo T	4,095	Oaxaca	-73,395
		Puebla	-81,237
		San Luis Potosí	-93,266
		Hidalgo	-130,236
		Zacatecas	-132,835
		Michoacán	-181,363
		Jalisco	-234,629
		Guanajuato	-266,916
		México	-343,009

Source: Calculation based on the difference between lifetime in-migration and lifetime out-migration for each state. Figures taken from Octavo Censo General de Poblacion 1960:148-243.

attractive state, Tamaulipas. Other states which attracted migrants, Veracruz and Tamaulipas, were those which benefited from increased stability as the result of nationalization of the petroleum industry and government policy encouraging the development of this industry. Northern border states, including Nuevo León and Chihuahua, again experienced high rates of in-migration. In addition to proximity to the border, which has always served as an attraction to migrants, additional public funds expended on irrigation systems and agricultural modernization attracted farm workers to these areas. Another factor influencing high rates of in-migration in the North and in urban areas was a wage differential: in 1945 a farm worker received 40-60 cents a day, whereas unskilled labor in more developed areas received more than a dollar a day (Corwin 1973a:573) (Figure 3.2).

Figure 3.2: Rates of Lifetime In-Migration Relative to the National Average, 1950

United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Lifetime In-Migration

National rate:	12.8%
Average rate:	10-14%
Greater than average:	more than 14%
Less than average:	less than 10%

For method of calculations of "rate," see Table 3.1, note b.

Table 3.5: Rates of Lifetime In-migration to Selected Urban and Rural States, 1950

State	Rate	State	Rate
Urban:		Rural:	
Federal District	46	Zacatecas	5
Coahuila	19	Guerrero	3
Baja California	59	Oaxaca	3
Nuevo León	18	Chiapas	2
		Hidalgo	4

Source: Myers 1965:16
Calculations based on rate of migration for each state, as taken from Septimo Censo General de Poblacion 1950: 50-51. For method used, see Table 3.1, note b.

As in the previous decade, such rural states as Chiapas, Oaxaca and Guerrero continued to lose inhabitants. Michoacán, characterized as having "widespread minifundista agriculture, few modern investments and population pressure on cultivatable land" (Sanders 1974:5) lost nearly 15 percent of her native born before 1950. Zacatecas, Guanajuato, and San Luis Potosí, which previously formed centers for the now diminished mining industry, lost substantial numbers of inhabitants through migration. The high negative lifetime net migration in the state of México can be explained with reference to its proximity to Mexico City.

While the dominant migration streams flowed principally to Mexico City, Guadalajara, Monterrey, and to cities along the United States border, smaller migration streams increased the size of state capitals, smaller commercial and industrial centers, and the areas of developing large scale agriculture in the Pacific Coast states of Sonora and Sinaloa. Migration thus provided much of the manpower required for the economic expansion occurring in various regions. Figure 3.2 depicts internal migration as of 1950.

A Second Decade of Development: 1950-60

During the 1950's the Mexican economy continued to expand with the rate of economic growth exceeding the rate of population growth. However, the pace of growth was slower than during the previous decade. The average per capita growth in national production, as one measure, slowed from a high annual 3.9 percent in 1940 to 3.0 percent per year in 1959. Two major contributors to economic growth were increasing government development of new lands for cultivation and continuing industrialization.

After 1950, there was a substantial increase in the number of hectares which benefited from federal irrigation investments. In one area, the North Pacific, over half of all the land under cultivation profited from federal hydraulic projects by 1958 (Reynolds 1970:156). Although this type of investment began in the 1940's, its greatest impact for migration did not occur until the 1950's when it became better established. Such irrigation projects frequently provided a major economic resource in previously lightly populated zones.

These large scale hydraulic developments reflect the second form of governmental expansion of agriculture. The first, land redistribution, continued at a slower pace than in previous decades. By the 1950's government policy was encouraging the growth of commercial agriculture as part of the policy initiated by Camacho emphasizing production rather than redistribution.

As the result of government policy, the development of high yield seeds, and the creation of new industrial markets for rural crops, agricultural production continued to increase during this decade in aggregate terms (Reynolds 1970:368-369). However, agricultural products contributed proportionately less to the gross domestic product than they had in previous years, dropping from 23.2 percent in 1940 to 17.7 percent in 1962 (Hansen 1971:42).

Government policy had major ramifications by encouraging the bifurcation between the traditional and modern sectors in Mexico. The divergence of the two aspects of Mexican agriculture, called "dualism," (Hansen 1971:75; Cline 1962:101-112) separates a small segment of modern, mechanized farms which participate in national networks of education and communication, from a second, larger segment, which utilizes traditional techniques of farming. It has been estimated that even today, some 85 percent of land holdings are farmed by non-mechanized means (Hansen 1971:81).

The amount of land farmed by more modern methods increased since World War II, thus liberating the small farmer from direct dependence on the land. This trend has had major ramifications for migration as the rural population has rapidly become available for urban employment. The percent of the labor force in each state which is employed in nonagricultural sectors, therefore, serves as a rough approximation of the degree of participation in the more modern, industrial sector of the national economy.

A second aspect of economic growth during the 1950's was accelerated industrialization. Foreign investment combined with internal encouragement of industrial development after World War II and particularly after 1950, to expand and diversify existing industries. Even more important were the multitude of new industries such as the automotive businesses, which began pouring their products on foreign and domestic markets. New industries were encouraged by continued federal expenditures for roads, railroads, electrical power facilities, and subsidies of airlines, buses, and fuel costs. The size of the domestic market had grown, as a consequence of an improved distributive system as well as increasing prosperity. There was an increasing diversification of exports, benefiting more industries and rendering Mexico less susceptible to fluctuations in the international market. During this decade, Mexico increasingly became productively self sufficient, and better unified as all aspects of communication and transport were improved. Such industrialization is, of necessity, tied to urbanization: "the population of a country mainly devoted to agriculture is spread over its whole cultivable surface area . . . industry, on the other hand, collects together large masses of human beings" (Wigny 1953:3). Thus, the 1950's in Mexico witnessed accelerated urbanization.

There have been numerous social consequences of these developments. First, some scholars have noted that economic development has meant increasing prosperity for many Mexicans: "Because population growth has become associated with a shift in the work force from subsistence to commercial agriculture and urban employment, the mass of the population is beginning to share, now as never before, in the productive gains from technological change and capital formation, brought about by high rates of savings and investment" (Reynolds 1970:42).

There was indeed a slow rise in the general standard of living, and substantial upward mobility. However, increasingly unequal distribution of the benefits of economic prosperity became a serious problem for Mexico. Unequal distribution of wealth represents the social expression of the pattern of dualism in the agricultural sector and corresponds to the distinction between rural and urban. In most cases, urban states, characterized by economic development, enjoyed a high monthly income, while rural, underdeveloped states experienced the lowest average wages. Thus, despite a slow overall rise in the standard of living, the 1950's witnessed a falling relative standard of living of those at the lowest income levels (Hansen 1971:70).

There were other beneficial social aspects of the developing economy. Real gains were made in the availability of health services. Even more spectacular were the improvements made in the realm of education. The percent of primary school-aged population (6-14) actually enrolled in school rose from 48.5 percent in 1950 to 65.6 percent in 1960 (Cline 1962:199). Again, however, there is tremendous disparity in the figures for rural as opposed to urban areas. In 1950, some 90 percent of urban primary-aged children attended school

(Cline 1963:200), while only 35.7 percent of rural school-aged children were enrolled (Myers 1965:47). Again, the states which offered their working population the lowest wages generally tended to have the lowest literacy rates.

Table 3.6: Agricultural Employment, Average Monthly Income, Literacy and Degree of Urbanization by State, 1950

State	Economically Active Pop. on Non-Agric. Employ., 1950[1]	Worker's Monthly Income, Pesos, 1950[2]	Percent of Pop. that is Literate, 1950[3]	Percent Urban Pop. 1950[4]
Federal District	95.3	289	81.7	94.3
Nuevo León	59.0	243	78.5	54.3
Baja California	54.4	471	81.3	62.3
Coahuila	50.8	222	74.1	55.5
Aguascalientes	49.4	211	69.0	52.7
Baja California T	48.3	300	77.3	32.1
Tamaulipas	47.4	250	74.2	60.0
Sonora	45.6	259	72.6	43.5
Chihuahua	45.0	255	72.8	42.5
Campeche	42.6	287	62.1	55.4
Jalisco	41.2	194	61.2	60.3
Colima	40.8	202	66.7	58.4
Yucatán	40.2	186	64.1	53.4
Quintana Roo T	36.1	277	62.9	25.6
Veracruz	33.2	202	48.9	31.8
Morelos	33.0	172	58.8	42.2
Guanajuato	32.9	173	44.3	39.9
Puebla	32.8	164	44.9	32.0
Sinaloa	32.4	208	58.2	26.5
San Luis Potosí	31.0	180	48.7	28.7
Nayarit	30.1	171	61.6	32.6
Tlaxcala	29.7	158	55.0	37.8
Querétaro	29.6	155	36.2	22.8
Durango	29.1	193	68.6	27.3
Hidalgo	28.6	149	40.5	20.2
Michoacán	26.6	154	45.7	30.6
México	26.5	146	48.1	25.7
Tabasco	24.1	172	57.4	20.5
Oaxaca	21.9	133	37.1	20.1
Chiapas	21.4	162	34.6	21.5
Zacatecas	21.2	162	59.2	23.9
Guerrero	19.3	176	32.0	20.8

Sources: [1]Benitez Zenteno 1961:52
[2]Benitez Zenteno 1961:50-51
[3]Benitez Zenteno 1961:51
[4]Septimo Censo General de Poblacion 1950:26-27

As during the 1940's, a clear pattern of increasing disparities in development in various regions of Mexico is evident as displayed in Table 3.6. Slow development is associated with low wages. It is also associated with greater participation in agricultural employment, greater rural population, and a high rate of illiteracy. Benitez Zenteno, in one of the few valuable analyses of Mexican migration in its historical context, has demonstrated (1961:48-55) that these factors are also associated with substantial out-migration for the decade 1950-60. Table 3.7 ranks states according to intercensal net migration from high positive net migration for 1950-60 to high negative net migration. Generally speaking, states which had low literacy rates as well as low wages in 1950, also experienced substantial negative net migration during this intercensal period. Those states with high positive net migration for the same intercensal period represent the other half of dual Mexico, the more modern area of high development.

Table 3.7: Intercensal Net Migration, 1950-60

State	Net Migrants	State	Net Migrants
Federal District	261,551	Baja California T	-5,225
México	124,191	Campeche	-6,781
Nuevo León	80,992	Nayarit	-7,072
Chihuahua	64,684	Tabasco	-14,815
Baja California	64,647	Sinaloa	-27,891
Sonora	53,214	Jalisco	-29,571
Veracruz	33,808	Aguascalientes	-31,591
Tamaulipas	26,993	Tlaxcala	-32,285
Morelos	24,048	Yucatán	-32,641
Quintana Roo T	5,504	Chiapas	-38,100
Colima	573	Querétaro	-39,566
		Guerrero	-44,183
		Coahuila	-66,212
		San Luis Potosí	-74,685
		Puebla	-83,693
		Hidalgo	-85,136
		Guanajuato	-96,372
		Oaxaca	-99,347
		Durango	-103,972
		Zacatecas	-110,128
		Michoacán	-155,408

Source: Calculations based on Octavo Censo General de Población 1960:148-243
Intercensal net migration refers to the difference between in- and out-migration in a particular state in the time since the last census was taken. A positive figure signifies that there have been more in- than out-migrants during the intercensal period, while a negative figure indicates that out-migration has exceeded in-migration. The formula follows:

Intercensal net migration (UNESCO 1970:7):

$$\text{Net } M = (I_{t+n} - O_{t+n}) - (S_I I_t - S_o O_t)$$

where I_t and I_{t+n} = the numbers of lifetime in-migrants to a particular area at two censuses at times "t" and "t+n"

O_t and O_{t+n} = the corresponding lifetime out-migrants

S_I and S_o = the intercensal survival ratio giving the proportions of I_t and O_t that will survive the intercensal period.

Note: Positive and negative net migration are not equal in these calculations because, (1) 191,392 individuals did not specify their state of birth, although it differed from their state of residence, in 1960, and (2) the survival ratios used are less than accurate because no age data was available for migrants. These measurements thus assume that the survival ratio of migrants is the same as that of the population as a whole.

For example, approximately three-fourths of the newly irrigated land, which represents a substantial part of public sector investment for this decade, was located in north and northwest Mexico (Hansen 1971:58). As expected, Baja California, Chihuahua, Sonora, and Nuevo León experienced substantial positive net migration during the decade from 1950-60.

Clearly, the correspondence between low wages, low rates of literacy, a high percent of labor force in agriculture, a high percent rural population, and high negative net migration is not exact. A few states, in fact, show the opposite pattern of migration than expected. According to these measures of development, México, for example, would be expected to experience high negative net migration. The increase of migrants to the state of México, which almost surrounds the Federal District, corresponds to the decreasing rate of in-migration to Mexico City. This suggests that people have continued to migrate in the direction of the Federal District, but in recent years, as the city has become saturated with migrants, they have tended to settle in the vicinity of the city rather than within the city limits. Likewise, Quintana Roo T and Veraçruz still benefited from the development of the natural gas and petroleum industry, and consequent elaboration of service industries, in the form of positive net migration.

Coahuila and Aguascalientes registered high negative net migration. A partial explanation for this unexpected result is that in states where the population is primarily urban based, unless there is continuous substantive expansion of the economy, out-migration will tend to exceed in-migration. Unfortunately, the four measures of development used here do not effectively measure "expansion." A second factor influencing out-migration from Coahuila is undoubtedly the proximity of Monterrey, which operates like the Federal District in attracting potential migrants from surrounding regions. In fact, the major source of migrants to Monterrey is Saltillo (Browning 1971:315). Browning (1971:315) characterizes this city as "unlucky," a place which has frequently been passed over for economic expansion.

Generally speaking, the final destination of most migrants has been larger urban areas. The municipios with the highest positive net migration rate (35 percent) were medium-sized urban centers, ranging from 9,000 to 13,000 in population (Stevens 1968:88). A study of migration to neighboring states, conducted by Claudia Koch and Theodore Downing for this project, produced data which supports Myers. The major conclusion of Koch and Downing's research is that rural to urban migration outweighs virtually every other migration stream between contiguous states. Further, their analysis of census data demonstrated that road availability, quality, and the presence of border towns tend to increase migration to adjacent states and municipalities. Figure 3.3 illustrates lifetime in-migration to states as of 1960.

The Most Recent Decade: 1960-70

Economic growth continued during the 1960's at a rate which was slightly higher than the previous decade, but which did not equal growth rates during the 1940's. There was a continuing trend toward industrialization with the manufacturing sector contributing a higher proportion of the GNP during the 1960's.

One of the keys to economic growth is high federal investment. In Mexico, government investment represented 15 percent of the GNP in 1960 (Needler 1971: 63). The pattern of government investments during this decade suggests a shift in federal priorities. Expenditures for communications, transport, and industrial promotion decreased slightly while services, including health, social welfare, and education, annually received a higher proportion of total federal investment.

Although federal expenditures for industry were continued, private investment aided in the expansion of existing industries and the establishment of new manufacturing enterprises. Industrial sector production has been encouraged by an expanding international, as well as domestic, market. Thus, the amount of Mexican products exported has slowly and erratically increased during the 1960's. At the same time, diversification of exports have decreased Mexican vulnerability to changing international demand (Hansen 1971:128). The value of Mexican exports rose at the rate of 8.5 percent per year, a figure which is close to the world rate of 8.7 percent annually, and substantially higher than the average 2.7 percent for Latin America (Needler 1971:63).

Figure 3.3: Rates of Lifetime In-Migration Relative to the National Average, 1960

United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Lifetime In-Migration

National Rate:	14.4%
Average Rate:	12-16%
Greater than Average Rate:	16+ %
Less than Average Rate:	12- %

For method of calculations of "rate," see Table 3.1, note b.

The agricultural sector also prospered, although it represented a decreasing proportion of the GNP. During the 1960's the Mateos administration encouraged the development of ejidos concentrating on cattle and forestry production (Cline 1963:214). Continued federal investment in irrigation, although proportionately less than in previous decades (Hansen 1971:57), encouraged the development of medium-sized and large farms. Again, there was tremendous variation between states in the percent of the labor force engaged in agriculture.

Between 1961 and 1970 the minimum wage more than doubled. In real terms this increase probably signified only slightly more buying power for 1970 over 1961, due to general inflation. By the end of the decade, there was less disparity between the rural and urban minimum wage but incomes in urban areas are generally higher than the minimum wage in those areas.

Once again, it is instructive to consider the relationship between intercensal net migration and four measures of "development": the percent of the labor force in agriculture, the minimum monthly wage, the percent of a state that is literate, and the percent of a state that is urban (Table 3.8, Columns 1-4). It is evident that, as in the 1950's there is a relationship between these measures and positive net migration, shown in Table 3.9. Before discussing the actual patterns of migration, each measure used will be evaluated for the decade 1960-70.

Table 3.8: Agricultural Employment, Average Monthly Income, Literacy and Degree of Urbanization by State, 1960

State	Percent State Labor Force in Agric. 1960[1]	Daily Minimum Wage in Pesos, 1960[2]	Percent Literate by State, 1960[3]	Percent Urban Pop., 1960[4]
Federal District	2.6	21.50	83	95.8
Nuevo León	32.1	18.69	80	70.4
Baja California	39.4	32.00	81	77.7
Coahuila	44.7	16.69	80	66.7
Aguascalientes	49.2	13.75	72	59.9
Chihuahua	49.9	19.76	74	57.2
Tamaulipas	50.0	19.29	77	59.8
Jalisco	52.1	15.80	65	58.5
Sonora	53.5	19.56	76	57.6
Colima	53.7	16.20	68	61.8
Campeche	54.6	13.26	68	63.2
Baja California T	56.2	17.94	79	36.3
Yucatán	58.9	16.89	65	59.8
Morelos	60.4	19.00	60	53.2
México	61.2	17.13	57	38.6
Guanajuato	64.2	14.52	51	46.4
Veracruz	64.4	18.77	54	39.6
Sinaloa	64.6	18.68	66	38.2
Puebla	67.0	16.61	50	39.2
Tlaxcala	68.3	14.50	61	43.8
San Luis Potosí	68.9	14.40	53	33.6
Quintana Roo T	69.1	20.00	64	31.4
Querétaro	69.7	11.86	42	28.1
Durango	70.2	12.28	75	35.5
Nayarit	70.7	13.00	65	42.6
Tabasco	70.9	16.00	61	26.6
Hidalgo	70.9	18.50	44	22.4
Michoacán	74.1	15.79	50	39.5
Chiapas	79.4	11.77	39	24.4
Zacatecas	80.1	13.21	63	27.2
Guerrero	81.2	13.07	37	25.7
Oaxaca	82.2	11.63	40	24.4

Sources: [1]Calculations based on Table 5.1
[2]Comision Nacional de los Salarios Minimos 1964:21-402. Calculations based on zone averages.
[3]Octavo Censo de Población 1960:290-298
[4]Octavo Censo de Población 1960:94-99

The best measure of out-migration for this decade is the percent in the labor force in agriculture. In only eight cases did the pattern of migration not fit the expected pattern. This can be explained with reference to historical factors, specifically the exodus of farm workers from the agricultural sector to industry or services (see Chapter V). The wage measure is the second most valuable predictor of intercensal net migration for this decade, probably because high wages correspond to the non-agricultural economic sectors. Literacy is the third most valuable predictor of net migration, not corresponding to expected patterns in 10 cases. The rural-urban measure was least useful in 1960-70, undoubtedly because of the increasing disparity between the cut-off for "urban" used in this report, that is, a population of 2,500 and what should really be considered "urban" in Mexico during this time. Finally, it is suggested that as migration becomes more common and as the migration stream ages, the selectivity of migrants decreases. Further, once an individual has migrated and as the risks and opportunities associated with migration become better known, migration becomes easier and occurs in response to less drastic conditions.

Migration during this decade did indeed become more common, with the volume increasing from 5,008,695 in 1960 to 6,984,533 in 1970. However, this increase represented a smaller rate of growth than that which occurred in the preceding decade.

All states which experienced positive net migration during this decade might have been predicted by using two or more of the measures of "development." Certain states, including Tabasco, Queretaro, and Jalisco registered a positive intercensal net migration for the first time, but as mentioned, in each case, their attraction might be predicted using measures of development.

Table 3.9: Intercensal Net Migration, 1960-70

State	Net Migration	State	Net Migration
México	833,448	Nayarit	-6,110
Nuevo León	140,214	Tamaulipas	-18,296
Sinaloa	48,708	Chiapas	-18,654
Jalisco	40,100	Federal District	-22,107
Morelos	35,475	Yucatán	-32,970
Baja California T	24,497	Tlaxcala	-35,264
Campeche	23,328	Veracruz	-41,936
Quintana Roo T	19,999	Chihuahua	-51,239
Colima	19,678	Coahuila	-60,378
Tabasco	13,207	Durango	-64,889
Aguascalientes	13,088	Guerrero	-110,619
Baja California	12,990	Puebla	-126,785
Sonora	6,128	San Luis Potosí	-128,033
Querétaro	2,997	Hidalgo	-133,737
		Guanajuato	-134,931
		Oaxaca	-162,060
		Zacatecas	-167,632
		Michoacán	-260,928

Source: Calculations based on 1960 and 1970 place of birth statistics. See formula used in Table 3.7.

For the first time, three states which might have been expected to continue their pattern of high positive net migration, experienced a negative net migration. They include Chihuahua, -51,239, the Federal District, -22,107, and Tamaulipas, -18,296. In the Federal District this reflects saturation. The reversal in the other two states suggests slowing expansion, as well as a substantial decrease in both the numbers and percent of the labor force in agriculture, in basically agricultural states. Coahuila and Yucatán experienced substantial out-migration, probably as a consequence of slowed expansion in all economic sectors.

Figure 3.4 exhibits the different rates of lifetime in-migration as of 1970.

Figure 3.4: Rates of Lifetime In-Migration Relative to the National Average, 1970

United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Lifetime In-Migration

National Rate:	14.5%
Average Rate:	12-16%
Greater than Average Rate:	16+ %
Less than Average Rate:	12-%

For method of calculations of "rate," see Table 3.1, note b.

Conclusions and Implications

The preceding half century has witnessed profound changes in Mexico. Structural changes have occurred in all aspects of the system. Revolution preceded reform, which subsequently evolved into political stability. Economic development has occurred at a rapid pace. Mexican society has become more flexible, as the more educated increasingly occupy positions in the middle and upper classes.

The growth of the Mexican economy from 1900-65 has been astounding. The relative importance of agriculture and mining has declined, while manufacturing and commerce have gradually accounted for more of the Gross National Product. One consequence of the change in the structure of the economy is the emergence of a pattern of dualism, or increasing disparity between the lifestyles, occupations, and opportunities of traditional, rural Mexicans and the more modern, urban sector of the population. During this time, the agricultural sector has evolved from a feudal system of debt bondage, to a dualistic system, encompassing modern, mechanized, commercial farms as well as small, family-farmed plots of land. Agrarian reform was accomplished at the expense of lost production during the 1920's. Nevertheless, economic production over the last three decades has been exceptional. The most rapid growth within the agricultural sector has occurred in commercial crops, such as coffee, wheat, cotton, and cattle, while growth in the production of traditional foods crops has been slow (Needler 1971:61).

Fortunately, Mexican development has been accomplished without sacrificing political and social stability. A major cause of this peaceful transition was that public sector infrastructural investments were not curtailed, but increased (Hansen 1971:46). Another cause of peaceful development is that unlike other Latin American countries, the Mexican political system has provided many rewards for the new industrial elite. In fact, these rewards have not been confined to the elites. The promise of land to rural peasants is as conservative a force as ownership of land itself (Hansen 1971:61). As a result, more Mexicans feel they have a vested interest in the maintenance of the system.

Social changes in Mexico have also been impressive. Beginning in 1940, sustained economic growth outran population increase. Within the next decade, the total of goods and services more than quintupled and agriculture quadrupled, while the population only doubled. Wages and salaries increased faster than the cost of living. This general rise in the standard of living, however, was accompanied by an increasing disparity in the fortunes of rich and poor. When faced with the perennial choice between high productivity and social justice, the Mexican government has opted, at least in earlier periods, for maximization of the growth rate, with little concern for existing inequalities (Needler 1971: 51). With the exception of land redistribution, no other major Latin American country has done less for the lowest classes.

The growth of the Mexican economy has produced one unqualified success, the increase in percent of educated people. The literacy rate has risen from 20 percent in 1910 to 72 percent in 1970. Between 1950 and 1965 the number of children in school more than doubled, rising from 48 percent to 69 percent. As in other social spheres, the disparity between rural and urban education systems continues, although the difference fortunately is decreasing over time. The quality of education in Mexico should be improving, with a decreasing student-teacher ratio and the increased number of teachers with a degree or certificate.

Demographic changes during this half century were also impressive. Most importantly, the population grew threefold from 15,160,139 in 1910 to 48,225,238 in 1970. It is currently growing at a rate exceeding three percent per year. A second demographic factor, internal migration, has affected more and more Mexicans over the years, by both aggregate as well as proportionate measures. In 1940, when the first census figures were available, 2,081,193 or 10.6 percent of all Mexicans, were living in a state other than the one in which they were born. By 1970, 6,984,483 or 14.5 percent had migrated.

In Mexico, migrant streams have flowed city-ward, reflecting the necessary association of industrialization with urbanization. Such urbanization includes rural to urban migration proper, migration from smaller towns to larger cities, and from the poorer to the more prosperous sections of the country. Besides the trend toward urbanization, this report has suggested a general association of in-migration with high literacy rates, high percent urban population, high percent

non-agricultural employment, and high monthly income. It is not suggested that this association is causal. Rather, migration represents one response to alterations in economic opportunity which is associated with economic growth. Thus, high literacy rates, substantial urban population and high wages are assumed to represent areas of high development. It is to these areas that migrants are attracted. In Mexico, therefore, this whole group of demographic shift signifies movement from the more traditional to the more modern aspects of a developing society.

On the basis of these findings, some tentative statements can be made with regard to demographic patterns in the 1970's and beyond. If the previous patterns of mobility continue, it can be assumed that more people will migrate, but will represent only a slightly increasing percentage of the population. It can also be assumed, simply because of the growing urban population, that rural to urban migration will contribute proportionately less to the volume of migration in the future. Nevertheless, as agrarian reform slows, and as the rural standard of living declines despite gains in education, it is likely that greater numbers of rural peasants will search for employment in centers of development.

CHAPTER IV

MEXICAN MIGRATION TO THE UNITED STATES

BARTON M. CLARK

People of Mexican origin hold a relatively unique position in the history of immigration to the United States due to the geographical proximity of the two countries. In fact, the first settlers in what is now the southwestern United States were not immigrating to a new country. They entered the region as colonials of the Spanish Empire. Even after Mexico gained her independence from Spain in 1821, residents of Mexico's interior moved to the northwestern frontier looking for new opportunities within their homeland. International military and political decisions made in late 1848 and 1854 moved the boundary between Mexico and the United States southward and made these people foreigners in what had been their own country.

In contrast to immigrants from Asia, Africa or Europe, immigrants from Mexico have not been separated from their homeland by long and relatively inaccessible distances. Although there is a legal boundary separating the United States and Mexico, it has never been a major impediment to the interaction of Mexican immigrants with Mexico.

The impact of this unique situation will be examined in its relationship to the push and pull factors that have influenced the immigration of people from Mexico to the United States. Further, earlier trends will be compared with current trends to determine if changes are occurring in the pattern of Mexican immigration to the United States.

An Historical Survey

Immigration Prior to 1900

Within a decade after Cortez's conquest of the Aztec Empire, Spanish explorers had begun to move northward toward what is now the present day United States Southwest. During the next two centuries, they were followed by priests, colonists, and Meso-American Indians.

Initially, these early travellers settled near long-established Indian groups. The colonization of New Mexico in 1598 was the most successful venture, though the areas which are now Arizona, Texas, and California received some settlers also.

In 1821, Mexico declared its independence from Spain, and took over the administration of all outlying areas. Mexico's control over the area was short-lived, however. Defeated by the United States in the Mexican-American War, Mexico was forced to sign the Treaty of Guadalupe Hidalgo in 1849 which ceded to the victors what is now the southwestern United States. Under the terms of the treaty, all Mexicans living within the area were given the option of becoming citizens of the United States, or moving within the new borders of Mexico. Approximately 2,000 people did return to their homeland, but the majority, between 73,000 and 100,000 people, chose to remain (McWilliams 1968:51-2; Samora 1975:65). McWilliams estimates that at the time of annexation, the distribution of the southwestern Spanish-speaking population heavily favored New Mexico, with Texas, California, and Arizona having proportionately fewer people (Table 4.1).

In the last half of the nineteenth century, immigrants were drawn to the Southwest by the expanding labor needs of agriculture, mining, and the railroads. By a strange irony, gold was discovered in California just days before the final signing of the Treaty of Guadalupe Hidalgo. Stimulated by the thought of new riches, Mexicans immediately flocked to this newly acquired United States territory. Later in the century, additional immigrants were to be drawn to the copper mines of Arizona. As agriculture expanded, especially in the

Table 4.1: Estimated Mexican Population in the Southwest at the Time of United States Cessation (1848)

Area of Contemporary State	Mexican Population
Arizona	1,000
California	7,500
New Mexico	60,000
Texas	5,000
TOTAL	73,500

Source: McWilliams 1968:52.

Rio Grande Valley of Texas and the central valleys of California, more Mexicans were encouraged to immigrate northward. Mexicans also contributed labor to railroad development in northern Mexico and in the southwestern United States. The completion of the railroads in northern Mexico also helped to establish an easy means of immigration to the Mexican-United States border (Grebler 1966:19).

In spite of these factors, immigration from Mexico to the Southwest prior to 1900 was gradual whether it was under the influence of Spanish colonization or the influence of pull factors within the United States economy. The total Mexican population in the United States was only 103,393 in 1900 (Gamio 1930:2). The most important aspect of migration during this period was that it defined the region of settlement for future immigration. Today 85 percent of all people of Mexican origin still live within the Southwest (U.S. Immigration Service 1974).

Immigration from 1900 to 1974

The turn of the century saw a dramatic upsurge in the immigration of Mexicans to the United States on a scale it had not previously experienced. Within the first decade of the new century, more immigrants from Mexico were registered than in the preceding 80 years (Table 4.2). This phenomenal increase in migration has continued almost unabated throughout the last 75 years.

Table 4.2: Immigration by Decade from Mexico

Decade	N	Decade	N
1821-30	4,817	1891-1900	971*
1831-40	6,599	1901-10	49,642
1841-50	3,271	1911-20	219,004
1851-60	3,078	1921-30	459,287
1861-70	2,191	1931-40	22,319
1871-80	5,162	1941-50	60,589
1881-90	1,913*	1951-60	299,811
		1961-70	443,301
		TOTAL	1,592,592

*No record for Mexican immigration from Mexico from 1886-93. Figures for these two decades cover only the years 1881-85 and 1894-1900.

Source: U.S. Immigration Service. Annual Report 1974.

Mexican migration to the United States in the twentieth century may be divided into two major waves separated by the United States depression of the 1930's. Although the Mexican Revolution which began in 1910 was the catalyst that initiated the first wave of migrants from Mexico, other events in Mexico played a part in stimulating migration to the United States at the turn of the century. Between 1876 and 1910 the population of Mexico grew from 9 to 15 million people. This rapid increase in population combined with the critical economic and social conditions resulted in a large migratory work force within Mexico some of whom began to immigrate to the United States even prior to the Mexican Revolution (Corwin 1973a:559). Due to the political turmoil of the revolutionary period (1910-26) and the economic instability of Mexico's recession (1926-29) the flow of immigrants to the United States steadily increased until 1929 (Camara 1975:3-4).

In the United States, there were economic pull factors at work. It was a time of prosperity and needed manpower. Laws such as the Chinese Exclusion Act of 1882 and the Gentlemen's Agreement of 1907 were designed to bar Chinese and Japanese from the United States (Samora 1971:34). This action created a vacuum in the agricultural labor niche vacated by the Orientals. The need for workers by the expanding United States agribusiness led to the establishment of labor recruiting centers on the border and in the interior of Mexico although such action often violated the Alien Contract Labor Law of 1885 (Corwin 1973a:563).

The need for additional Mexican agricultural laborers was stimulated by two legislative acts. The Tariff Act of 1897 which taxed foreign sugar made it more profitable for farmers in the United States to raise sugar beets. As a result, the sugar beet acreage increased from 135,000 acres in 1899 to 376,000 acres in 1906. The center of the industry was in Colorado, but Mexican workers were also drawn to beet fields in North Dakota, Minnesota, Michigan, and Ohio (McWilliams 1968:180-1). A few years later, the Reclamation Act of 1902 provided federal funding for the utilization of the arid lands of the Southwest primarily through the development of irrigation agriculture. Suddenly the Southwest needed a large inexpensive labor force to work in the fields (McWilliams 1968:175). Within two years, Mexican immigration had surpassed 1,000 people per year for the first time. Within a year, the immigration figures had doubled (Samora 1975:68). From then on, the rate of Mexican immigration continued to climb until the beginning of the United States depression (Table 4.2).

It was not only the growth of agribusiness which stimulated the need for more manpower; railroads, mining, and industry continued to draw upon the Mexican immigrant pool to fill their labor requirements. In 1909, the labor force of nine western railroads was 17 percent Mexican; 20 years later, the number of Mexican workers on these railroads had increased to almost 60 percent (Hoffman 1974:7). Mining activities continued to spread, particularly in Colorado. This, coupled with the expansion of the sugar beet industry, caused Colorado's immigrant population to increase ten-fold during the first decade of the twentieth century, growing from 264 to 2,543 persons (United States Bureau of the Census, 1910, 2:211).

Job opportunities, however, were not limited to the Southwest. During the first two decades of the twentieth century, Mexican immigrants began to migrate to other parts of the United States, particularly areas within close proximity to agricultural labor migratory routes, such as the California-Washington-Idaho-Colorado-to-Texas loop, and the Minnesota-to-Wisconsin loop. The Mexican immigrant population of Kansas increased from 91 in 1900 to 9,429 in 1910 due to the importance of Kansas City as a stopover for immigrants continuing both eastward and northward. Between 1910 and 1920 the states of Illinois, New York, and Pennsylvania saw their Mexican immigrant population increase five-fold. The most dramatic rise was in Michigan where the Mexican population grew from 86 to 1,333 persons between 1910 and 1920 (Gamio 1930:24-27).

World War I also placed major demands on an increased labor force since the United States military was dipping deeply into the resident labor force. Immigration regulations relating to the head tax, literacy requirements and contract labor laws were waived between 1918 and 1921 to allow for greater numbers of Mexican immigrants (McWilliams 1968:178). The continued economic prosperity in the United States coupled with Mexico's economic and political

difficulties after World War I served to further encourage Mexican immigration to the United States. During the 1920's, immigration from Mexico reached a peak of 459,287 people.

Although the improved political situation in Mexico was somewhat responsible for the slackening of Mexican emigration to the United States in the 1930's, it was the depression in the United States that resulted in the serious curtailment of immigrants to the United States through the enforcement of established immigration laws. Government agencies from federal down to local units made the first serious and effective effort to remove illegal Mexican immigrants already residing in the United States. It was hoped that the jobs vacated by the Mexicans could be filled by unemployed United States citizens thus helping to alleviate the pressures of the depression. Between 1929 and 1937, over 400,000 Mexicans were repatriated either by force or their own volition (Hoffman 1974:126). To reduce the problem at its source, the Border Patrol which had been created to control European and Asian illegal immigrants coming into the United States through Mexico was used more and more to stop illegal entry of Mexicans into the United States (Samora 1971:38).

This systematic program of border tightening and repatriation reduced the total decade immigration of Mexicans to fewer than 28,000 people. Corwin (1973:594-5), however, believes that only about one-third of those repatriated remained in Mexico. This is quite possible considering the great influx of Mexican immigrants to the United States in the 1940's.

World War II brought a new prosperity to the United States and a relaxing of immigration regulations which initiated the second wave of Mexican immigration to the United States. Caught in the same manpower shortage as during World War I, the United States government instituted the Bracero Program in 1942, designed to provide temporary agrarian manpower. The program was intended to last only for the duration of the war, but it was extended until 1964 when it was finally terminated. During the program, five million braceros were employed (Samora 1975:72). Even with the instigation of the Bracero Program registered immigration for the period from 1930 to 1950 was only 83,000, less than the period from 1909 to 1913 when Mexican immigration experienced its first spurt of growth.

These figures are a bit misleading, however, for concomitant with the beginning of the Bracero Program was a rise in illegal immigrants. Since 1940, illegal immigrants have exceeded the number of legal immigrants. The rise of illegal immigrants peaked in 1954. As a result, Operation Wetback was put into effect, resulting in over one million arrests of illegal Mexican immigrants. After 1954, the number of illegal immigrants apprehended dropped significantly (Galarza 1966:58-70). By the 1960's, it had begun to rise steadily again so that the level of apprehended illegals increased 1,713 percent between 1960 and 1970 (Table 4.3). The exact number of individuals represented by these figures is, of course, hard to ascertain since the U.S. Immigration and Naturalization Service figures do not reveal how many persons were apprehended more than once. With the end of the Bracero Program in 1964 and the enactment of the new immigration law (PL 86-236) in 1968, legal Mexican immigration was to have been stabilized at 20,000 immigrants per year. Provisions for exceptions to the limit have allowed legal immigration to rise to an all time high of 71,586 in 1974 (Figure 4.1).

The twentieth century, in contrast to the earlier period of immigration, is marked by mass migration focused upon the Southwest, but at the same time, expanding outward from this core area. Push factors that stimulated this increased migration were political and economic insecurity in Mexico. Pull factors were economic, initially agriculture, but ever increasingly associated with industry.

A Profile of Mexican Immigrants

Age and Sex

Since 1900, the number of female legal immigrants has slowly increased. The ratio for the first decade of the twentieth century was about 70 males to

Table 4.3: Deported Aliens

Date	Total Deported Aliens	All Deported Illegals	Total Deported Mexicans	Mexican Illegal
1960	70,684	16,964	29,651	13,985
1961	88,823	16,874	29,877	14,000*
1962	92,758	16,747	30,272	14,000*
1963	88,712	23,662	39,124	20,000*
1964	86,597	25,515	43,884	22,620
1965	110,371	32,938	55,349	29,693
1966	138,520	60,458	89,751	58,040
1967	161,608	80,325	108,327	77,594
1968	212,057	121,047	151,705	117,173
1969	283,557	167,174	201,636	161,658
1970	345,353	244,492	277,377	239,602
1971	420,126	317,822	348,178	313,792
1972	505,949	398,290	430,213	390,000*
1973	655,968	551,328	576,823	545,815
1974	788,145	693,084	709,959	687,566

Total Deported = All aliens who for whatever reason (e.g. expired visa) were deemed to be deportable.
Illegal = All individuals who entered the United States surreptitiously

*For these years, the U.S. Immigration Service provides only approximate figures to the nearest thousand.

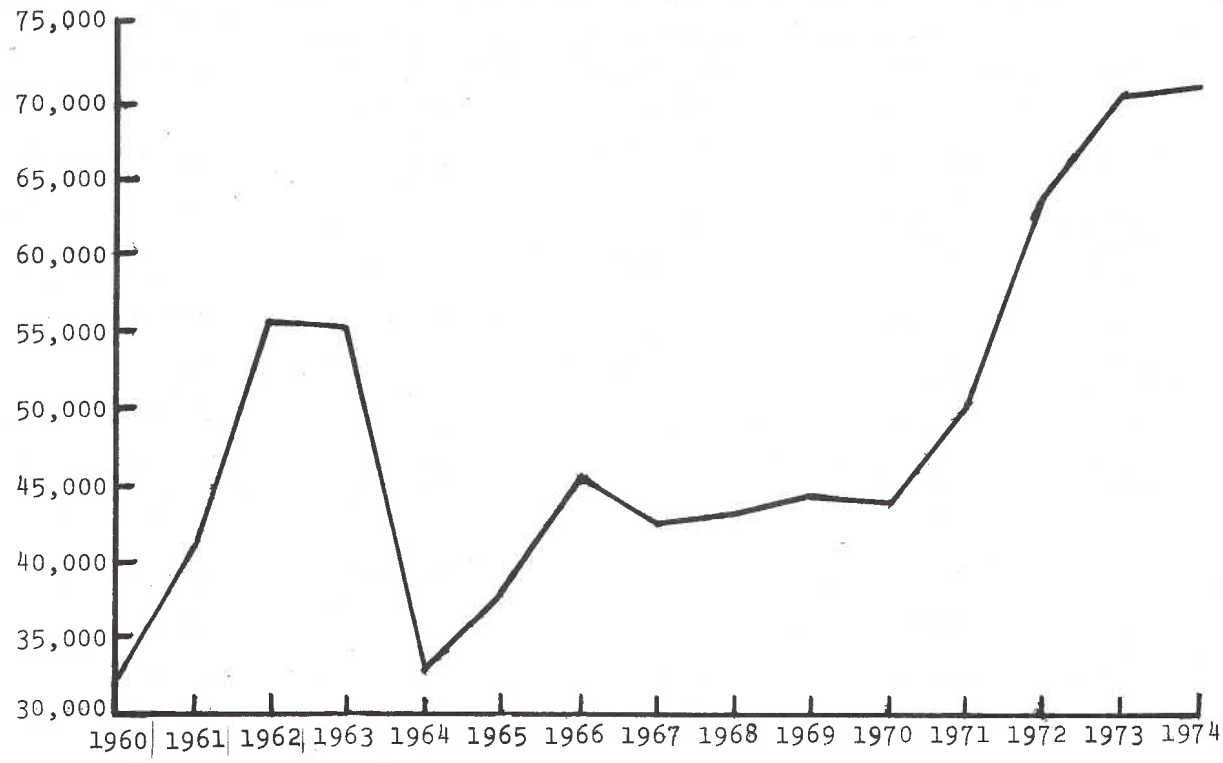
Source: U.S. Immigration Service. Annual Report 1960-74.

30 females. By the 1950's, it was about 53 males to 47 females (Grebler 1966:46). Since then, there have been about equal numbers of legal male and female immigrants (Figure 4.2).

Among illegal immigrants, the majority of entries are male (Merrit 1975). Exact figures are, of course, impossible to acquire. The U.S. Immigration and Naturalization Service (1969:11) reported a decrease in the percentage of males between 1966 when 81 percent of the apprehended illegal immigrants were male and in 1969 when 68 percent were male. Unfortunately, the lack of more data prevents determining if this represents a trend towards an increased number of illegal female immigrants similar to the increase in the number of legal female immigrants.

During the last 15 years, there has been a downward shift in the median age of all legal immigrants. Fifty percent of all immigrants in 1970 were under 20 years of age, whereas in 1960, about 35 percent of the immigrants were under 20 years of age (Figure 4.2). This shift is most likely due to the loopholes in the 1965 immigration law which provides a more liberal allowance for dependents by allowing children of a parent living in the United States to be exempted from the 20,000 person quota allowed for Mexico. Between 1960 and 1970, the group with the

Figure 4.1: Legal Migration From Mexico; 1960-74



Source: U.S. Immigration Service, Annual Reports 1961-74.

largest percentage of immigrants changed from the 20-29 age group to the 10-19 age group, but by 1974, the balance had shifted back to the 20-29 age group. Most illegal entrants seem to be between 20 and 35 years old (United States Congress, House of Representatives Judiciary Committee 1973:704).

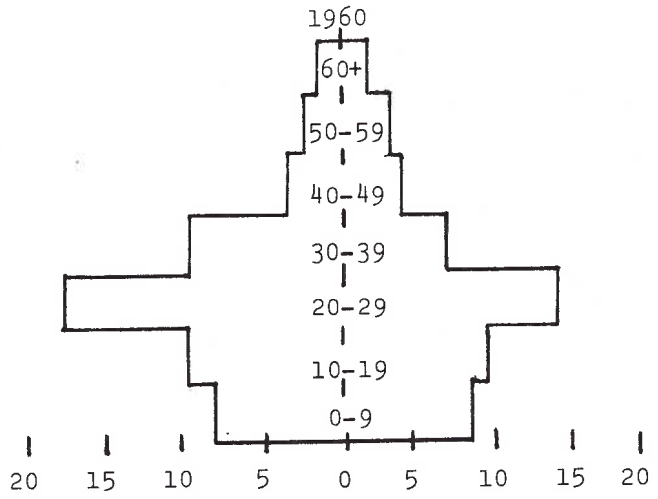
As the average age of the Mexican immigrant population decreases, the prospect that they will make additional moves within the United States increases. Wilber (1963:446) notes that individuals under 20 years of age hold the highest potential for migrating within the United States. It is therefore possible that Mexican immigrants of the last 15 years will be more inclined than earlier Mexican immigrants to move both within and outside the Southwest.

Occupation

Although Mexican immigration to the United States initially centered on agriculture, it has gradually shifted to industry and manufacturing. In 1930, the immigrants in the Southwest were still primarily employed in agriculture while those in the Midwest were in industry. By 1950, a larger number of immigrants were working in industry (Hernandez 1966:496). The only significant change is that the category representing housewives, children, and others with no employment increased by 20 percent between 1960 and 1970 (Table 4.4). This increase is most likely tied to the larger number of immigrants under age 20.

The illegal immigrant labor force in the United States is possibly 1.5 million strong (Corwin 1973a:615). Whereas a few years ago the majority of illegals were employed in agriculture, it is now assumed that at least half of the illegal immigrant labor force is involved in other occupations. One of the few reliable sources relating to the occupations of illegal migrants is the United States Immigration and Naturalization Service's raids on illegal aliens in the Los Angeles area from July to September, 1974. Of 8,813 illegal apprehensions, 50 percent were

Figure 4.2: Age and Sex Distribution of Legal Mexican Immigrants: 1960 and 1970



Male Percentage of Population

Males Below Age 40: 84 Percent

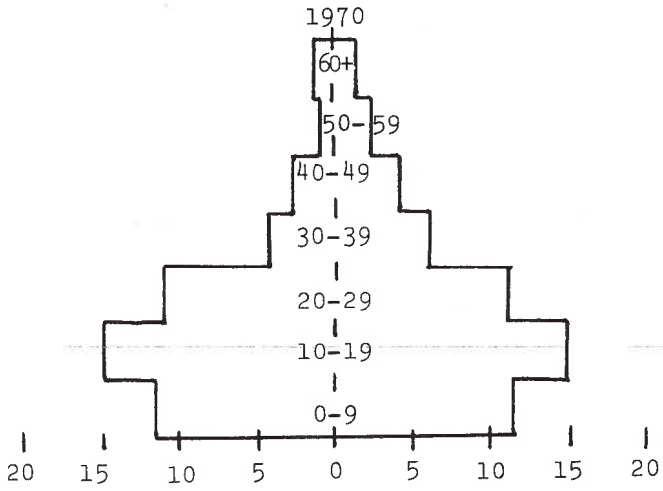
Males Below Age 20: 32 Percent

Female Percentage of Population

Females Below Age 40: 82 Percent

Females Below Age 20: 38 Percent

Sex Ratio: 112.2



Male Percentage of Population

Males Below Age 40: 90 Percent

Males Below Age 20: 56 Percent

Female Percentage of Population

Females Below Age 40: 86 Percent

Females Below Age 20: 53 Percent

Sex Ratio: 98

Source: U.S. Immigration Service. Annual Reports 1960 and 1970.

Table 4.4: Percentage Change in Occupations Between 1960 and 1970

Occupation	1960 Number Employed	1960 Percent	1970 Number Employed	1970 Percent
Professional Technical and Kindred Workers	583	1.78	435	.98
Farmers and Food Managers	362	1.11	216	.49
Managers, Officials and Proprietors	320	.97	244	.55
Clerical and Kindred Workers	801	2.45	402	.90
Sales Workers	306	.93	194	.44
Craftsmen, Foremen and Kindred Workers	1,529	4.68	1,725	3.88
Operatives and Kindred Workers	1,880	2.69	877	1.97
Private Household Workers	2,564	7.84	1,535	3.45
Service Workers Except Private Household	502	1.53	448	1.01
Farm Laborers and Foremen	1,658	5.07	867	1.95
Laborers Except Farm and Mine	5,781	17.69	5,295	11.91
Housewives, Children and Others With No Occupation	17,398	53.23	32,231	72.48

Source: U.S. Immigration Service. Annual Report 1960 and 1970.

involved in heavy industry at wages from $4.50 to $6.50 per hour. An additional 20 percent were involved in light industry earning salaries from $2.50 to $3.55 per hour. Only 30 percent of the apprehended illegals were employed in agriculture. These individuals were also the lowest paid, earning an average of $1.65 per hour (Chapman 1974:77). Although this raid revealed a substantial number of illegal aliens receiving wages of over $4.50 per hour, it is doubtful that the majority of illegal immigrants are in fact able to obtain these wages. The result of the raiding most likely reflects the enforcement procedures of the Immigration Service rather than the general earnings of illegal immigrants.

Geographical Distribution of Mexican Immigrants

The settlement pattern of Mexican immigrants has continually changed over the years. Early migrants came from rural areas in Mexico and settled in rural areas in the United States. Today migrants are coming from more diverse areas and settling in the United States in a greater range of locales.

Origins of Mexican Immigrants

The main source of immigrants to the United States has always been the central plateau of Mexico with the northern border states providing a secondary source (Grebler 1966:75). Over the years, the number of states contributing a large number of immigrants has gradually expanded. In the late 1920's, Gamio (1930:13) estimated that 60 percent of the Mexican immigrant population came from the states of Michoacán, Guanajuato, Jalisco, and Nuevo León. Forty years later, Samora (1971) estimated that 73 percent of the Mexican immigrants came from the same states cited by Gamio plus San Luis Potosí, Chihuahua, Durango, and Zacatecas. It would seem that the immigrant population will continue to come from an increasingly larger number of Mexican states, especially those states that are experiencing economic and population pressures.

Immigrants in the Southwest

The point of destination of most Mexican migrants once they have left Mexico has usually been the Southwest. At no time has the immigrant population of the Southwest ever been below 86 percent of the total residing in the United States. Today, most legal migrants (80 percent) continue to select either California or Texas as their initial place of residence. Arizona currently receives five percent of the immigrants whereas Colorado and New Mexico receive only a minimal number of new arrivals (Table 4.5).

Table 4.5: State of Intended Residence of Mexican Immigrants Change 1960 to 1970: Percentage

State	1960	1970
All States	100.00	100.00
Arizona	5.56	4.67
California	51.15	51.23
Colorado	.74	.39
New Mexico	1.69	1.21
Texas	27.66	29.87
Other States	13.20	12.63

Source: U.S. Immigration Service. Annual Report 1960 and 1970

Within the Southwest, the settlement pattern has changed over the last 300 years. During Spanish and Mexican control, the majority of migrants settled in New Mexico. At the time of the signing of the Treaty of Guadalupe Hildalgo in 1849, approximately 80 percent of these migrants living in the Southwest were in New Mexico. In 1900, the population was still clustered in New Mexico, Arizona, Texas and California (Gamio 1930:23-4).

With the first major wave of migration during the twentieth century the settlement patterns began to change. New Mexico ceased to be the focal point of immigration. In fact, since 1910, New Mexico has never drawn over 2.5 percent of the immigration population. By 1910, Texas had become the center of Mexican immigration receiving over 65 percent of all new immigrants. During the 1910-20 period, Arizona had the second largest number of immigrants with approximately 13 percent of the entries.

Between 1910 and 1930 the number of Mexican immigrants in California more than doubled due primarily to the need for agricultural labor. Because of the legal actions of 1885 and 1907 which prohibited Orientals from immigrating to the United States, California was experiencing a labor shortage at exactly the time that the state's agribusiness was expanding. Whereas economic opportunities were developing in California both in agriculture in the central valleys and in industry in Los Angeles, Arizona, New Mexico, and to a lesser degree, Texas, were experiencing an economic decline.

With the advent of World War II the need for labor brought an upsurge of immigrants to the United States, primarily to California and Texas. The Bracero Program had a major impact on this influx of immigrants. By 1957, immigrants comprised 70 percent of the farm labor force in the Imperial Valley of California (Galarza 1964:157). The result has been that by 1960 California replaced Texas as the state attracting the largest number of Mexican immigrants (Table 4.6).

Because of the lack of adequate data, it has been much more difficult to determine the internal migration of persons whose parents were of Mexican origin. Among native born Mexican Americans, Beale (1973:941-3) notes that the migration pattern between those born in Texas and those born in California was distinctively different. While only five percent of the Mexican Americans born in California migrated out of California within the Southwest, 20 percent of those born in Texas have migrated out of the Southwest. Moore (1971:295) has suggested that one reason for out-migration from Texas is that the attitudes of other inhabitants of the state are less favorable than in California.

Migration Outside the Southwest

One of the most significant changes in the settlement pattern of Mexican immigrants is the increase of people migrating to other areas besides the Southwest. Although there have been a few long-existing settlements in the North, prior to 1940, the immigrant population living in the non-southwestern states was never more than 9.5 percent (Grebler 1966:52). In the last 20 years, the number of Mexican immigrants residing outside the Southwest has risen to approximately 14 percent (U.S. Immigration and Naturalization Service 1955-74). The growth is more phenomenal when it is placed in the context of the reduction of Mexican immigrants living in areas other than the Southwest during the repatriation period of the 1930's. Although Michigan, Illinois, and Indiana had only 3.6 percent of the Mexican population, more than 10 percent of the total of all repatriated Mexicans came from these three states (Hoffman 1974:116).

While only California, among the southwestern states, has increased its immigrant population percentage, numerous states outside the Southwest have increased their percentage of immigrants since 1930. In Florida, Illinois, and Oregon, the population of individuals born in Mexico has doubled between 1960 and 1970. Other states have also experienced large increases in Mexican born immigrants (Table 4.6).

Not only are immigrants moving out of the Southwest, they are beginning to break out of traditional western and midwestern areas of the country. The pattern of Spanish speaking migration within the United States has seen Mexicans dominate the western two-thirds of the country and Spanish speaking people of the Caribbean dominate the eastern one-third. Persons of Mexican origin still do not represent more than five percent of the Spanish origin population in any of the eastern states. They are, however, beginning to break this pattern although admittedly in small numbers (Table 4.6). In Florida, for example, more than 90 percent of the population of Mexican heritage is either first or second generation (U.S. Bureau of the Census 1970). It is possible that this rapid growth of people of Mexican origin will also stimulate movement along the eastern migrant streams to northeastern cities.

Urban Migration

Whether Mexican immigrants live in the Southwest or in other parts of the country, they have increasingly moved from rural to urban environments. This trend has resulted in Mexican immigrants being one of the most urbanized groups in the

Table 4.6: Foreign Born Persons of Mexican Origin in the United States

State	1910	1930	1950	1960	1970
United States	221,915	457,360	450,562	575,902	759,711
Alabama	75	45	125	141	214
Alaska	*	29	*	77	182
Arizona	29,452	57,971	24,917	35,834	31,303
Arkansas	105	194	553	209	216
California	33,444	82,119	162,309	248,542	411,008
Colorado	2,543	10,695	5,275	4,882	5,442
Connecticut	*	11	158	245	382
Delaware	*	25	38	51	111
District of Columbia	*	26	325	330	246
Florida	116	59	431	1,312	3,018
Georgia	*	23	132	161	294
Hawaii	*	94	*	112	149
Idaho	*	974	326	1,010	1,520
Illinois	*	3,555	12,463	24,477	50,098
Indiana	*	638	3,222	5,058	5,060
Iowa	509	2,355	1,253	1,038	1,224
Kansas	8,415	13,365	4,204	3,495	2,621
Kentucky	*	73	82	116	127
Louisiana	996	1,895	1,106	1,237	1,351
Maine	*	2	40	63	55
Maryland	*	33	193	478	1,970
Massachusettes	*	35	324	458	763
Michigan	*	1,147	5,235	6,292	7,604
Minnesota	*	223	950	846	968
Mississippi	72	88	259	232	149
Missouri	1,412	2,788	2,057	2,506	2,298
Montana	*	200	693	430	361
Nebraska	289	2,307	1,673	1,521	1,123
Nevada	727	1,108	786	920	1,817
New Hampshire	*	1	34	28	25
New Jersey	*	195	598	769	1,136
New Mexico	11,918	19,064	9,666	10,725	11,052
New York	*	1,217	4,138	4,496	4,806
North Carolina	*	7	96	207	331
North Dakota	*	25	77	72	49
Ohio	*	803	1,824	2,639	2,621
Oklahoma	2,645	6,313	1,196	1,105	325
Oregon	*	503	618	1,000	1,993
Pennsylvania	*	1,274	1,374	1,437	1,482
Rhode Island	*	4	53	47	145
South Carolina	*	4	28	52	107
South Dakota	*	66	112	56	68
Tennessee	*	35	145	232	238
Texas	124,238	242,735	196,077	202,315	193,639
Utah	145	929	1,396	1,153	1,308
Vermont	*	1	17	30	66
Virginia	*	25	145	270	724
Washington	*	289	1,546	3,407	4,424
West Virginia	*	42	177	194	135
Wisconsin	*	131	1,067	1,880	2,398
Wyoming	186	1,753	1,049	770	682

*Data not given in Census of the Population

Source: U.S. Bureau of the Census. Census of the Population: 1910, 1930, 1950, 1960, and 1970.

United States. By 1930, more than 50 percent of the Mexican immigrant population in the United States was living in urban areas. In 1950, the national figures had reached 70 percent although only 50 percent of the Mexican immigrants in the Southwest were living in urban areas (Hernandez 1966:475, 495). Today, over 95 percent of the Mexican immigrant population resides in urban centers (Table 4.7). Mexican immigrants are now moving into cities faster than either non-whites or Anglos (Moore 1966:3).

Table 4.7: Mexican Immigrants Living in Rural and Urban Areas

		Rural	Urban and Cities
Date	Total	(0-2,500)	(2,500+)
1960	32,684	5,556	27,128
1961	41,632	6,950	34,682
1962	55,291	10,842	44,449
1963	55,253	10,947	44,306
1964	32,967	5,943	27,024
1965	37,969	6,386	31,583
1966	45,163	6,694	38,469
1967	42,371	6,225	36,146
1968	43,563	4,686	38,877
1969	44,623	5,721	38,902
1970	44,469	5,360	39,109
1971	50,103	1,892	48,211
1972	64,040	129	63,911
1973	70,141	131	70,010
1974	71,586	128	71,458

Source: U.S. Immigration Service. Annual Report 1960-74.

Price (1971), in a study of South Texas rural people of Mexican origin migrating to San Antonio and Chicago, has revealed some factors relating to the phenomenal movement towards urban environments. Although Price does not state what percentage of his study group was born in Mexico, the factors that have stimulated the group he studies must certainly pertain as well to most immigrants who move into the South Texas region. The South Texas group had very positive attitudes about cities. This was most likely based on the wage differential between South Texas and the two cities. While average salary for the rural South Texas group was $2,500, the average wage in Chicago was $5,545 and in San Antonio was $4,167. Considering the cost of living index, the San Antonio average salary was actually better than the Chicago salary. In interviewing the urban dwellers, Price found that the San Antonio group was happier than the Chicago group. Both groups were more satisfied with the urban setting and less inclined to return to a rural environment than either Blacks or Anglos in the study sample. Mexicans actually found the city conditions better than they had anticipated.

Illegal Immigrants

For obvious reasons, it is much harder to determine the patterns of illegal migration. They seem to follow patterns similar to the legal patterns though the assumptions are based upon those illegals who have been caught. The trend does seem to be for illegals to also move outside the Southwest. In 1954, almost all illegals that were caught were found within 300 miles of the border (United States Congress House of Representatives Judiciary Committee 1973:79). Today, illegals have been apprehended from Washington to New Hampshire to Virginia as well as in the Southwest (United States Congress House of Representatives Judiciary Committee 1973:9). More and more illegals are to be found today living in cities. In 1971, more than 8,000 Mexican illegals were apprehended in Chicago. Not only have they used traditional migratory routes, but they have also moved directly from one place to another without intermediate stops, in some cases by jetting from El Paso to Chicago (United States Congress House of Representatives Judiciary Committee 1973:698-702.

Conclusions

Mexican migration to the United States has increased from a small trickle in the nineteenth century to massive proportions during this century. Most of this migration has centered in the Southwest. The pattern of settlement within the Southwest, however, has continually changed. Today, urban areas especially in California attract the largest number of Mexican immigrants as industry replaces agriculture as the major source of employment.

As the population has increased and economic opportunities have been made available in other parts of the country, Mexican immigrants, both legal and illegal, have moved in greater numbers out of the Southwest. Most of the new locations have been related to migrant worker's routes. As the immigrant flow increases, this pattern of settlement outside the Southwest will no doubt prove to be the major model.

It is quite possible that if the growth pattern of Mexico continues at its present rate, the 1975-84 legal immigration figures could reach 750,000. Concomitant with this increase of legal aliens may also be a rise of illegal immigrants. The next decade could see a total of 1.5 million new immigrants enter the United States from Mexico both through legal and illegal channels or approximately the same number as all previous legal entrants to the United States. These calculations, of course, assume that immigration rates will continue at their present rate. The trend of the last 15 years would indicate that this could be the case. However, it is possible that several factors could influence a reduction in these figures. If the economic situation in the United States worsens, economics will not act as a pull factor as it has in the past. Also worse economic conditions could encourage actions such as 1954's Operation Wetback, or the repatriation program of the 1930's. More restrictive legislation by the United States government could also limit immigration of Mexican immigrants.

CHAPTER V

ECONOMIC FACTORS IN MEXICAN MIGRATION

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This chapter concerns the relationship between contemporary economic factors and migration in Mexico. By considering data on levels of economic activity on a state by state basis for the two census periods 1960 and 1970, and by looking at patterns of change in economic activity during this period an attempt is made to assess the implications of the economic factors on future trends in human population movements.

For the purpose of the present study, the level of economic activity in each state was defined as the size and distribution of the state labor force in each of the following economic sectors: agriculture, manufacturing, services, construction, commerce, and the "insufficient information" category (workers who could not be classified in other sectors). Patterns of change were determined by relative and absolute changes in inter- and intra-state distribution of the labor force in the various sectors between the two census periods. The premise underlying the present approach is that the states with the strongest pattern of development in the non-agricultural economic sectors will also be the strongest magnets for attracting migrants.

Research has documented the importance of conscious economic considerations among contemporary migrants in Mexico. One of the most comprehensive studies was a 1969 survey of unemployed and underemployed workers in six United States-Mexican border cities (Engineer Agency for Resource Inventories 1970). Migrant respondents were questioned on their reasons for migrating to the various cities where the surveys were conducted. While economic motives were not universal among this group, a large percentage of migrants in each city replied with such explicitly economic reasons as "looking for work," "better pay," "no work back home."

Although border cities may be obvious destinations for economically motivated migrants, economic considerations are also significant factors in the decisions of persons migrating from rural areas to Mexico City. Such motives among migrants from Oaxaca were identified by Butterworth (1962:267):

> The main motivations for migrants to urban centers are economic... in the dual sense that the subsistence level of the economy in Tilantongo exerts tremendous pressure on a portion of the population to emigrate ... (and) the attraction of urban life exerts an equal attraction for the more enterprising young men.

The results of the Butterworth and border cities studies are supported by other investigators who have studied migration in Mexico and other Latin American countries (Cone, nd; Flinn and Cartano 1970; MacDonald and MacDonald 1968; Rollwagen 1971; Young and Young 1966). The desire for economic and occupational mobility is an important factor for individual migrants. The pull of opportunity, whether real or imagined, is strong, and is made even stronger by the historic tendency of agricultural areas to generate larger populations than can normally be supported, thus adding a push from the rural areas.

Economic activity has been shown to be equally significant for understanding migration as a national phenomenon. The landmark study by Kuznets and Thomas of internal migration in the United States was directed specifically to the relationship between economic changes and migration. Kuznets concluded that internal migration, an indispensable accompaniment to economic growth, can best be analyzed as a ". . . response to the changing economic opportunities that constitute potential economic growth" (Kuznets 1958:5-7).

A similar relationship between economic factors and migration was documented by Tarver (1961) in a study of United States internal migration between 1940 and 1950. Using state demographic, social, and economic data, he tested 24 independent variables and found that a single economic variable -- changes in the distribution of the labor force among the various economic sectors -- accounted for 77 percent of the variation in net intercensal migration rates. For the period in question, Tarver concludes that " . . . economic factors clearly outweigh the demographic and social factors in explaining white net migration . . . " (Tarver 1961:211).

Changes in levels of economic activity or changes in the relative importance of specific sectors are identified as significant determinants of migration in developing nations as well as in the more established industrial countries. Bogue (1969) suggests that the less-developed economies will generate an "immediate stream of migration" in response to any significant expansion of industrial or commercial sectors. Whether or not Mexico is properly considered as a "developing" nation (Ruddle and Borrows 1974:24; Sanders 1974:7), the literature on Mexican migration suggests that in Mexico there is a strong association between migration patterns and economic activity in various parts of the country (Ball 1971; Barkin 1971; Randall 1962). Most of the studies on Mexican migration, however, appear to have centered on specific migration streams, with comparatively little emphasis on the general patterns of economic change across the nation as a whole. In order to gain a more comprehensive view of recent and prospective migration patterns, the present work addresses levels of economic activity in Mexico by state and by economic sector. The basic objective is to identify, chiefly from the economic processes of the 1960's, those conditions most likely to favor or impede migration during the next two decades. This is done by describing and analyzing the major characteristics of economic activity in Mexico, along with the rates and directions of change in such activity for various states and sectors.

Methods

The Measure of Economic Activity

There are various standard measures used to describe economic activity. Some measures, such as per capita income, are addressed to the well-being of a population and are referred to as "welfare" measures (Schultz 1949; Perloff, et al:1960). Other measures deal with the volume of output, or level of activity, either for a specific sector of the economy or for the total economy within a country or region. These latter measures include the various concepts of gross and net income (which are tied to the value of output), and measures of labor force size and distribution (which are tied through productivity factors to the volume of physical output).

Because of wide variations in the size and character of Mexican firms in the different economic sectors and the various parts of the country, and the attendant difficulty of obtaining uniform data on value of product, the present study has chosen the census categories dealing with economically active population, or labor force, as the primary measure of activity levels. Essentially the same information was reported in these categories for the two census periods employed in the study, and the level of detail is sufficient to allow discrimination among states as to changes in sector activity and overall aggregates.

The labor force data are less than perfect, however, because they do not contain corrections for unemployment, either by sector or by state. This deficiency is to some extend unavoidable. Reporting procedures for unemployment are notorious for their inaccuracy and variability, so that even if the appropriate corrections of labor force figures were attempted, there is little assurance that the quality of the analysis would be improved comensurately with the time and effort required. In any case, the distortion resulting from the inclusion of an unknown number of unemployed is partially offset by an approach which relies for its conclusions more upon the relationships between sectors and states than upon the absolute numbers in a given data category. Overall, the labor force data are a reasonably good proxy for measuring economic activity in Mexico. When considered in relation to demographic data (total population, rural-urban residence, density factors, etc.) the sector-specific labor force data allows a broad range of inferences about economic patterns and migration potentials.

Assumptions

Certain assumptions are inherent in the utilization of labor force data as a measure of economic activity. First, it is assumed that for the period under consideration there is a stable functional relationship between labor force by sector and economic output for activity by sector. Abstracting from the unemployment problem mentioned above, such an assumption implies that the technology of the sector in question has not changed so rapidly as to modify input-output relationships. Second, it is assumed that there is a direct relationship between the level of employment in various sectors of activity and the relative significance of a sector in the regional or national economy. Third, changes over time in sector shares of labor force and in absolute size of labor force in a sector are assumed to be indicative of changes in the rate and direction of economic growth for the relevant region.

Data Collection

Mexican census data on the distribution of the labor force were gathered for states and sectors of economic activity as of 1960 and 1970 (U.S. Mexico Census, 1960 and 1970). Other sources of published data were utilized in the collection of additional information necessary to the development of a mere comprehensive picture of physical, demographic, social, and historical factors relevant to the respective states. Such sources are appropriately cited as the data is introduced in the analysis.

State Economic Profiles

The first level analysis of the data on the distribution of the labor force focused on the level and composition of economic activities within each state. These data are summarized graphically in Figures 5.1 through 5.33 (Appendix B). Figure 5.1 is the national profile and shows the distribution of the labor force by sector for 1960 and 1970. Figures 5.2 through 5.33 represent state profiles of the distribution of the labor force by sector of economic activity in 1960 and 1970. The profile figures show at a glance which sectors are most prominent in the respective states and where the major changes occurred between 1960 and 1970. The state's share of the total national labor force is also noted on each figure. Although labor force data are uniformly reported for most sectors from 1960 and 1970, neither government nor oil and gas employment figures were reported for 1960. There was also an obvious difference in the 1970 treatment of the insufficient information category, signalled by the manifold increases in persons reported. This last change will be discussed later, but the dramatic changes in this category in all states clearly indicates a shift in census practices or underlying economic conditions, or both.

The sector profiles for the various states show a melange of change across the nation. All states show a relative decline in agriculture and a sharp increase in the "insufficient information" category. Including these changes, there are three basic patterns of change among the states. The first is represented by a pattern similar in outline to the national profile, but showing little change in sectors other than agriculture and insufficient information. The second pattern is also generally similar to the national profile but shows noticeable expansion in one sector of economic activity (most frequently either manufacturing or services). The third pattern shows a visible expansion in two or more sectors, (usually manufacturing and services). The Federal District is the only jurisdiction which does not conform to one of the above patterns. As the most highly developed area of the nation, it is in a class of its own, displaying a profile which exaggerates the magnitudes of the national distributions. The Federal District recorded no large change in any sector during the 1960-70 period although there is a slight relative expansion in commerce.

The state profiles do not alone permit extensive generalization as to the relationship between migration potentials and the different levels of economic activity. They do, however, document the levels of economic activity and patterns of change during the 1960-70 period and demonstrate that certain sectors of economic activity are more prominent in the national economy than others and are therefore more likely than others to have major importance for migration.

Sector Analysis

The following analysis will focus in depth on the most significant sectors of the economy in terms of migration potential: agriculture, manufacturing, services, and construction. The commerce sector and the insufficient information category will also be discussed, although more briefly. Combined, these sectors represent 95.2 percent and 92.2 percent of the economically active population of Mexico in 1960 and 1970. The low employment sectors of mining, oil, transportation, and electrical energy generation are not stressed in the analysis because the absolute numbers of people involved are too small to initiate population movements. The government sector is not treated because data in this category were reported only for 1970.

The analysis focuses on both the absolute size and the share of the labor force in a sector, thus identifying patterns of concentration and sector rates of change in the various states during the 1960-70 period. Attention is also directed to the geographical distribution of changes in the major sectors. This is important for identifying regional variations, especially in sectors which function in leading or lagging roles. The analysis of each sector is concluded with an assessment of the probable migration influences exercised by the sector in question.

Agriculture

The agricultural sector diminished in relative importance throughout the Mexican economy between 1960 and 1970, declining from 54.1 percent of the labor force in 1960 to 29.4 percent in 1970. Overall, there were 982,012 fewer agricultural workers in 1970 than 1960. Absolute declines occurred in all but six states (Sinaloa, Tabasco, Federal District, Campeche, Colima, and Quintana Roo T), and increases of significant size occurred only in Sinaloa and Tabasco. In spite of the large and widespread declines, the agricultural sector in 1970 continued to absorb the largest portion of the labor force in all states but the Federal District and Nuevo León. There were 21 states in 1970 in which agriculture accounted for more than 40 percent of workers and two states (Chiapas and Oaxaca) in which farm pursuits occupied over 70 percent of the work force.

Distribution of the national agricultural labor force. The distribution of agricultural employment among Mexican states remained fairly stable from 1960 to 1970, despite the general contraction of the sector. Table 5.1 shows the states ranked in terms of absolute size of the labor force for 1960 and 1970. For both census dates more than half of agricultural workers (54.4 percent) were concentrated in eight states (Veracruz, Puebla, Oaxaca, Michoacán, Jalisco, México, Chiapas, and Guanajuato). While there were minor shifts in the rankings among these states, the same group retained the dominant position in both 1960 and 1970.

Given the general pattern of contraction in the agricultural sector, the absolute expansions which occurred in Sinaloa, Tabasco, Federal District, Campeche, Colima, and Quintana Roo T indicate the growth in these states of commercialized agriculture, either for export to foreign markets, or, in the case of the Federal District, for supplying large urban centers. None of the six states in this group is a major employer of agricultural labor in Mexico.

Rate of change in agricultural sector. The rates of change for the decade showed considerable variation among the states. Table 5.2 ranks the states in terms of their rate of change in agricultural labor force from 1960 to 1970. While agriculture's share of the national labor force declined by 27.2 percent (from 54.1 to 39.4 percent), the absolute size of the agricultural labor force declined by only 16.1 percent. Nevertheless, the agricultural sector lost 982,012 workers, a figure larger than the total labor force in all but three of the states of Mexico!

Table 5.2 also points up the importance of absolute changes as compared with rates. Veracruz, for instance, shows a relatively low rate of change (-6.4 percent) but the absolute reduction of 36,586 workers was greater than the change in Nuevo León (31,496), which had a rate of change (-27.0 percent) more than four times that of Veracruz. Guanajuato and Baja California T provide another example of the care with which rate of change data must be interpreted. Both states had a decade rate of change of -17.2 percent, but in Guanajuato this meant a net reduction in the agricultural labor force of 57,277 workers and in Baja California T only 2,497.

Table 5.1: Agricultural Labor Force: State Rankings, 1960 and 1970

1960					1970				
Rank	State	Number	State Percent	Cum. Percent	Rank	State	Number	State Percent	Cum. Percent
1.	Veracruz	567,386	9.3	9.3	1.	Veracruz	530,800	10.4	10.4
2.	Oaxaca	505,015	8.3	17.6	2.	Puebla	380,396	7.4	17.8
3.	Puebla	434,944	7.2	24.8	3.	Oaxaca	372,950	7.3	25.1
4.	Michoacán	420,904	6.9	31.7	4.	Michoacán	320,670	6.3	31.4
5.	Jalisco	389,854	6.4	38.1	5.	Jalisco	306,299	6.0	37.4
6.	México	355,365	5.8	43.9	6.	México	300,296	5.9	43.3
7.	Guanajuato	332,921	5.5	49.4	7.	Chiapas	293,152	5.7	49.0
8.	Chiapas	307,915	5.0	54.4	8.	Guanajuato	275,644	5.4	54.4
9.	Guerrero	302,114	4.9	59.3	9.	Guerrero	238,314	4.6	59.0
10.	Hidalgo	222,076	3.6	62.9	10.	Hidalgo	184,941	3.6	62.6
11.	San Luis Potosí	219,967	3.6	66.5	11.	Sinaloa	177,691	3.5	66.1
12.	Zacatecas	196,452	3.2	69.7	12.	San Luis Potosí	175,113	3.4	69.5
13.	Chihuahua	186,699	3.1	72.8	13.	Chihuahua	151,498	2.9	72.4
14.	Tamaulipas	166,607	2.7	75.5	14.	Zacatecas	138,826	2.7	75.1
15.	Sinaloa	175,587	2.7	78.2	15.	Tamaulipas	126,346	2.4	77.5
16.	Durango	164,171	2.7	80.9	16.	Durango	123,694	2.4	79.9
17.	Sonora	133,642	2.2	83.1	17.	Tabasco	116,147	2.2	82.1
18.	Coahuila	128,443	2.1	85.2	18.	Yucatán	111,076	2.2	84.3
19.	Nuevo León	116,645	1.9	87.1	19.	Sonora	109,377	2.1	86.4
20.	Yucatán	115,342	1.9	89.0	20.	Nayarit	87,445	1.7	88.1
21.	Tabasco	100,029	1.6	90.6	21.	Coahuila	85,760	1.7	89.8
22.	Nayarit	89,002	1.5	92.1	22.	Nuevo León	85,149	1.6	91.4
23.	Querétaro	77,671	1.3	93.4	23.	Morelos	73,545	1.4	92.8
24.	Morelos	75,082	1.2	94.6	24.	Querétaro	61,549	1.2	94.0
25.	Tlaxcala	74,380	1.2	95.8	25.	Tlaxcala	58,023	1.1	95.1
26.	Baja California	65,799	1.1	96.9	26.	Baja California	49,440	1.0	96.1
27.	Federal District	46,021	0.7	97.6	27.	Federal District	49,164	1.0	97.1
28.	Aguascalientes	37,774	0.6	98.2	28.	Campeche	32,785	0.6	97.7
29.	Campeche	30,718	0.5	98.7	29.	Aguascalientes	32,095	0.6	98.3
30.	Colima	26,629	0.4	99.1	30.	Colima	29,925	0.6	98.9
31.	Baja California T	14,532	0.2	99.3	31.	Quintana Roo T	13,374	0.3	99.2
32.	Quintana Roo T	11,295	0.2	99.5	32.	Baja California T	12,035	0.2	99.4
	National Sector	6,085,531				National Sector	5,103,519		

Source: U.S. Mexican Census 1960 and 1970

Table 5.2: Percent Change 1960-70, Agricultural Sector: State Rankings

		1960		1970			
		Percent State Labor Force	Absolute Number	Percent State Labor Force	Absolute Number	Net Change	Percent Change
1.	Quintana Roo T	69.1	11,295	53.5	13,374	+2,079	+18.4
2.	Tabasco	70.9	100,029	59.1	116,147	+16,118	+16.1
3.	Colima	53.7	26,629	43.8	29,925	+3,296	+12.4
4.	Sinaloa	64.6	165,587	51.3	177,691	+12,104	+7.3
5.	Federal District	2.6	46,021	2.2	49,164	+3,143	+6.8
6.	Campeche	54.6	30,718	45.8	32,785	+2,067	+6.7
7.	Nayarit	70.7	89,002	43.0	87,445	-1,557	-1.7
8.	Morelos	60.4	75,082	43.0	73,545	-1,537	-2.0
9.	Yucatán	58.9	115,342	55.1	111,076	-4,266	-3.7
10.	Chiapas	79.4	307,915	72.8	293,152	-14,763	-4.8
11.	Veracruz	64.4	567,386	53.1	530,800	-36,586	-6.4
12.	Puebla	67.0	439,494	56.0	380,396	-59,098	-13.4
13.	Aguascalientes	49.2	37,774	37.0	32,095	-5,679	-15.0
14.	México	61.2	344,365	30.3	300,296	-55,069	-15.5
15.	Hidalgo	70.9	222,076	61.3	184,941	-37,135	-16.7
16.	Guanajuato	64.2	332,921	49.0	275,644	-57,277	-17.2
17.	Baja California T	56.2	14,532	34.5	12,035	-2,497	-17.2
18.	Sonora	53.5	133,642	38.5	109,377	-24,265	-18.1
19.	Chihuahua	49.9	186,699	36.4	151,498	-35,201	-18.8
20.	Querétaro	69.7	77,671	48.1	61,549	-16,122	-20.1
21.	San Luis Potosí	68.9	219,967	53.3	175,113	-44,854	-20.4
22.	Guerrero	81.2	302,114	62.2	238,314	-63,800	-21.1
23.	Jalisco	52.1	389,854	34.1	305,299	-83,555	-21.4
24.	Tlaxcala	68.3	74,380	54.5	58,023	-16,357	-22.0
25.	Michoacán	74.1	420,904	59.0	320,670	-100,234	-23.8
26.	Tamaulipas	50.0	166,607	33.1	126,346	-40,261	-24.2
27.	Durango	70.2	164,171	55.0	123,694	-40,477	-24.6
28.	Baja California	39.4	65,799	22.3	49,440	-16,359	-24.8
29.	Oaxaca	82.0	505,015	71.5	372,950	-132,065	-26.2
30.	Nuevo León	32.1	116,645	17.3	85,149	-31,496	-27.0
31.	Zacatecas	80.1	196,452	64.1	138,826	-57,626	-29.3
32.	Coahuila	44.7	128,443	29.6	85,760	-42,683	-33.2
	National Sector	54.1	6,085,531	39.4	5,103,519	-982,012	-16.1

Source: U.S. Mexican Census 1960 and 1970

Rates of change compared with expected change. In order for the relationships among sectors to remain constant from one point in time to another, the sectors would all have to change by the same proportion for the period in question. The same is true for the states if all sectors changed by the same proportion in all states, the state shares of each sector labor force would remain unchanged and so would the state rankings. In other words, uniformity in the distributions by state or by sector would require equal percentage changes. But, as we have seen, the actual changes have not been in equal percentages either by state or by sector, despite the fact that the state rankings of a sector have remained relatively stable; the ten top-ranked states in agriculture, for example, did not change greatly, but there were shifts of rank position among a few states.

In view of the fact that rank-position changes and sector share changes did occur, it is useful to look at such changes in terms of their deviations from the norm, that is from the values that would have been expected if the distributions had remained uniform. This technique is known as "shift" analysis. While it does not alter the basic import of the data, it does afford a somewhat finer discrimination among states as to the strength of change in a sector. The differential shifts in agriculture are represented geographically on Figure 5.34. The data on which Figure 5.34 is based are presented in Table 5.3.

Based upon the national decline of 16.1 percent in agricultural labor force the map indicates the direction and magnitude of deviation from the expected, or uniform change, value for all states. Notably, the largest positive deviation is shown for Veracruz, which, despite its actual loss of more than 36,000 workers, still had 54,905 more persons reported in agriculture than would have been the case had it declined at the national rate. Veracruz and three other states (Sinaloa, Tabasco, and Chiapas) had positive deviations from the norm which accounted for 69.3 percent of all positive deviations. Clearly, of the 13 states in which agriculture remained relatively strong, these four states were by far the strongest.

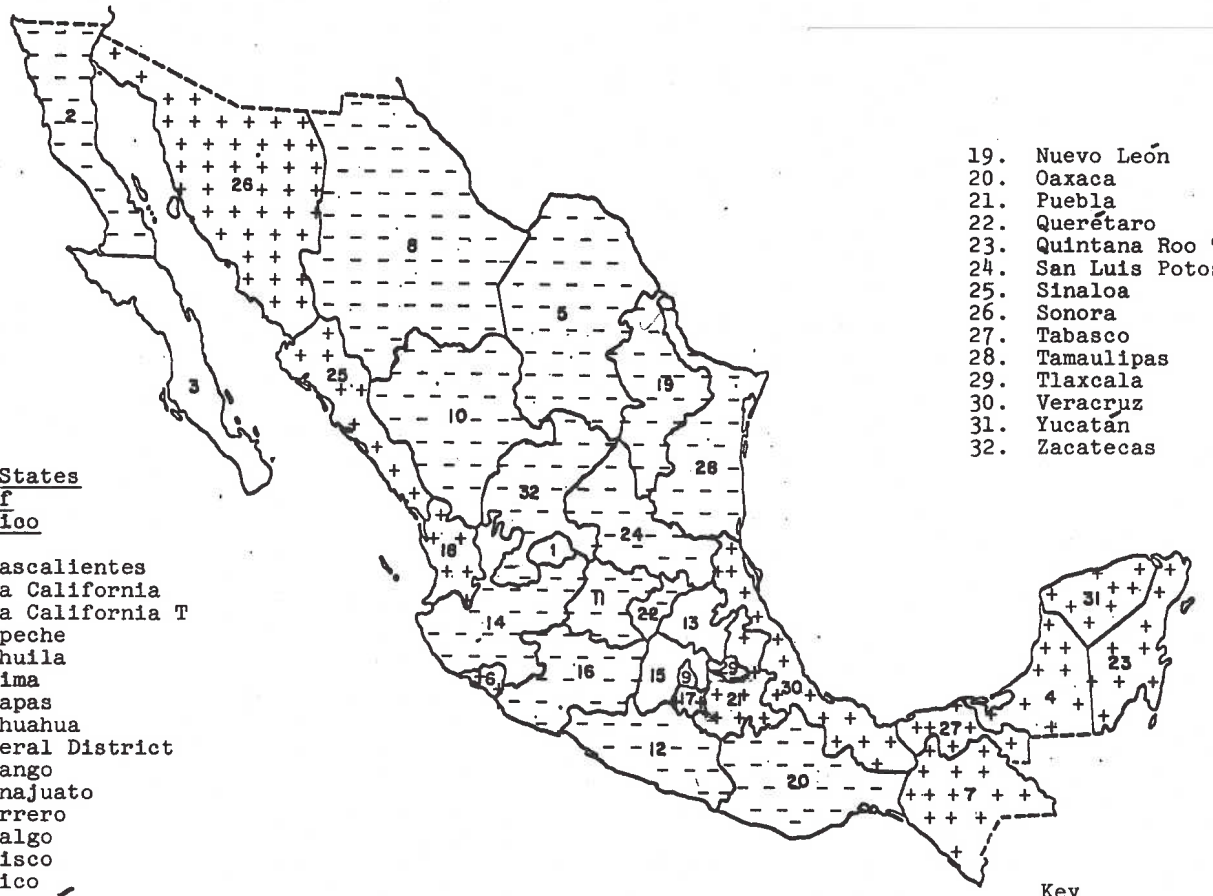
The data summarized on Figure 5.34 provides a basis for identifying three types of situations (sometimes overlapping) in which agriculture remains economically viable. The first situation applies to Veracruz, Tabasco, Sinaloa, Colima, Nayarit, Campeche, Yucatán and Quintana Roo T, and is characterized by conditions suitable for larger-scale land holdings and the application of capital to farm operations. Capital applications may be in the form of irrigation (Sinaloa) and other types of land reclamation works, or in the form of modern farm machinery, or both. The second situation applies to the Federal District, Morelos, and Aguascalientes, and is characterized by modern agricultural methods employed in the supply of farm products to large urban centers. The third situation applies to Chiapas, Puebla, and Hidalgo (and probably also to several states in the first category) and is characterized by favorable institutional patterns (principally stable land holdings and improved technology), combined with favorable world market prices for particular products. In the case of Chiapas and Hidalgo the chief product is coffee. Sugar, tropical fruits, fiber crops, and fresh vegetables which occupy this role in other states.

The map shows that the states where changes in agricultural employment have been relatively positive fall geographically in three distinct zones: Sinaloa, Nayarit, and Colima on the western coast; the Federal District and Morelos in the center; and Veracruz, Chiapas, Tabasco, Campeche, Yucatán, and Quintana Roo T on the Gulf and Caribbean Coasts. For the most part, these are states which tend to be more susceptible to large-scale commercial agriculture and may have received recent infusions of public investment in land clearing, drainage, or irrigation projects.

Reference to Figure 5.34 shows that the states with large negative deviations in the agricultural sector include a large block of states, extending from the Texas border to the southern reaches of the west coast of Mexico. This group includes Coahuila, Durango, Zacatecas, San Luis Potosí, Baja California, Nuevo León, and Tamaulipas in the northern and central sections of the country, and Jalisco, Michoacán, Guerrero, and Oaxaca on the southern coast.

The northernmost states having strong negative deviations (Baja California, Coahuila, Nuevo León, and Tamaulipas) are among the more sparsely populated and highly urbanized states. Appendix C presents rural-urban data for all states. Urban places are defined as settlements of 10,000 or more inhabitants . They are also among the states with micro-environments (combinations of rainfall, terrain, etc.)

Figure 5.34: Agricultural Sector. Geographical Distribution of Deviation Between Actual and Expected 1970 Labor Force



United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Labor Force Distribution

++: actual greater than expected
−−: actual less than expected
unmarked: actual within ± 1% of expected

Table 5.3: Agriculture. Changes in Labor Force, 1960-70, Analysis of Deviation from Expected Size

	Labor Force 1960	Expected Labor Force 1970[1]	Actual Labor Force 1970	Positive Deviation	Percent of Total Positive Deviation
United States of Mexico	6,085,531		5,103,519		
1970 Labor Force > Expected					
Veracruz	567,386	475,895	530,800	54,905	22.7
Sinaloa	165,587	138,927	177,691	38,764	16.0
Chiapas	307,915	258,341	293,152	34,811	14.4
Tabasco	100,029	83,924	116,147	32,223	13.3
Yucatán	115,342	96,772	111,076	14,304	5.9
Nayarit	89,002	74,673	87,445	12,772	5.3
Puebla	439,494	368,735	380,396	11,661	4.8
Federal District	46,021	38,612	49,164	10,552	4.4
Morelos	75,082	62,994	73,545	10,551	4.4
Colima	26,629	22,342	29,925	7,583	3.1
Campeche	30,718	25,772	32,785	7,013	2.9
Quintana Roo T	11,295	9,477	13,374	3,897	1.6
México	355,365	298,151	300,296	2,145	0.9
Aguascalientes	37,774	31,692	32,095	403	0.2
				(+241,584)	(99.9)
United States of Mexico				Negative Deviation	Percent of Total Negative Deviation
1970 Labor Force < Expected					
Oaxaca	505,015	423,708	372,950	50,758	20.8
Michoacán	420,904	353,138	320,670	32,468	13.3
Zacatecas	196,452	164,823	138,826	25,997	10.7
Coahuila	128,443	107,764	85,760	22,004	9.0
Jalisco	389,854	327,088	306,299	20,789	8.5
Guerrero	302,114	253,474	238,314	15,160	6.2
Durango	164,171	137,739	123,694	14,045	5.8
Tamaulipas	166,607	139,783	126,346	13,437	5.5
Nuevo León	116,645	97,865	85,149	12,716	5.2
San Luis Potosí	219,967	184,552	175,113	9,439	3.9
Baja California	65,799	55,205	49,440	5,765	2.4
Chihuahua	186,699	156,640	151,498	5,142	2.1
Tlaxcala	74,380	62,405	58,023	4,382	1.8
Guanajuato	332,921	279,321	275,644	3,677	1.5
Querétaro	77,671	65,166	61,549	3,617	1.5
Sonora	133,642	112,126	109,377	2,749	1.1
Hidalgo	222,076	186,322	184,491	1,381	0.6
Baja California T	14,532	12,192	12,035	157	0.1
				(-243,683)	(100.0)

[1] Expected 1970 Labor Force = Y(Z)+Z
Y = Percent change national sector
Z = 1960 State Labor Force in Sector

Source: U.S. Mexican Census 1960 and 1970

less supportive of agriculture. As of 1960, these northern states showed greater development in other sectors than in agriculture. Despite the negative deviations, however, all of the northern states are important producers of cotton and wheat. All were less important in the production of basic food crops.

States which had negative deviations for agriculture in the central region include Durango, Querétaro, San Luis Potosí, and Zacatecas. Except for Querétaro, these central states also have lower than average population density; all of them, however, are heavily rural in character, rank in the middle ranges of output in maize and beans, and produce cotton or wheat, or both. Querétaro is a moderately important producer of wheat, and San Luis Potosí ranked among the top ten states in sugar cane and coffee production in 1970.

Negative deviations for the states of Jalisco, Michoacán, Guerrero, Guanajuato, Oaxaca, and Tlaxcala are best understood in terms of the institutional character of agricultural production. These states have a high concentration of relatively small, privately-owned farms and have very limited prospects for expansion in output or employment. Farm units of this type are potentially significant reservoirs of surplus population, as the record of negative deviations shows. As a further attribute of the dominant small farm unit, all of these states except Tlaxcala are highly diversified in crop production, and most are major producers of important commercial crops such as cotton, sugar cane, and coffee. Again excepting Tlaxcala, these south-central states ranked near the top in total population in 1960. Tlaxcala, while very small, ranked third in population density. Due to the large numbers of people in the rural hinterlands and the institutional factors affecting agricultural production, the south-central states have contributed a steady stream of migrants from their respective rural areas in response to positive changes in other economic sectors (Sanders 1974:16, 22).

The states which deviated one percent or less (in either direction) from the national rate of decline (unmarked states on Figure 5.34) include Aguascalientes, Baja California T, Hidalgo, México, and Sonora. While these states are varied in their geographical and demographic characteristics, when considered as a group they are the least diversified in terms of their agricultural products. All produce such local food crops as maize, beans, and wheat, but only México is diversified in at least two of the major commercial crops. Baja California T ranks next to last in population size, density, and number of cultivated hectares -- measures associated with geographical isolation, arid climate and mountainous terrain. Sonora, the northern border state in this group is quite different, ranking first in irrigated hectares and second in value of total agricultural product in 1966 (Bonine, et al 1970:62). As previously discussed, Sonora's agricultural potential was well developed and operational prior to 1960. As a result, it did not show large changes between 1960 and 1970. Aguascalientes, Hidalgo, and México rank among the top 10 in population density, and produce the bulk of their output on small proprietary farms and ejidos. Because of deeply-rooted traditional practices, neither of these types of farm units have significant potential for rapid expansion or rapid decline.

Implications for migration of declines in agriculture. The decade of the 1960's in Mexico has witnessed a widespread and fairly intensive transfer of labor out of the agricultural sector and into other sectors of productive activity. In all states the agricultural labor force declined relative to other sectors, and in most states this involved a decline in absolute numbers as well. Many states experienced very sharp declines for the decade.

This pattern represents a fundamental change in the structure of economic activity. It cannot be regarded as a short term phenomenon or even as a manifestation of economic stagnation in agriculture. Agricultural output per cultivated hectare was generally rising even while the exodus from rural areas was underway (Hanson 1971:60). The transfer out of agricultural employment has unquestionably resulted in increased unemployment and underemployment in the most densely populated rural areas, and in movements into non-agricultural activities. In addition, however, it has produced sizeable intrastate, interstate, and international migration of agricultural workers. While it is difficult to document the precise number of migrants originating in the agricultural sector, the percentage of rural workers in the migrant streams is known to be very high (Barkin 1971:53; Browning and Feindt 1969:356). In addition to the long-term movements, there is a well established pattern of seasonal migration into several of the areas showing strong

positive deviations, as well as into the southwestern United States. Much of this movement comes from the heavily populated south-central states (Sanders 1974:6).

Several lines of evidence suggest that the pattern of decline in agricultural employment will continue and perhaps intensify between now and 1985. First, Mexico clearly exhibits the prevailing modern tendency toward substitution of capital for labor in agriculture, and the Mexican government has already demonstrated its commitment to a policy of agricultural modernization through public investment in infrastructure primarily of benefit to larger-scale units (Hanson 1971:58). Secondly, the Mexicans have followed a policy of overall regional development emphasizing public subsidies and investments supportive of urban-oriented manufacturing. Government projects which would have slowed or reversed the declines in small scale farming have not been aggressively pursued, and some observers claim that they have been pointedly neglected (Barkin 1971:52; Lamartine Yates 1961). Finally, the continued expansion of non-agricultural sectors ancillary to manufacturing increasingly provides economic alternatives to agriculture. Subsistence farming, and even small-scale, market-oriented agriculture, is thus rendered progressively less attractive to Mexico's rural population.

The foregoing analysis indicates that no state exerts a strong and continuing migratory pull for purposes of agricultural employment. Even in states where agriculture is highly commercialized (Sonora, Veracruz, Sinaloa, etc.) and in which there is a seasonal demand for agricultural labor, the absolute number of workers required is small enough to be supplied from the rapidly growing indigenous populations. Where rates of agricultural decline are slower, the migratory push is surely somewhat reduced but it does not thereby become a pull. This conclusion is supported by the experience of these few states which showed absolute increases in agricultural employment. Where unexploited or under-exploited opportunities exist for large-scale commercial agriculture (e.g. Tabasco, Yucatán) or where further expansions of output can occur on an already established base (Sinaloa and Veracruz) the agricultural labor force declined much less rapidly than in the nation as a whole. Where rural populations are large and the agricultural infrastructure both stagnant and relatively primitive, the agricultural sector will continue to contribute large numbers of people to migration streams.

Manufacturing

In an expanding, modernizing economy such as that of contemporary Mexico, manufacturing activities are of central importance, as a means to supply domestic needs for consumption goods, income, and employment, and as a means of improving the international trading and currency position.

From the point of view of migration however, some types of manufacturing units are more important than others. In Mexico, much of the reported manufacturing activity is carried out in small-scale units utilizing little capital and oriented to the production of goods for village and provincial markets. This type of manufacturing has been going on for centuries in Mexico and is still of crucial importance to economies of small subregions throughout the nation. Because of rugged terrain and great distances, a truly national market for manufactured goods did not exist in Mexico prior to the transportation improvements of the post World War II period. Even with constantly improving transportation facilties, the small village units remain important sources of local supply for goods such as textiles, footwear, furniture, building materials, and simple metal products.

Despite the continuing importance of the small producing units for the Mexican economy, such units do not provide any significant attraction for migrants. With limited access to capital, markets, and technical information, the expansion potential of the village manufacturer is severely limited in both output and employment. The town and village-centered manufacturing unit is not capable of absorbing either the large increments of new labor force entrants associated with rapid population growth or the people displaced from agriculture. Where expansion does occur, it usually comes in small increments geared to the growth of nearby markets.

The continued importance of the small-scale manufacturer in Mexico is testimony to the presence of "dualism" in the national economy. Modern, large-scale, capital-intensive producers are increasingly dominant in total output and employment, but thousands of more traditional producing units retain their viability in local markets.

In order to attract labor -- and therefore, migrants -- from outside the local area, manufacturing must be relatively concentrated in larger-scale firms organized around highly rationalized production processes. Units of this type are designed specifically for high and rising levels of output, extensive use of semi-skilled labor, and orientation to broader national or international markets. All of these factors cause modern manufacturing to be overwhelmingly urban-based, for it depends upon a well-developed infrastructure of transport, communications, and supporting services of all kinds. Except for instances involving very large facilities (such as steel mills), which are by themselves capable of supporting urban settlement, modern manufacturing facilities tend to locate in urban centers where the necessary support facilities and other productive resources (especially labor) are already mobilized. Mexico City and Monterrey are prime examples of this type of manufacturing center in Mexico, and smaller centers are now emerging in several states.

For purposes of assessing the influences of the manufacturing sector upon migration, it is necessary to identify those states in which manufacturing centers are either already established or in which a combination of favorable circumstances make the further development of such centers likely. The relevant distinction is not whether production units are giants in their class, but whether the production processes and market orientations in question exhibit the conventional industrial attributes of capital intensity, specialized task performances, and predisposition to expansion of output and firm size.

In order to identify the major manufacturing centers, the 10 top manufacturing industries in Mexico were ranked on the basis of aggregate value of product in 1965. The top 10 states were then ranked in descending order of their contribution to the value of output in each industry. The states which ranked among the top 10 in at least four industries were judged to have a concentration of manufacturing activities of sufficient size and diversity to make them potentially attractive to migrant labor. States which ranked high in fewer than four industries were considered less likely to exert strong migratory pulls. This is because their more narrowly focused activity can be regarded as implying a lower potential for industrial expansion and employment and therefore a lower attraction for migrants. To have included states ranking in less than four industries would have expanded the list of states to unmanageable size, while also diminishing the importance of diversity as a factor influencing migration. Similarly, a cut-off point higher than four industries would have dropped from the list several states which appear to have potential migratory pulls because of urban concentrations or other factors favorable to industrial growth. Finally, it is to be remembered that the procedure deals only with migration influences attached to the manufacturing sector. It does not include influences stemming from other sectors.

Ten states in Mexico qualified as key manufacturing centers on the basis of the procedure described above and are listed on Table 5.4. The table shows the major industries of Mexico with the 1965 value of national output arranged at the head of each column. It then lists the industry rankings and percent of product of the 10 states, each of which was among the top 10 producers in at least four industries. States not listed in the table either failed to rank in the top 10 in any industry, or held such rank in less than four industries. On the basis of already existing diversity and value of output, these states are considered to be key manufacturing centers for purposes of the present analysis.

Three of the 10 states listed in Table 5.4 are below the national average in their shares of state labor force in manufacturing in 1970, although they still ranked high in four or more industries. The reasons for this vary among the three states, but the net effect of the observed differences is to divide the 10 key states into two groups: those with well-developed <u>current</u> potential for attracting migrants, and those with an <u>emergent</u>, but as yet underdeveloped potential for such attraction. Other things equal, the latter group may be expected to attract migrants somewhat more slowly than the former, although this can be expected to change with time. The share of state labor force in manufacturing in the 10 key states in both 1960 and 1970 is shown in Table 5.5. The table shows 1960 to 1970 share changes which are positive in manufacturing for nine states and negative for one state. Of the four states below the national share in 1960 (Baja California, Puebla, Sinaloa, and Veracruz), only Baja California increased to a level above the national average for 1970.

Table 5.4: Percent of Output and State Rankings in Major Manufacturing Industries of Key Manufacturing States, 1965

State	Food 23,840* Percent (Rank)	Chemicals 15,139* Percent (Rank)	Textiles 11,515* Percent (Rank)	Primary Iron & Steel 8,943* Percent (Rank)	Autos and Parts 6,937* Percent (Rank)	Beverages 6,645* Percent (Rank)	Elect. Equip. 6,096* Percent (Rank)	Primary Non-Ferrous Metals 3,152* Percent (Rank)	Mech. Equip. 2,265* Percent (Rank)	Leather 661* Percent (Rank)
Baja California	4.1(6)	-	-	-	1.5(7)	6.9(4)	.4(10)	2.3(7)	-	-
Coahuila	-	1.7(9)	-	28.9(2)	4.2(5)	3.7(7)	.4(9)	21.6(2)	4.3(6)	.7(9)
Federal Dist.	28.3(1)	50.4(1)	26.4(1)	7.9(5)	61.5(1)	28.9(1)	49.7(1)	37.1(1)	33.5(1)	53.2(1)
Guanajuato	2.8(10)	2.1(7)	-	-	-	-	.5(8)	-	-	14.3(2)
Jalisco	9.7(2)	5.3(4)	4.0(6)	-	.9(8)	6.8(5)	1.1(5)	-	3.2(8)	8.3(3)
México	6.9(5)	20.5(2)	16.3(2)	17.8(3)	15.6(2)	6.4(6)	30.4(2)	17.1(3)	22.5(2)	4.0(6)
Nuevo León	7.1(4)	7.1(3)	-	32.2(1)	5.4(4)	7.2(3)	12.5(3)	16.6(4)	13.0(3)	5.0(5)
Puebla	3.0(9)	-	14.4(3)	-	.4(10)	2.7(8)	1.6(4)	-	.9(9)	1.6(8)
Sinaloa	3.4(7)	-	3.0(8)	.3(10)	-	-	-	-	-	3.8(7)
Veracruz	8.9(3)	3.2(5)	2.9(9)	9.1(4)	.5(9)	13.1(2)	-	2.3(6)	4.8(5)	6.1(4)
Percent of Industry Output of Listed States	74.2	90.3	67.0	96.2	90.0	75.7	96.6	97.0	82.2	97.0

*Total value of 1965 product in 000 of Pesos

Source: Bonine, et. al. 1970:108-128.

Table 5.5: Percent of State Labor Force in Manufacturing Sector in Key Manufacturing States*

Key Manufacturing States*	Percent of State Labor Force	
Current Potential for Attracting Well Developed Labor	1960	1970
Baja California	12.9	18.2
Coahuila	15.2	18.0
Federal District	30.4	29.8
Guanajuato	13.9	17.3
Jalisco	15.5	20.9
México	15.1	24.9
Nuevo León	25.4	29.6
Emergent Potential for Attracting Labor		
Puebla	11.5	13.6
Sinaloa	8.4	8.9
Veracruz	9.1	9.5
National Sector	13.8	16.7

*States ranking in top 10 in at least four industries

Distribution of the national manufacturing labor force. The relatively low share of the state labor force in manufacturing in certain of the key manufacturing states disguises to some extent their importance in the national distribution. Table 5.6 ranks all states as to absolute size of the labor force in manufacturing. It shows that manufacturing employment in Mexico is highly concentrated in only a few states. Since such leading positions are not easily or quickly changed, the concentration involves the same states for both census years. There were changes of rank among the top states, the most important of which was the movement of México from the fourth-ranked position in 1960 to second in 1970. Other states (Chihuahua, Michoacán, Guanajuato, and Tamaulipas) also shifted as much as two positions, but did so on much smaller percentage changes. The state of México, surrounding the dominant Federal District has far outstripped other states in manufacturing gains. As of 1970, well over 45 percent of the national manufacturing activity is concentrated in Mexico City and the immediately surrounding region.

Of the 10 key manufacturing states, eight rank in the top 10 in absolute size of their manufacturing labor force. Sinaloa is the lowest ranking of the 10 in manufacturing employment. The 10 key manufacturing states have 1,612,623 workers, or 74.3 percent of national manufacturing employment in 1970.

Rate of change in manufacturing. Nationally, the manufacturing sector grew at a rate of 39.8 percent during the period 1960-70. In the 10 key states, however, there were widely differing rates of change for the decade (Table 5.7). Veracruz shows the lowest positive gain increasing its manufacturing labor force by only 18.2 percent. As indicated above, México had the highest rate of change, nearly tripling its manufacturing sector from 1960 to 1970. Baja California also had a strong increase, 87.4 percent, but on a much smaller 1960 base. Jalisco and Nuevo León expanded their labor force in manufacturing at rates well above the national average (60.9 percent, and 58.2 percent respectively) and registered impressive increases in absolute numbers employed (70,981 in Jalisco and 53,630 in Nuevo León). Sinaloa was just above the national average with a decade change of 43.3 percent.

Table 5.6: Manufacturing Labor Force: State Rankings, 1960 and 1970

1960					1970				
Rank	State	Number	State Percent	Cum. Percent	Rank	State	Number	State Percent	Cum. Percent
1.	Federal District	531,467	34.3	34.3	1.	Federal District	665,486	30.7	30.7
2.	Jalisco	116,627	7.5	41.8	2.	México	246,493	11.4	42.1
3.	Nuevo León	92,075	5.9	47.7	3.	Jalisco	187,608	8.6	50.7
4.	México	87,536	5.6	53.5	4.	Nuevo León	145,705	6.7	57.4
5.	Veracruz	80,322	5.2	58.5	5.	Guanajuato	97,254	4.5	61.9
6.	Puebla	75,643	4.9	63.4	6.	Veracruz	94,953	4.4	66.3
7.	Guanajuato	72,181	4.7	68.1	7.	Puebla	92,244	4.3	70.6
8.	Coahuila	43,645	2.8	70.9	8.	Michoacán	56,565	2.6	73.2
9.	Tamaulipas	43,635	2.8	73.7	9.	Chihuahua	52,166	2.4	75.6
10.	Michoacán	43,248	2.8	76.5	10.	Coahuila	52,077	2.4	78.0
11.	Chihuahua	39,295	2.5	79.0	11.	Oaxaca	45,583	2.1	80.1
12.	Oaxaca	38,358	2.5	81.5	12.	Tamaulipas	44,457	2.0	82.1
13.	Hidalgo	27,435	1.8	83.3	13.	Baja California	40,432	1.9	84.0
14.	San Luis Potosí	27,025	1.7	85.0	14.	San Luis Potosí	36,318	1.7	85.7
15.	Sonora	23,994	1.5	86.5	15.	Hidalgo	30,966	1.4	87.1
16.	Yucatán	23,690	1.5	88.0	16.	Sinaloa	30,803	1.4	88.5
17.	Baja California	21,573	1.4	89.4	17.	Guerrero	30,525	1.4	89.9
18.	Sinaloa	21,497	1.4	90.8	18.	Sonora	28,393	1.3	91.2
19.	Chihuahua	18,917	1.2	92.0	19.	Morelos	21,679	1.0	92.2
20.	Durango	16,497	1.1	93.1	20.	Chiapas	21,404	1.0	93.2
21.	Guerrero	15,477	1.0	94.1	21.	Yucatán	21,344	1.0	94.2
22.	Tlaxcala	14,034	0.9	95.0	22.	Durango	20,869	1.0	95.2
23.	Aguascalientes	12,651	0.8	95.8	23.	Tlaxcala	18,146	0.8	96.0
24.	Morelos	12,091	0.8	96.6	24.	Querétaro	16,316	0.8	96.8
25.	Zacatecas	9,550	0.6	97.2	25.	Zacatecas	14,094	0.6	97.4
26.	Querétaro	9,449	0.6	97.8	26.	Aguascalientes	13,572	0.6	98.0
27.	Tabasco	9,122	0.6	98.4	27.	Tabasco	11,672	0.5	98.5
28.	Nayarit	9,047	0.6	99.0	28.	Nayarit	11,658	0.5	99.0
29.	Campeche	7,876	0.5	99.5	29.	Campeche	9,795	0.5	99.5
30.	Colima	4,589	0.3	99.8	30.	Colimas	6,151	0.3	99.8
31.	Baja California T	1,532	0.1	99.9	31.	Baja California T	2,726	0.1	99.9
32.	Quintana Roo T	995	0.06	-	32.	Quintana Roo T	1,620	0.07	-
	National Sector	1,551,073				National Sector	2,169,074		

Source: U.S. Mexican Census 1960 and 1970

Table 5.7: Percent Change 1960-70, Manufacturing Sector: State Rankings

	State	1960 Percent State Labor Force	1960 Absolute Number	1970 Percent State Labor Force	1970 Absolute Number	Net Change	Percent Change
1.	México	15.1	87,536	24.9	246,493	158,957	181.6
2.	Guerrero	4.2	15,477	8.0	30,525	15,048	97.2
3.	Baja California	12.9	21,573	18.2	40,432	18,859	87.4
4.	Morelos	9.7	12,091	12.7	21,679	9,588	79.3
5.	Baja California T	5.9	1,532	7.8	2,726	1,194	77.9
6.	Queretaro	8.5	9,449	12.7	16,316	6,867	72.7
7.	Quintana Roo T	6.1	995	6.5	1,620	625	62.8
8.	Jalisco	15.5	116,627	20.9	187,608	70,981	60.9
9.	Nuevo León	25.4	92,075	29.6	145,705	53,630	58.2
10.	Zacatecas	3.9	9,550	6.5	14,094	4,544	47.6
11.	Sinaloa	8.4	21,497	8.9	30,803	9,306	43.3
12.	Guanajuato	13.9	72,181	17.3	97,254	25,073	34.7
13.	San Luis Potosí	8.4	27,025	11.1	36,318	9,293	34.4
14.	Colima	9.3	4,589	9.0	6,151	1,562	34.0
15.	Chihuahua	10.5	39,295	12.5	52,166	12,871	32.8
16.	Michoacán	8.2	43,248	10.4	56,565	13,317	30.8
17.	Tlaxcala	12.9	14,034	17.1	18,146	4,112	29.3
18.	Nayarit	7.2	9,047	7.9	11,658	2,611	28.9
19.	Tabasco	6.5	9,122	5.9	11,672	2,550	28.0
20.	Durango	7.1	16,497	9.3	20,869	4,372	26.5
21.	Federal District	30.4	531,467	29.8	665,489	134,022	25.2
22.	Campeche	14.0	7,876	13.7	9,795	1,919	24.4
23.	Puebla	11.5	75,643	13.6	92,244	16,601	21.9
24.	Coahuila	15.2	43,645	18.0	52,077	8,432	19.3
25.	Oaxaca	6.2	38,358	8.7	45,583	7,225	18.8
26.	Sonora	9.6	23,994	10.0	28,393	4,399	18.3
27.	Veracruz	9.1	80,322	9.5	94,953	14,631	18.2
28.	Chiapas	4.8	18,917	5.3	21,404	2,487	13.1
29.	Hidalgo	8.8	27,435	10.3	30,966	3,531	12.9
30.	Aguascalientes	16.5	12,651	15.6	13,572	921	7.3
31.	Tamaulipas	13.1	43,635	11.6	44,457	822	1.9
32.	Yucatán	12.1	23,690	10.6	21,344	-2,346	-9.9
	National Sector	13.0	1,551,073	16.7	2,169,074	618,001	+39.8

Source: U.S. Mexican Census 1960 and 1970

All other states in the group of 10 changed at rates below the national average and on 1960 bases of varying sizes. The Federal District for instance, changed at a rate well below the national average (25.2 percent) but added 134,022 to the manufacturing work force. Coahuila changed at a rate of 19.3 percent, adding only 3,531 workers.

Overall, the combined net increase for the 10 key states totaled 510,492 or 82.6 percent of the national increase in manufacturing. Four out of five of the workers gained in the key states were added in the four states of the Federal District, México, Jalisco, and Nuevo León, thus demonstrating the effects of agglomeration factors in manufacturing growth.

Rates of change compared with expected change. The previous discussion has pointed up the variations in manufacturing rates of change among various states. These variations are viewed in Figure 5.35 as deviations from those values of manufacturing labor force which would have been expected if all states had changed at the national average of 39.8 percent for the 1960-70 period. (The deviation analysis is presented in Table 5. 8). This approach depicts the uneven nature of the expansion in manufacturing, specifically the narrow geographical focus of the strongest expansion, the saturation effects operating in the Federal District and the widespread distribution of changes clustering around the national average.

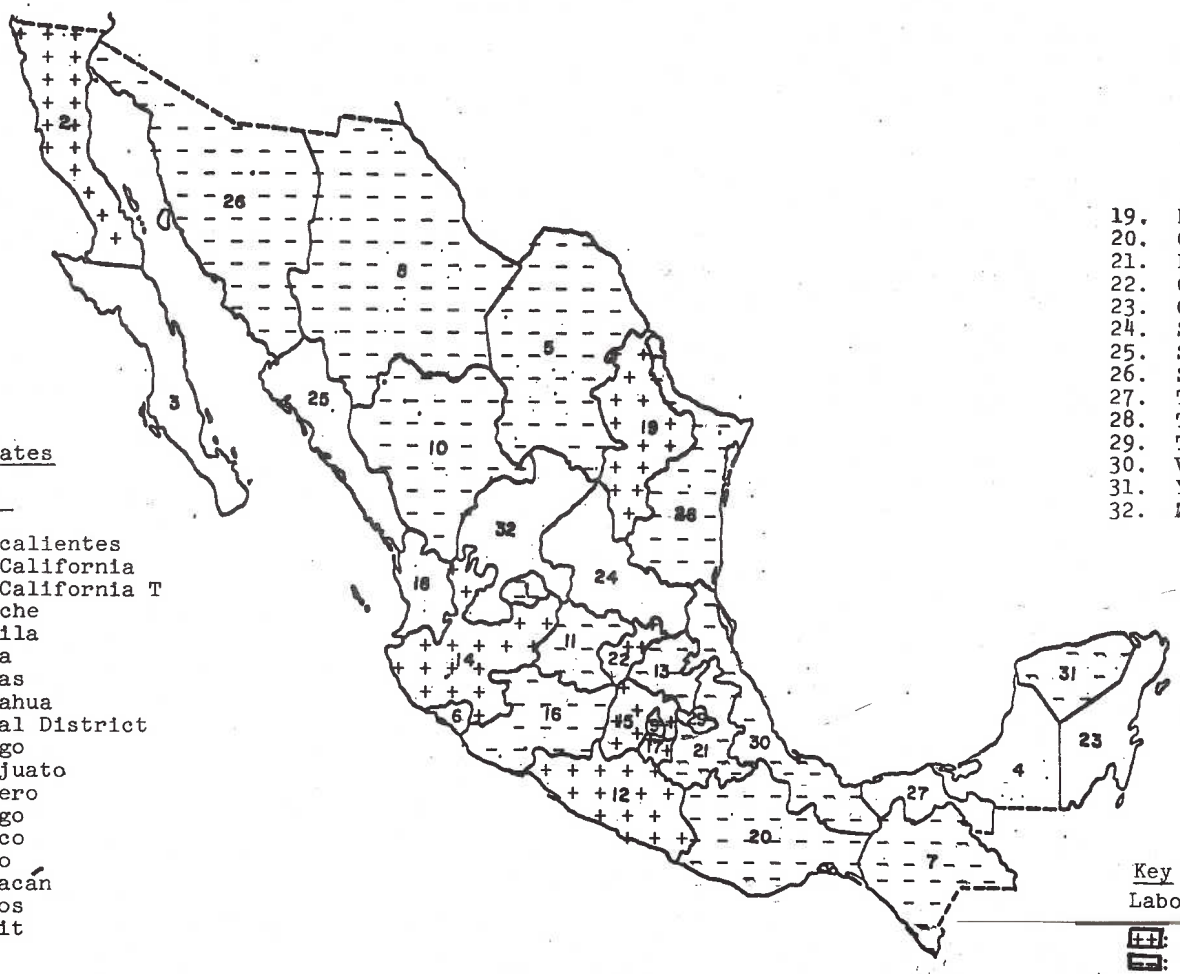
Almost 85 percent of the total positive deviation was located in only three states: Jalisco, Nuevo León, and México, and roughly 64 percent of this shift occurred in the single state of México, which has already been identified as the major beneficiary of saturation processes occurring in the adjacent Federal District. Jalisco had the next largest share of positive deviations with 12.6 percent, and Nuevo León was third with 8.7 percent. Other states showing significant, positive deviations were Baja California, Guerrero, Morelos, and Querétaro. The latter two states are partial beneficiaries, along with the state of México, of the saturation effects in Mexico City. Baja California as a border state with large cities, has expanded due to the border industrialization program and its own urban demands for goods. Guerrero's experience remains unexplained except possibly as an expansion in cement manufacture and other products related to the current construction of a steel mill on the Rio Balsas in the neighboring state of Michoacán (Myers 1975).

The negative deviations from the expected values are also revealing. They demonstrate unmistakably the saturation of the Federal District, which had 39.9 percent of all the negative deviations. Another 24.3 percent of negative deviations was accounted for by Veracruz, Puebla, and Tamaulipas. These states also had absolute increases in labor force, but grew at rates sufficiently below the national average to fall below the expected values. The shortfalls from expected values are not large enough to indicate the presence of saturation tendencies, but suggest that the fastest growing industries were not heavily represented in those states. All three of these states, however, have favorable prospects for future expansion in manufacturing -- they had only minor deviations (positive or negative) in other non-agricultural sectors, and their location and high levels of urbanization augur well for manufacturing growth during the 1970's. The negative deviations for other states were relatively small which indicates that moderate growth in manufacturing is remarkably well-distributed among all states.

Implications for migration. Any component of total Mexican migration that is attributable to the pull of the manufacturing sector will be heavily directed to the 10 key manufacturing states identified in this section. México, Guanajuato, and Puebla are probably the best candidates for migration pulls by the manufacturing sector over the next 10 years. This effect upon migration can be expected largely as a result of the saturation phenomenon in Mexico City and its attendant backwash into the major cities of adjoining states. Veracruz and Sinaloa are also likely candidates to show increased pull in manufacturing, but with less strength and over longer periods of time.

The states with prospective pulls in manufacturing are all relatively well diversified, and all have large cities functioning as central places in regions which are both heavily populated and heavily rural. In addition, México, Guanajuato,

Figure 5.35: Manufacturing Sector. Geographical Distribution of Deviation Between Actual and Expected 1970 Labor Force



United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Labor Force Distribution

++: actual greater than expected
−−: actual less than expected
unmarked: actual within ± 1 % of expected

Table 5.8: Manufacturing. Changes in Labor Force 1960-70, Analysis of Deviation from Expected Size

	Labor Force 1960	Expected Labor Force 1970 [1]	Actual Labor Force 1970	Positive Deviation	Percent of Total Positive Deviation
	1,551,073		2,169,074		
1970 Labor Force > Expected					
México	87,536	122,375	246,493	124,118	63.6
Jalisco	116,627	163,045	187,608	24,653	12.6
Nuevo León	92,075	128,721	145,705	16,984	8.7
Baja California	21,573	30,159	40,432	10,273	5.3
Guerrero	15,477	21,637	30,525	8,888	4.6
Morelos	12,091	16,903	21,679	4,776	2.4
Querétaro	9,449	13,210	16,316	3,106	1.6
Sinaloa	21,497	30,053	30,803	750	0.4
Zacatecas	9,550	13,351	14,094	743	0.4
Baja California T	1,532	2,142	2,726	584	0.3
Quintana Roo T	995	1,391	1,620	229	0.1
				(+195,014)	(100.0)
1970 Labor Force < Expected				Negative Deviation	Percent of Total Negative Deviation
Federal District	531,467	742,990	665,486	77,504	39.9
Veracruz	80,322	112,290	94,953	17,337	8.9
Tamaulipas	43,635	61,002	44,457	16,545	8.5
Puebla	75,643	105,749	92,244	13,504	6.9
Yucatán	23,690	33,119	21,344	11,775	6.1
Coahuila	43,645	61,016	52,077	8,939	4.6
Oaxaca	38,358	53,624	45,583	8,041	4.1
Hidalgo	27,435	38,354	30,966	7,388	3.8
Sonora	23,994	33,544	28,393	5,158	2.7
Chiapas	18,917	26,446	21,404	5,042	2.6
Aguascalientes	12,651	17,686	13,572	4,114	2.1
Michoacán	43,248	60,461	56,565	3,896	2.0
Guanajuato	72,181	100,909	97,254	3,655	1.9
Chihuahua	39,295	54,935	52,166	2,769	1.4
Durango	16,497	23,063	20,869	2,194	1.1
Tlaxcala	14,034	19,620	18,146	1,474	0.8
San Luis Potosí	27,025	37,781	36,318	1,463	0.8
Campeche	7,876	11,011	9,789	1,216	0.6
Tabasco	9,122	12,753	11,672	1,081	0.6
Nayarit	9,047	12,648	11,658	990	0.5
Colima	4,589	6,415	6,151	264	0.1
				(-194,343)	(100.0)

[1] Expected 1970 Labor Force = Y(Z)+Z
Y = Percent change national sector
Z = 1960 State Labor Force in Sector

Source: U.S. Mexican Census 1960 and 1970

Puebla, Veracruz, and Sinaloa are all situated along major transportation corridors between the capital and other centers of population, and major ports of entry. These locational factors ensure that the states in question will attract large numbers of migrants along with new industrial facilities.

The manufacturing-related migration potentials of Baja and Coahuila are heavily geared to the future of the border industrialization program, and this outlook is related, in turn, to the nature of industrial expansion in the United States. Space limitations prohibit a full discussion of this issue, but the manufacturing prospects of border states are judged to be much less favorable for the last half of the 1970's than for the first. On balance, migration to these areas is not likely to be strongly influenced by manufacturing activity for the next five to ten years.

The remaining states in the group of key manufacturing centers are the Federal District, Nuevo León, and Jalisco. These states are viewed as having less attraction for migrants because of the present size and stable nature of their present manufacturing activities. The Federal District will probably continue to lose in share of total manufacturing workers, and could function as a point of origin for urban-urban migration as well as a destination point for rural-urban migrants. During the 1960-70 period, the Federal District had net out-migration of 22,107 (Chapter 3), but there is no data on the occupational categories of these migrants.

Services

The services sector in Mexico exhibits leading, coincident, and lagging roles, according to the different economic and geographical circumstances of the respective states. In general, there is usually a significant elaboration of services functions in well-established manufacturing centers, and the same thing is true in established urban centers receiving their main support from government, educational facilities or tourism. In newly developing tourist and recreational centers service activities may lead the way to changes in other sectors, such as manufacturing, commerce or urban-oriented agriculture. The service sector appears to have played a strong leading role in Baja California and Baja California T, and in lesser degree in Sinaloa, Jalisco, and Guerrero.

During the 1960-70 period, the services sector increased in share of the national labor force from 13.5 percent in 1960 to 16.7 percent in 1970. A majority of the Mexican states reflect this expansion of services activity, with larger growth in the states which are also manufacturing leaders. The exceptions to this general pattern of expansion include Chiapas and Hidalgo, where the service sector increased only minutely, and Colima, the Federal District, and Quintana Roo T where relative declines in services were recorded. Of these last three, Colima and the Federal District were well above average in the service sector in 1960 and remained so in 1970 despite the relative declines.

Table 5.9 lists the states which were above the national average in services as a share of the state labor force in 1970. Most of the states above the average in services employment in 1970, were also well above average in 1960. Only Jalisco moved from behind to exceed the national average by the end of the period.

Distribution of national services labor force. Table 5.10 ranks the states in terms of the absolute size of the labor force in services. The top 10 ranking states in 1970 represented 73.6 percent of the national labor force in services. Six of the states which had above average shares of total labor force in services were represented among the top 10 in the ranking by absolute size of the sector. The four states of México, Veracruz, Puebla, and Guanajuato, while below the national average in share of labor force, nevertheless increased their service sectors relative to other classes of activity. México almost doubled the number of service workers, moving from 8.2 percent of the state labor force in 1960 to 14.8 percent in 1970. Veracruz, Puebla, and Guanajuato increased more modestly.

Concentration of the services labor force stayed relatively constant from 1960 to 1970. The 10 states with the largest numbers of people in services represented 72.9 percent of the total services labor force in 1960 and 73.3 percent in 1970. There were some slight shifts in the rankings, with Coahuila dropping to eleventh place and Sonora moving up to tenth place.

Table 5.9: States Above National Level in Services Employment, 1970

State	Percent of State Labor Force 1960	1970
Baja California	19.1	24.2
Baja California T	16.0	18.6
Coahuila	13.7	18.6
Colima	16.9	16.8
Chihuahua	15.3	19.2
Federal District	33.6	32.2
Jalisco	12.1	17.0
Nuevo León	16.7	22.4
Tamaulipas	15.0	20.4
Sonora	14.7	19.1
National Sector	13.5	16.7

For purposes of comparison, the status of manufacturing and the degree of urbanization is shown in Table 5.11 for the 10 major states in the services sector in 1970. A state is judged to be a top-ranking manufacturing state if it is one of the 10 which are major producers in at least four of the most prominent Mexican industries. Urbanization data is based on a minimum population concentration of 10,000 inhabitants, as smaller communities in Mexico do not truly function as cities. Also shown in the table are the rankings of these states in terms of value of services and value of capital in service industries (1965 rankings).

As Table 5.11 shows, services employment, major manufacturing, urbanization, value of services and capital rankings are not absolutely regular, at least at the state level. Chihuahua, for instance, is not a major producer in the top manufacturing industries. It is however, tenth in beverage production and sixth in primary iron and steel, and is ranked high in less prominent industries such as furniture manufacture, photo and optical equipment. It also has two of the largest cities in Mexico; Cuidad Juárez with a 1970 population of 407,400 and Chihuahua, population 257,000. The border town of Cuidad Juarez is by itself a major services center and would account for Chihuahua's position in the rankings. Three of the other states, México, Veracruz, and Puebla, are well below average in urban population, but all have very strong urban centers: México is partially integrated in the metropolitan area of Mexico City; Veracruz has four of the most rapidly growing cities in the country (1960-70 growth: Poza Rica, 376.3 percent; Coalzalcoalco, 87.1 percent; Minatitalán, 93.2 percent; and Jalapa, 84.6 percent). The city of Puebla is the fifth largest in the nation, with a population of more than 400,000 in 1970.

Rate of change in services employment. Table 5.12 ranks the states by rate of change in the services sector 1960 to 1970. Several states which were not among the top 10 ranking states in services employment are ranked at the top when rate of change is considered. The change rate in three of these, Querétaro, Baja California T, and Campeche, are basically artifacts of moderate absolute increases on very small base populations in 1960, although the rate of change in Baja California T is doubtlessly related to the rapidly expanding tourist services industry. The other states highlighted by the rate of change table include Sinaloa,

Table 5.10: Services Labor Force: State Rankings, 1960 and 1970

1960					1970				
Rank	State	Number	State Percent	Cum. Percent	Rank	State	Number	State Percent	Cum. Percent
1.	Federal District	587,734	38.7		1.	Federal District	717,363	33.2	
2.	Jalisco	90,590	5.9	44.6	2.	Jalisco	152,365	7.0	40.2
3.	Veracruz	82,967	5.5	50.0	3.	México	146,867	6.8	47.0
4.	Nuevo León	60,653	4.0	53.9	4.	Veracruz	118,737	5.5	52.5
5.	Chihuahua	57,453	3.0	57.6	5.	Nuevo León	110,255	5.1	57.6
6.	Puebla	54,896	3.6	61.2	6.	Chihuahua	79,984	3.7	61.3
7.	Tamaulipas	49,845	3.3	64.4	7.	Tamaulipas	77,953	3.6	64.9
8.	México	47,625	3.1	67.5	8.	Puebla	72,612	3.3	68.2
9.	Coahuila	39,276	2.6	70.0	9.	Guanajuato	58,115	2.6	70.8
10.	Guanajuato	39,204	2.5	72.5	10.	Sonora	54,403	2.5	73.3
11.	Michoacán	36,824	2.4	74.9	11.	Coahuila	53,770	2.4	75.7
12.	Sonora	36,713	2.4	77.3	12.	Baja California	53,692	2.4	78.1
13.	Baja California	31,882	2.1	79.4	13.	Sinaloa	49,668	2.3	80.4
14.	Oaxaca	30,535	2.0	81.4	14.	Michoacán	49,635	2.3	82.7
15.	Sinaloa	27,158	1.8	83.1	15.	Queretaro	41,310	1.9	84.6
16.	Chiapas	26,377	1.7	84.8	16.	San Luis Potosí	36,279	1.0	86.2
17.	Guerrero	26,106	1.7	86.5	17.	Oaxaca	30,698	1.0	87.6
18.	San Luis Potosí	25,303	1.6	88.1	18.	Morelos	28,397	1.3	88.9
19.	Hidalgo	24,310	1.6	89.7	19.	Chiapas	28,211	1.0	91.2
20.	Yucatán	22,198	1.6	91.1	20.	Hidalgo	25,361	1.1	92.3
21.	Durango	21,108	1.4	92.4	21.	Durango	25,292	1.1	93.4
22.	Morelos	16,369	1.1	93.4	22.	Yucatán	25,211	1.1	94.5
23.	Zacatecas	12,480	.8	94.2	23.	Tabasco	19,727	.9	95.4
24.	Tabasco	11,799	.8	94.9	24.	Zacatecas	18,400	.8	96.2
25.	Nayarit	10,991	.7	95.6	25.	Nayarit	16,537	.7	96.9
26.	Queretaro	9,571	.6	96.2	26.	Queretaro	15,147	.7	97.6
27.	Aguascalientes	8,735	.6	96.7	27.	Aguascalientes	12,508	.5	98.1
28.	Colima	8,352	.5	97.2	28.	Colima	11,437	.5	98.6
29.	Tlaxcala	7,950	.5	97.7	29.	Campeche	9,503	.4	99.0
30.	Campeche	6,153	.4	98.1	30.	Tlaxcala	9,120	.4	99.4
31.	Baja California T	4,140	.3	98.3	31.	Baja California T	6,588	.3	99.7
32.	Quintana Roo T	2,274	.1	99.9	32.	Quintana Roo T	3,130	.1	99.8
	National Sector	1,517,571				National Sector	2,158,175		

Source: U.S. Mexican Census 1960 and 1970

Table 5.12: Percent Change 1960-70, Services Sector: State Rankings

	State	1960 Percent State Labor Force	1960 Absolute Number	1970 Percent State Labor Force	1970 Absolute Number	Net Change	Percent Change
1.	México	8.2	47,625	14.8	146,867	99,242	208.4
2.	Sinaloa	10.6	27,158	14.3	49,668	22,510	82.9
3.	Nuevo León	16.7	60,653	22.4	110,255	49,602	81.8
4.	Morelos	13.2	16,369	16.6	28,397	12,028	73.5
5.	Baja California	19.1	31,882	24.2	53,692	21,810	68.4
6.	Jalisco	12.1	90,590	17.0	152,365	61,775	68.2
7.	Tabasco	8.4	11,799	10.0	19,727	7,928	67.2
8.	Querétaro	8.6	9,571	11.8	15,147	5,576	58.3
9.	Guerrero	7.0	26,106	10.8	41,310	15,204	58.2
10.	Baja California T	16.0	4,140	18.6	6,488	2,348	56.7
11.	Tamaulipas	15.0	49,845	20.4	77,953	28,108	56.4
12.	Campeche	10.9	6,153	13.3	9,503	3,350	54.4
13.	Nayarit	8.7	10,991	11.2	16,537	5,546	50.5
14.	Guanajuato	7.6	39,204	10.3	58,115	18,911	48.2
15.	Sonora	14.7	36,713	19.1	54,403	17,690	48.1
16.	Zacatecas	5.1	12,480	8.5	18,400	5,920	47.4
17.	San Luis Potosí	7.9	25,303	11.0	36,279	10,976	43.4
18.	Aguascalientes	11.4	8,735	14.4	12,508	3,773	43.2
19.	Veracruz	9.4	82,967	11.9	118,737	35,770	43.1
20.	Chihuahua	15.3	57,453	19.2	79,984	22,531	39.2
21.	Quintana Roo T	13.9	2,274	12.5	3,130	856	37.6
22.	Coahuila	13.7	39,276	18.6	53,770	14,434	36.8
23.	Colima	16.9	8,352	16.8	11,437	3,085	36.4
24.	Michoacán	6.5	36,824	9.1	49,635	12,811	34.8
25.	Puebla	8.4	54,896	10.7	72,612	17,716	32.3
26.	Federal District	33.6	587,734	32.2	717,363	129,629	22.1
27.	Durango	9.0	21,108	11.3	25,292	4,184	19.8
28.	Tlaxcala	7.3	7,950	8.6	9,120	1,170	14.7
29.	Yucatán	11.3	22,198	12.5	25,211	3,013	13.6
30.	Chiapas	6.8	26,377	7.0	28,211	1,834	7.0
31.	Hidalgo	7.8	24,310	8.4	25,361	1,051	4.3
32.	Oaxaca	5.0	30,535	5.9	30,698	163	0.5
	National Sector	13.5	1,517,571	16.7	2,158,175	640,604	42.2

Source: U.S. Mexican Census 1960 and 1970

Table 5.11: Association of Manufacturing and Urbanization in Ten Top Ranking States in Services Employment, 1970

	Key Manufacturing State*	Percent Urban (10,000+)	Value of Services (rank)	Value of Capital (rank)
Federal District	X	97.2	1	1
Jalisco	X	53.5	4	3
México	X	28.0	12	11
Veracruz	X	32.2	5	4
Nuevo León	X	62.5	2	2
Chihuahua		57.5	6	6
Tamaulipas		62.4	7	7
Puebla	X	24.6	14	14
Guanajuato	X	42.5	13	13
Sonora		56.4	8	8
National average		44.9		

*Procedure for identification explained in Manufacturing section.

Source: Urban data: Olizar 1973:12. Rankings in value of services and capital: Bonine, et al 1970:84-85

Morelos, Baja California, Tabasco, and Guerrero. As previously noted, two of these, Baja California and Guerrero are also high ranking states when value of services and capital are considered. Baja California is also a major manufacturing state and ranks third in terms of growth in the manufacturing sector. Guerrero, while not presently important in manufacturing, ranked second in rate of growth, nearly doubling its small manufacturing sector in the 1960-70 period. Guerrero and Baja California both enjoy a vigorous tourism as well. Guerrero is perhaps the best example of a leading services sector: favorable climate, natural recreational resources and well-developed tourist facilities have made Acapulco one of the fastest growing cities in Mexico.

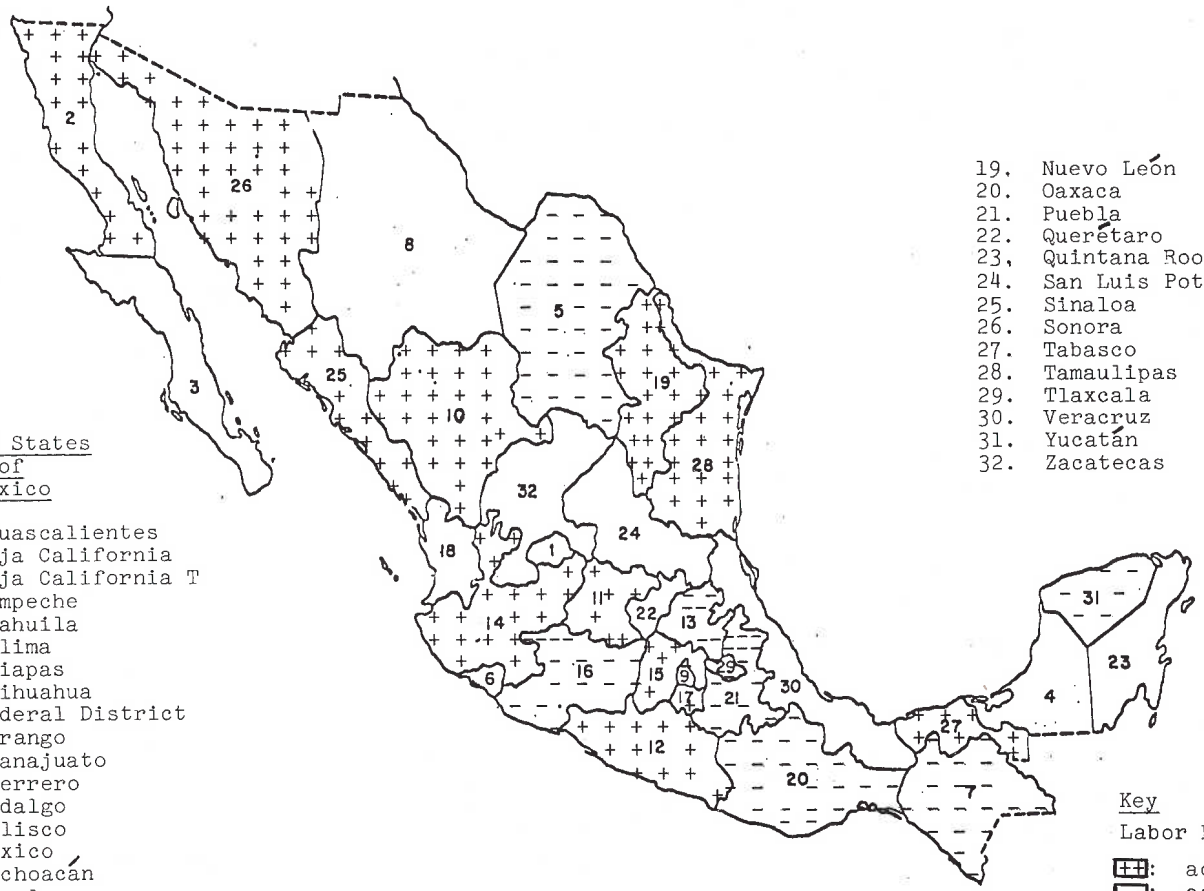
Rates of change compared with expected change. The states were ranked by degree of deviation from the expected value if the state services sectors had changed at the national rate from 1960 to 1970. Table 5.13 presents the data and Figure 5.36 depicts the deviation patterns geographically. The 10 top ranking states in services employment represented 77.9 percent of the total positive deviations, and the state of México was the leader with 45.1 percent of the positive deviations. This record of service expansion is directly related to the manufacturing expansion discussed earlier.

Eleven states had positive deviations from expected values which amounted to more than 1.0 percent of the total positive deviation. Of these, México, Nuevo León, Jalisco, and Sinaloa were the more important. In all of these states but Sinaloa there were also strong manufacturing changes. In Sinaloa the service expansion was probably related to commercial agriculture and tourism. Baja California also had a moderately positive deviation in services, and like others with positive changes, it is a growing manufacturing state ranking third in terms of growth in the manufacturing sector. Guerrero, with some 4,000 workers more than expected, is not yet established in manufacturing, but ranked second in rate of growth, nearly doubling its small manufacturing sector in the 1960-70 period.

One factor common to the states with significant positive deviations in services is that they all have rapidly expanding major cities, and it is in the cities that services activities are located.

Implications for migration of services employment. The migration implications of sector share changes in services vary from state to state. Where the service expansion is primarily in support of manufacturing in an established center, the skill requirements for such services are likely to be such that the migration implications are narrowly focused on certain groups. Where the service sector is

Figure 5.36: Services Sector. Geographical Distribution of Deviation Between Actual and Expected 1970 Labor Force



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15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Labor Force Distribution

⊞: actual greater than expected
⊟: actual less than expected
Unmarked: actual within ± 1 % of expected

Table 5.13: Services. Changes in Labor Force 1960-70, Analysis of Deviations from Expected Size

	Labor Force 1960	"Expected" Labor Force 1970[1]	Actual Labor Force 1970	Positive Deviation	Percent of Total Positive Deviation
1970 Labor Force > Expected	1,517,571		2,158,175		
México	47,625	67,723	146,867	79,144	45.1
Nuevo León	60,653	86,249	110,255	24,006	13.7
Jalisco	90,590	128,819	152,365	23,546	13.4
Sinaloa	27,158	38,619	49,668	11,049	6.3
Baja California	31,882	45,336	53,692	8,356	4.8
Tamaulipas	49,845	70,880	77,953	7,073	4.0
Morelos	16,369	23,277	28,397	5,120	2.9
Guerrero	26,106	37,123	41,310	4,187	2.4
Tabasco	11,799	16,778	19,727	2,949	1.7
Guanajuato	39,204	55,748	58,115	2,367	1.3
Sonora	36,713	52,206	54,403	2,197	1.3
Querétaro	9,571	18,610	15,147	1,537	0.9
Nayarit	10,991	15,629	16,537	908	0.5
Campeche	6,153	8,570	9,503	753	0.4
Veracruz	82,967	117,979	118,737	758	0.4
Zacatecas	12,480	17,747	18,400	653	0.3
Baja California T	4,140	5,887	6,488	601	0.3
San Luis Potosí	25,303	35,981	36,279	298	0.2
Aguascalientes	8,735	12,421	12,508	87	0.4
				(+175,589)	(99.9)
1970 Labor Force < Expected				Negative Deviation	Percent of Total Negative Deviation
Federal District	587,734	835,758	717,363	118,395	67.5
Oaxaca	30,535	43,421	30,698	12,723	7.3
Chiapas	26,377	37,508	28,211	9,297	5.3
Hidalgo	24,310	10,259	34,569	25,631	5.3
Yucatán	22,198	31,566	25,211	6,355	3.6
Puebla	54,896	78,062	72,612	5,450	3.1
Durango	21,108	30,016	25,292	4,724	2.7
Michoacán	36,824	52,364	49,635	2,729	1.6
Tlaxcala	7,950	11,305	9,120	2,185	1.2
Coahuila	39,276	55,850	53,770	2,080	1.2
Chihuahua	57,453	81,698	79,984	1,714	1.0
Colima	8,352	11,877	11,437	440	0.3
Quintana Roo T	2,274	3,234	3,130	104	0.1
				(-175,404)	(100.0)

[1] Expected 1970 Labor Force = Y(Z)+Z
Y = Percent change national sector
Z = 1960 State Labor Force in Sector

Source: U.S. Mexican Census 1960 and 1970

elaborating as a result of rapid urban expansion the change may be extended to lower skill levels and result in greater migration significance.

In those cases where services is a leading sector (tourism, etc.) skill requirements are not an obstacle to strong migration pulls and the numbers of migrants so affected will be determined by the scale of the development and local labor supply conditions. For example, in the large and presently dominant states there is already a large urban population and, in most cases, a rapidly changing rural hinterland to supply any increases in demand for services labor that might occur. Such new demands will depend on growth in other sectors of the economy and are therefore related to the conditions affecting non-services sectors. A new and substantial investment program in oil production and exploration in Veracruz and Tamaulipas could result in stimulation of all sectors of the economy and result in many new opportunities for services employment. In contrast, states which presently have very few services workers (Baja California T) could probably support high rates of change in the service sector with people drawn from their own rural hinterlands. Under these circumstances, a single new resort complex could effectively double the labor force in services without supplying a stimulus to in-migration.

It would seem from the data that the states which will offer the greatest expansion in services employment opportunities are those that (1) are already large in absolute size of services employment, thus indicating a supporting infrastructure for manufacturing or urbanization, or both; or (2) presently have service sectors well below the national average, but show signs of strong expansion in one or more other sectors.

These conditions point to three states, Guanajuato, Jalisco, and México as having strong enough potentials for service expansion to attract migrants. All are key manufacturing states and have important urban concentrations. All three are less urbanized than several other states which already have large service employment. Despite their existing urban centers these three states are below average in rate of urbanization during the 1960-70 period, apparently indicating that the agricultural sector is strong enough to retain the indigenous rural population on the land. Despite increases in the service sector share of total labor force for these three states during the 1960's, they are all at or below the national sector share, and have above average rates of change in services.

There are few states which can be identified as exerting any definite push from the services sector other than those showing an absolute decline, e.g. the Federal District and Quintana Roo T. Because of its very small base, the development of even one new project could reverse such declines in Quintana Roo T. The Federal District is a different matter, and it can be hypothesized that the "saturation" pattern so pronounced in the economic profile will have the effect of spinning off urban service workers to other urban centers in states immediately surrounding the capital region.

Construction

The construction industry, like other industries producing long-lived capital goods, is generally recognized to be a leading sector. Decisions to expand or to renew facilities in manufacturing, transport, services, or other sectors result in new construction activity, and this activity necessarily precedes employment changes in the initiating sectors. Construction is a leading activity even in cases where the investment is in residential construction, for such cases rest upon an increase in population or income which is functionally equivalent to investment decisions in other sectors.

While construction is unmistakably a leading sector, employment data is too highly aggregated to permit inferences as to the magnitude, timing, or sector identity of the economic changes without additional information. For example, the development of a single large resort hotel in Baja California T could cause an expansion in construction employment and a consequent expansion in service employment since the facilities would require staffing before they could be placed in operation at all. However the same number of units developed as a condominium might entail expansion in construction employment, but the ensuing effects in other sectors (services, commerce, etc.) would be relatively slow to appear in employment figures.

Much the same kind of consideration applies to the construction of a large-scale industrial facility, which obviously implies later changes in manufacturing employment. But the timing and magnitude of the manufacturing changes will depend upon the lead-time required to bring the facility into operation and the capital-intensiveness of the particular industrial process. A petrochemical plant may produce a large surge in construction employment but only a ripple in manufacturing employment; the same capital outlay on construction of an automobile plant or steel mill would be likely to produce much larger subsequent changes in manufacturing employment.

Finally, there is also a question of the scale of the development. A given change in construction employment would produce new employment in other sectors more quickly if the construction activity were distributed uniformly among many small facilities than if the building were concentrated in a single giant plant. This is because the smaller-sized facilities would have shorter lead-times in the planning and construction phases as well as in the cluster of other activities such as staffing and equipping, which would be required before operations could begin.

Because of these obvious relationships, construction changes in the various states in Mexico must be interpreted in terms of the best available information concerning the economic prospects and opportunities of the particular state. As a practical matter, this means an assessment of the activity mix (sector shares) at a point in time, with appropriate modifications for other known influences such as location, resources, terrain, and population. Where large construction changes occur upon a very small employment base in the sector, the change may or may not have economic consequences impacting upon migration. In these cases the assessments require specific information regarding the micro-setting in which the change is occurring.

Nationally, the construction sector in Mexico absorbed less than five percent of the work force: 3.62 percent in 1960 and 4.41 percent in 1970. The nine states where the employment in construction was above the national average in both 1960 and 1970 include: Aguascalientes, Baja California, Chihuahua, Coahuila, the Federal District, Jalisco, Morelos, Nuevo León, and Sonora. Of these, four states (Coahuila, Jalisco, Nuevo León, and Sonora) expanded during the 1960's to increase their margin over the national ratio. Two states (Federal District and Chihuahua) had relative declines in construction employment. Querétaro and Quintana Roo T were the only states to move from below the national average in 1960 to a sector share above the average in 1970. Zacatecas expanded the relative proportion of employment in construction but did not reach the level of the national sector.

Distribution of the national construction labor force. Table 5.14 ranks the Mexican states according to the absolute size of the labor force in construction. The Federal District alone had more than 20 percent of the total national employment in 1970 -- a result of sheer size. México nearly tripled its construction workers and Tamaulipas increased by nearly 100 percent. The top 10 states (excluding the Federal District) totaled 111,335 or 68.0 percent of the change in the national sector during the 1960-70 period. There were also important gains in lower ranking states. Guerrero, Morelos, and Querétaro increased their portion of the national sector impressively, although on a much smaller 1960 base than the top ranking states.

Rate of change in the construction sector. Table 5.15 ranks the states on the basis of the rate of change in construction employment from 1960 and 1970.

While the rate of change data tabulation is a valuable method to assess the changes in the construction sector without the automatic domination of the Federal District, rate data must be interpreted with care. For example, Quintana Roo T and México top the distribution with a change rate of over 170 percent, and both nearly tripled their employment in construction during the 1960-70 period. However, such a large percentage change increased the work force in Quintana Roo T by only 762 persons in contrast to an addition of 39,752 in the state of México.

Only four of the states which ranked among the top 10 in total construction labor force were also in the top group in terms of rate of change. These four were México, Tamaulipas, Nuevo León, and Jalisco. Of these, only Nuevo León was significantly above the level of the national sector in 1960. The rapid expansion

Table 5.14: Construction Labor Force: State Rankings, 1960 and 1970

1960					1970				
Rank	State	Number	State Percent	Cum. Percent	Rank	State	Number	State Percent	Cum. Percent
1.	Federal District	118,047	28.9	28.9	1.	Federal District	122,248	21.4	21.4
2.	Jalisco	33,152	8.1	37.0	2.	México	62,896	11.0	32.4
3.	Veracruz	23,201	5.7	42.7	3.	Jalisco	50,647	8.8	41.2
4.	México	23,144	5.7	48.4	4.	Nuevo León	33,493	5.8	47.0
5.	Nuevo León	21,189	5.2	53.6	5.	Veracruz	33,084	5.8	52.8
6.	Chihuahua	20,285	5.0	58.6	6.	Tamaulipas	22,914	4.0	56.8
7.	Puebla	15,344	3.7	62.3	7.	Chihuahua	20,862	3.6	60.4
8.	Guanajuato	14,050	3.4	65.7	8.	Guanajuato	20,574	3.6	64.0
9.	Michoacán	12,455	3.1	68.8	9.	Puebla	20,249	3.5	67.5
10.	Coahuila	11,744	2.9	71.7	10.	Michoacán	16,550	2.9	70.4
11.	Tamaulipas	11,668	2.8	74.5	11.	Coahuila	16,298	2.8	73.2
12.	Sonora	10,626	2.6	77.1	12.	Sonora	15,238	2.6	75.8
13.	Baja California	8,407	2.1	79.2	13.	Sinaloa	12,827	2.2	78.0
14.	Sinaloa	7,627	1.9	81.1	14.	Baja California	12,534	2.2	80.2
15.	San Luis Potosí	7,618	1.9	83.0	15.	San Luis Potosí	11,472	2.0	82.2
16.	Oaxaca	6,875	1.7	84.7	16.	Guerrero	10,934	1.9	84.1
17.	Chiapas	6,820	1.7	86.4	17.	Hidalgo	9,487	1.6	85.7
18.	Hidalgo	6,614	1.6	89.4	18.	Morelos	8,380	1.5	87.2
19.	Yucatán	5,755	1.4	90.8	19.	Oaxaca	7,829	1.4	88.6
20.	Guerrero	5,594	1.4	92.1	20.	Querétaro	7,750	1.3	89.9
21.	Morelos	5,157	1.3	93.3	21.	Durango	7,338	1.3	91.2
22.	Durango	5,124	1.2	94.3	22.	Chiapas	7,109	1.2	92.4
23.	Tabasco	4,146	1.0	95.2	23.	Tabasco	6,854	1.2	93.6
24.	Tlaxcala	3,737	0.9	96.1	24.	Zacatecas	6,672	1.2	94.8
25.	Aguascalientes	3,673	0.9	97.0	25.	Yucatán	6,385	1.1	95.9
26.	Zacatecas	3,524	0.9	97.7	26.	Aguascalientes	4,085	0.7	96.6
27.	Querétaro	3,057	0.7	98.4	27.	Tlaxcala	3,852	0.7	97.3
28.	Nayarit	3,053	0.7	99.0	28.	Nayarit	3,670	0.6	97.9
29.	Campeche	2,384	0.6	99.4	29.	Colima	2,916	0.5	98.4
30.	Colima	1,921	0.4	99.6	30.	Campeche	2,598	0.5	98.9
31.	Baja California T	925	0.2	99.7	31.	Baja California T	2,059	0.4	99.3
32.	Quintana Roo T	440	0.1	99.8	32.	Quintana Roo T	1,202	0.2	99.5
	National Sector	407,356				National Sector	571,006		

Source: U.S. Mexican Census 1960 and 1970

Table 5.15: Percent Change 1960-70, Construction Sector: State Rankings

	State	1960 Percent State Labor Force	1960 Absolute Number	1970 Percent State Labor Force	1970 Absolute Number	Net Change	Percent Change
1.	Quintana Roo T	2.69	440	4.80	1,202	762	173.2
2.	México	3.98	23,144	6.34	62,896	39,752	171.8
3.	Querétaro	2.75	3,057	6.05	7,750	4,693	153.5
4.	Baja California T	3.57	925	5.90	2,059	1,134	122.6
5.	Tamaulipas	3.50	11,668	6.00	22,914	11,246	96.4
6.	Guerrero	1.50	5,594	2.85	10,934	5,340	95.5
7.	Zacatecas	1.44	3,524	3.08	6,672	3,148	89.3
8.	Sinaloa	2.97	7,627	3.70	12,827	5,200	68.2
9.	Tabasco	2.94	4,146	3.48	6,854	2,708	65.3
10.	Morelos	4.15	5,157	4.90	8,380	3,223	62.5
11.	Nuevo León	5.85	21,189	6.81	33,493	12,304	58.1
12.	Jalisco	4.43	33,152	5.64	50,647	17,495	52.8
13.	Colima	3.88	1,921	4.27	2,916	995	51.8
14.	San Luis Potosí	2.39	7,618	3.49	11,472	3,854	50.6
15.	Baja California	5.03	8,407	5.64	12,534	4,127	49.1
16.	Guanajuato	2.72	14,050	3.66	20,574	6,524	46.4
17.	Sonora	4.24	10,626	5.36	15,238	4,612	43.4
18.	Hidalgo	2.12	6,614	3.14	9,487	2,873	43.3
19.	Durango	2.19	5,124	3.27	7,338	2,214	43.2
20.	Veracruz	2.63	23,201	3.31	33,084	9,883	42.6
21.	Coahuila	4.09	11,744	5.63	16,398	4,554	38.8
22.	Michoacán	2.19	12,455	3.04	16,550	4,095	32.9
23.	Puebla	2.34	15,344	2.98	20,249	4,905	32.0
24.	Nayarit	2.43	3,053	2.49	3,670	617	20.2
25.	Oaxaca	1.12	6,875	1.50	7,829	954	13.9
26.	Aguascalientes	4.78	3,673	4.70	4,085	412	11.2
27.	Yucatán	2.94	5,755	3.17	6,385	630	10.9
28.	Campeche	4.24	2,384	3.63	2,598	214	9.0
29.	Chiapas	1.76	6,820	1.76	7,109	289	4.2
30.	Federal District	6.75	118,047	5.48	122,248	4,201	3.6
31.	Tlaxcala	3.43	3,737	3.62	3,852	115	3.1
32.	Chihuahua	5.42	20,285	5.00	20,862	577	2.8
	National Sector	3.62	407,356	4.80	571,006	163,650	40.2

Source: U.S. Mexican Census 1960 and 1970

in construction in all of these states can be associated with the general economic expansion which they all have experienced between 1960 and 1970. The other states ranking in the top 10 in terms of the size of their construction sector kept pace with the national rate of change in the sector, except for Chihuahua. Chihuahua held approximately steady in construction employment, adding only 577 people to its 1960 based of 20,285.

Rates of change compared with expected change. Figure 5.37 depicts geographically the positive and negative deviations from expected values established by the national change of 40.2 percent in construction employment. Table 5.16 presents the deviation data analysis.

Twenty of the 32 states had positive deviations from the expected values, with México absorbing 48.5 percent of the total positive shift. Other states with relatively strong positive deviations were Tamaulipas, Jalisco, Nuevo León, Querétaro, and Guerrero. The large number of positive deviations in a leading sector indicates relatively strong and widely distributed increases in investment which are likely to have resulted in changes in other sectors soon after 1970.

The negative deviations were dominated by the Federal District, which produced 68.7 percent of total negative shift. Other significant negatives occurred in Chihuahua, Chiapas, and Oaxaca, though these changes were only a tiny fraction of the change in the Federal District. Such large deviations as occurred in the Federal District are typical of the swings in capital-producing industries. When the big expansions begin to slow down, construction turns strongly negative.

The map (Figure 5.37) shows that states with high positive deviations in construction employment tend to cluster in the center of the country, with only a few exceptions. Sinaloa with a positive deviation of just over 2,000 expanded more rapidly than the national rate due to rapid growth in the principal cities of Mazatlán and Culiacán, and an expanding tourist industry. The construction sector in Sinaloa was also relatively small in 1960, and despite its positive deviation, remained below the level of the national sector in 1970.

In the central areas, Querétaro, San Luis Potosí, and Zacatecas had positive deviations and rapid rates of growth in construction. All were below average in this sector in 1960 and only Querétaro expanded to above the national level in 1970. Although detailed information is not available, changes in the construction sector in Querétaro are probably related to developments in road, rail, and pipeline facilities. The state is located in a pivotal position athward all major transportation routes between the western and northern regions and the capital city. The deviation in San Luis Potosí was quite small, and associated with the rapid growth of Cuidad de Valles. While this city remains below 50,000 in 1970, it doubled in population in the 1960-70 period.

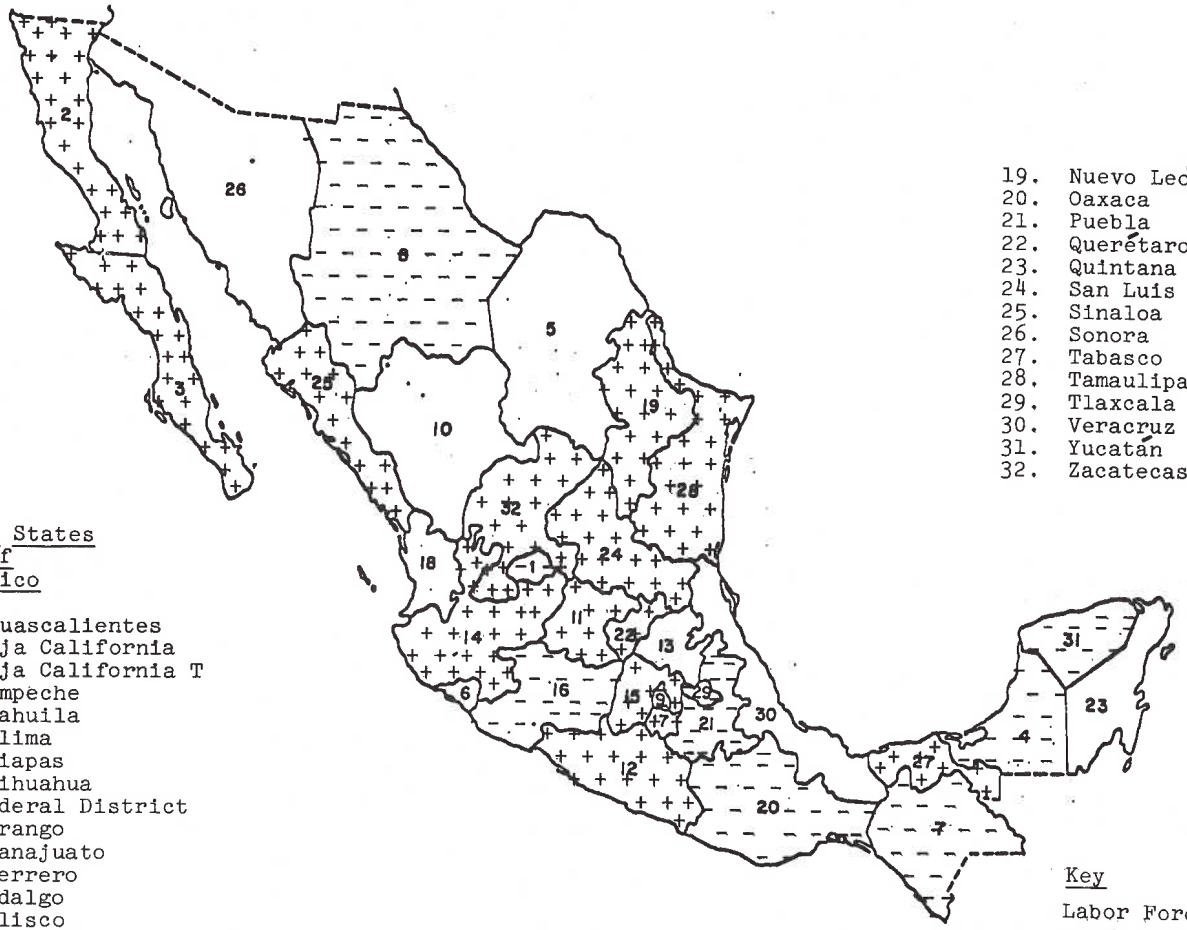
The positive deviation of over 3,000 for Guerrero is related to high rates of growth in manufacturing and in continued expansion of tourist services and other urban facilities in Acapulco.

The 12 states with negative deviations in construction are generally those areas in which overall activity is lagging. Most such areas were below the national sector share in construction employment in 1960 and showed little change in 1970. The exceptions, Aguascalientes, and Chihuahua, were both relatively urban states in 1960, and along with the Federal District were above the national sector share in construction in 1960 but showed small declines in 1970.

The group of states with very small deviations in either direction (unmarked) includes a majority of the states in which the national construction labor force is concentrated (Coahuila, Guanajuato, Michoacán, Puebla, and Veracruz). The combined deviations for all of these large employers of construction labor accounted for less than 1.5 percent of total deviations from the national rate of change. These states, while growing well in construction, are neither leading nor lagging.

Implications for migration. As stated in the introductory paragraphs, activity in the construction sector has high signal value for expansion in other economic sectors. It usually leads such expansion in time and is a necessary

Figure 5.37: Construction Sector. Geographical Distribution of Deviation Between Actual and Expected 1970 Labor Force



United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Labor Force Distribution

+: actual greater than expected
−: actual less than expected
unmarked: actual within ± 1 % of expected

Table 5.16: Construction. Changes in Labor Force 1960-70, Analysis of Deviations from Expected Size

	Labor Force 1960	"Expected" Labor Force 1970[1]	Actual Labor Force 1970	Positive Deviation	Percent of Total Positive Deviation
1970 Labor Force > Expected	407,356		571,006		
Mexico	23,144	32,448	62,896	30,448	48.5
Tamaulipas	11,668	16,359	22,914	6,555	10.4
Jalisco	33,152	46,479	50,647	4,168	6.6
Nuevo Leon	21,189	29,707	33,493	3,786	6.0
Queretaro	3,057	4,286	7,750	3,464	5.5
Guerrero	5,594	7,843	10,934	3,091	4.9
Sinaloa	7,627	10,693	12,827	2,134	3.4
Zacatecas	3,524	4,941	6,672	1,731	2.8
Morelos	5,157	7,230	8,380	1,150	1.8
Tabasco	4,146	5,813	6,854	1,041	1.7
Guanajuato	14,050	19,698	20,574	876	1.4
San Luis Potosi	7,618	10,680	11,472	792	1.3
Baja California T	925	1,297	2,059	762	1.2
Baja California	8,407	11,787	12,534	747	1.2
Quintana Roo T	440	617	1,202	585	.9
Veracruz	23,201	32,528	33,084	556	.9
Sonora	10,626	14,898	15,238	340	.5
Colima	1,921	2,693	2,916	223	.4
Hidalgo	6,614	9,273	9,487	214	.3
Durango	5,124	7,184	7,338	154	.2
				(+62,817)	(99.9)
				Negative Deviation	Percent of Total Negative Deviation
1970 Labor Force < Expected					
Federal District	118,047	165,502	122,248	43,254	68.7
Chihuahua	20,285	28,440	20,862	7,578	12.0
Chiapas	6,820	9,562	7,109	2,453	3.9
Oaxaca	6,875	9,639	7,829	1,810	2.9
Yucatan	5,755	8,069	6,385	1,684	2.7
Tlaxcala	3,735	5,239	3,852	1,387	2.2
Puebla	15,344	21,512	20,249	1,263	2.0
Aguascalientes	3,673	5,150	4,085	1,065	1.7
Michoacan	12,455	17,462	16,550	912	1.4
Campeche	2,384	3,342	2,598	744	1.2
Nayarit	3,053	4,280	3,670	610	1.0
Coahuila	11,744	16,465	16,298	167	.3
				(-62,927)	(100.0)

[1]Expected 1970 Labor Force = Y(Z)+Z
Y = Percent change national sector
Z = 1960 State labor force in sector

Source: U.S. Mexican Census 1960 and 1970

precedent for certain changes in manufacturing, services, transport, etc. Also, because construction activity is inherently geared to the creation of long-lived physical facilities, high levels of construction simply cannot be sustained in the absence of accelerating growth in other sectors. For any given size of place and rate of economic change there exists a minimum level of construction activity (and therefore employment) necessary for the maintenance and replacement of existing facilities. The percentage of total labor force required in construction in order to maintain equilibrium is determined by such factors as the age, structure, and average life expectancy of the facilities.

When expansion is occurring, however, the construction sector must grow more rapidly than the other activities, thereby exceeding the equilibrium size and shifting upward the equilibrium level required to maintain a larger stock. Once new facilities are created however, the required maintenance level of construction activity is always less than that required to provide for expansion. In such circumstances, the work force must either decline or the demand for new facilities must receive another upward spurt. Given these inherent properties of construction, it is possible for relatively underdeveloped areas with large economic hinterlands to expand construction activity continuously for several years at a time. Eventually, however, even this type of expansion must recede to lower levels as the secondary expansions in other sectors encounter cost and market constraints which reduce demands for new construction.

These processes are already clearly evident in Mexico. The Federal District, for example, appears at present to have passed its peak in construction activity, and its aggregate size (approaching 10 million in 1973) is already such as to cast doubt on the prospects for future expansion, especially at rates anywhere near those of the recent past. The state of Nuevo León is also evidencing some slow down in rates and can be expected to approach a relatively stable state during the next decade.

Viewing construction activity specifically as a leading indicator, the migration significance of changes noted throughout this section is that the most highly developed centers of activity in Mexico will not play the same heavy role in future migration that they have in the past.

The high rates of change in construction that were exhibited during the 1960-70 period in states such as México, Morelos, Jalisco, Baja California, and Tamaulipas, point to imminent expansion in other sectors and therefore to increased influence upon population movements. Still other states, such as Guerrero, Guanajuato, Michoacán, and Veracruz may also be identified as important migration destinations if their recent performances in construction are sustained by the necessary expansion in other sectors. Such expansion would then strengthen these states as destination points.

Commerce

The commerce sector embraces the total of specialized trading and financing activities associated with relatively high levels of economic development. This means that commerce is a lagging sector, involving functions which are viable only in relation to large markets. Both logically and historically the commerce sector is associated with big cities and a high degree of functional specialization.

During the 1960-70 period, the commerce sector declined in share of the national labor force from 9.5 percent in 1960 to 9.2 percent in 1970. The state profiles show that while every state has some commercial employment, few states show any visible expansion during the period. Only Baja California, Baja California T, the Federal District, Guerrero, México and Quintana Roo T expanded at all. Yucatán shows a sharp decline.

Distribution of national commerce labor force. In spite of the relative decline in commerce sector employment during the 1960-70 period, there was an absolute increase of 125,549 workers. Table 5.17 ranks the states in terms of the absolute size of the labor force in commerce, and as the table shows, the commerce sector in Mexico is strongest in the large financial and industrial centers and in major port cities located in the states of Federal District, Jalisco, México, Veracruz, Nuevo León, Puebla, and Chihuahua. Together these states account for 65 percent of the 1970 commerce labor force and 1960-70 changes in these seven states account for 71.4 percent of the absolute expansion in the national sector.

Table 5.17: Commerce Labor Force: State Rankings, 1960 and 1970

1970					1970				
Rank	State	Number	State Percent	Cum. Percent	Rank	State	Number	State Percent	Cum. Percent
1.	Federal District	305,438	28.5	28.5	1.	Federal District	310,540	25.9	25.9
2.	Jalisco	82,935	7.7	36.2	2.	Jalisco	94,739	7.9	33.8
3.	Veracruz	71,548	6.7	42.9	3.	México	91,726	7.7	41.5
4.	Puebla	50,668	4.7	47.6	4.	Veracruz	78,285	6.5	48.0
5.	Nuevo León	47,363	4.4	52.0	5.	Nuevo León	57,582	4.8	52.8
6.	México	43,397	4.1	56.1	6.	Puebla	50,597	4.2	57.0
7.	Guanajuato	42,094	3.9	60.0	7.	Chihuahua	45,665	3.8	60.8
8.	Michoacán	39,384	3.7	63.7	8.	Tamaulipas	43,577	3.6	64.4
9.	Tamaulipas	38,594	3.6	67.3	9.	Guanajuato	43,451	3.6	68.0
10.	Chihuahua	38,081	3.6	70.9	10.	Michoacán	37,220	3.1	71.1
11.	Coahuila	29,536	2.8	73.7	11.	Sonora	32,838	2.7	73.8
12.	Sonora	26,832	2.5	76.2	12.	Baja California	32,037	2.7	76.5
13.	Oaxaca	24,144	2.3	78.5	13.	Coahuila	31,415	2.6	79.1
14.	San Luis Potosí	23,916	2.2	80.7	14.	Sinaloa	29,478	2.5	81.6
15.	Sinaloa	22,799	2.1	82.8	15.	San Luis Potosí	24,137	2.0	83.6
16.	Baja California	21,831	2.0	84.8	16.	Guerrero	19,572	1.6	85.2
17.	Yucatán	20,682	1.9	86.7	17.	Chiapas	19,235	1.6	86.8
18.	Hidalgo	20,086	1.9	88.6	18.	Oaxaca	18,956	1.6	88.4
19.	Chiapas	18,510	1.7	90.3	19.	Hidalgo	17,104	1.4	89.8
20.	Guerrero	15,479	1.4	91.7	20.	Yucatán	15,241	1.3	91.1
21.	Durango	14,326	1.3	93.0	21.	Durango	14,655	1.2	92.3
22.	Zacatecas	11,210	1.0	94.0	22.	Morelos	13,562	1.1	93.4
23.	Morelos	10,502	1.0	95.0	23.	Tabasco	13,086	1.1	94.5
24.	Tabasco	9,793	0.9	95.9	24.	Zacatecas	11,331	0.9	95.4
25.	Nayarit	9,164	0.9	96.8	25.	Nayarit	10,889	0.9	96.3
26.	Querétaro	8,243	0.8	97.6	26.	Querétaro	8,709	0.7	97.0
27.	Aguascalientes	8,004	0.7	98.3	27.	Aguascalientes	8,608	0.7	97.7
28.	Tlaxcala	5,579	0.5	98.8	28.	Tlaxcala	5,888	0.5	98.2
29.	Campeche	4,667	0.4	99.2	29.	Colima	5,886	0.5	98.7
30.	Colima	4,197	0.4	99.6	30.	Campeche	5,675	0.5	99.2
31.	Baja California T	1,507	0.1	99.7	31.	Baja California T	3,642	0.3	99.5
32.	Quintana Roo T	820	0.07	99.8	32.	Quintana Roo T	1,552	0.1	99.6
	National Sector	1,071,329				National Sector	1,196,878		

Source: U.S. Mexican Census 1960 and 1970

Table 5.18: Percent Change 1960-70, Commerce Sector: State Rankings

	State	1960 Percent State Labor Force	1960 Absolute Number	1970 Percent State Labor Force	1970 Absolute Number	Net Change	Percent Change
1.	Baja California T	5.8	1,507	10.5	3,642	2,135	141.7
2.	México	7.5	43,397	9.3	91,726	48,329	111.4
3.	Quintana Roo T	5.0	820	6.2	1,552	732	89.3
4.	Baja California	13.1	21,831	14.4	32,037	10,206	46.8
5.	Colima	8.5	4,197	8.6	5,886	1,689	40.2
6.	Tabasco	6.9	9,793	6.7	13,086	3,293	33.6
7.	Sinaloa	8.9	22,799	8.5	29,478	6,679	29.3
8.	Morelos	8.5	10,502	7.9	13,562	3,060	29.1
9.	Guerrero	4.2	15,479	5.1	19,572	4,093	26.4
10.	Sonora	10.7	26,832	11.6	32,838	6,006	22.4
11.	Campeche	8.3	4,667	7.9	5,675	1,008	21.6
12.	Nuevo León	13.1	47,363	11.7	57,582	10,219	21.5
13.	Chihuahua	10.2	38,081	11.0	45,665	7,584	19.9
14.	Nayarit	7.3	9,164	7.4	10,889	1,725	18.8
15.	Jalisco	11.1	82,935	10.6	94,739	11,804	14.2
16.	Tamaulipas	11.6	38,594	11.4	43,577	4,983	12.9
17.	Veracruz	8.1	71,548	7.8	78,285	6,737	9.4
18.	Aguascalientes	10.4	8,004	9.9	8,608	604	7.5
19.	Coahuila	10.3	29,536	10.9	31,415	1,879	6.4
20.	Querétaro	7.4	8,243	6.8	8,709	466	5.7
21.	Tlaxcala	5.1	5,579	5.5	5,888	309	5.5
22.	Chiapas	4.8	18,510	4.8	19,235	725	3.9
23.	Guanajuato	8.1	42,094	7.7	43,451	1,357	3.2
24.	Durango	6.1	14,326	6.5	14,655	329	2.3
25.	Federal District	17.5	305,438	13.9	310,540	5,102	1.7
26.	Zacatecas	4.6	11,210	5.2	11,331	121	1.1
27.	San Luis Potosí	7.5	23,916	7.3	24,137	221	0.9
28.	Puebla	7.7	50,668	7.4	50,597	-71	-.1
29.	Michoacán	6.9	39,384	6.9	37,220	-2,164	-5.5
30.	Hidalgo	6.4	20,086	5.7	17,104	2,982	-14.8
31.	Oaxaca	3.9	24,144	3.6	18,956	-5,188	-21.5
32.	Yucatán	10.6	20,682	7.6	15,241	-5,541	-26.3
	National Sector	9.52	1,071,329	9.24	1,196,878	125,549	11.7

Source: U.S. Mexican Census 1960 and 1970

Figure 5.38: Commerce Sector. Geographical Distribution of Deviation Between Actual and Expected 1970 Labor Force

United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo Leon
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Labor Force Distribution

++: actual greater than expected
--: actual less than expected
unmarked: actual within ± 1 % of expected

Table 5.19: Commerce. Changes in Labor Force 1960-70, Analysis of Deviation from Expected Size

	Labor Force 1960	"Expected" Labor Force 1970[1]	Actual Labor Force 1970	Positive Deviation	Percent of Total Positive Deviation
1970 Labor Force "Expected"	1,071,329		1,196,878		
Mexico	43,397	48,474	91,726	43,252	54.5
Baja California	21,831	24,385	32,037	7,652	9.6
Nuevo Leon	47,363	52,904	57,582	4,678	5.9
Sinaloa	22,799	25,466	29,478	4,012	5.1
Chihuahua	38,081	42,536	45,665	3,129	3.9
Sonora	26,832	29,971	32,838	2,867	3.6
Guerrero	15,479	17,290	19,572	2,282	2.9
Tabasco	9,793	10,939	13,086	2,147	2.7
Jalisco	82,935	92,638	94,739	2,101	2.6
Baja California T	1,507	1,683	3,642	1,959	2.5
Morelos	10,502	11,731	13,562	1,831	2.3
Colima	4,197	4,688	5,886	1,198	1.5
Nayarit	9,164	10,236	10,889	653	.8
Quintana Roo T	820	916	1,552	636	.8
Tamaulipas	38,594	43,109	43,577	468	.6
Campeche	4,667	5,213	5,675	462	.6
				(+79,327)	(99.9)

				Negative Deviation	Percent of Total Negative Deviation
1970 Labor Force "Expected"					
Federal District	305,348	341,174	310,540	30,634	38.7
Oaxaca	24,144	26,969	18,956	8,013	10.1
Yucatan	20,682	23,102	15,241	7,861	9.9
Michoacan	39,384	43,992	37,220	6,772	8.6
Puebla	50,668	56,596	50,597	5,999	7.6
Hidalgo	20,086	22,436	17,104	5,332	6.7
Guanajuato	42,094	47,019	43,451	3,568	4.5
San Luis Potosi	23,916	26,714	24,137	2,577	3.3
Veracruz	71,548	79,919	78,285	1,634	2.1
Coahuila	29,536	32,992	31,415	1,577	2.0
Chiapas	18,510	20,676	19,235	1,441	1.8
Durango	14,326	16,002	14,655	1,347	1.7
Zacatecas	11,210	12,522	11,331	1,191	1.5
Queretaro	8,243	9,207	8,709	498	.6
Tlaxcala	5,579	6,232	5,888	344	.4
Aguascalientes	8,004	8,941	8,608	333	.4
				(-79,121)	(99.9)

[1] Expected 1970 Labor Force = Y(Z)+Z
Y = Percent change national sector
Z = 1960 State labor force in sector

Source: U.S. Mexican Census 1960 and 1970

Rate of change in commerce. The absolute increase in 1970 of 125,549 resulted in a decade rate of change of 11.7 percent. The states are ranked according to the decade rate of change in Table 5.18. With the exception of México, all of the states which top the list in terms of rate of change are lower ranking states in terms of the absolute size of the labor force, so in most cases, high rates of change were on relatively small 1960 bases. It will be noted that of the top 10 states, all but Baja California and Sonora were below the national average of 9.5 percent in employment in commerce in 1960 and in spite of the high rate of change Quintana Roo T, Colima, Tabasco, Sinaloa, Morelos, and Guerrero remain below the 9.2 percent national average in 1970.

Rates of change compared with expected change. Table 5.19 and Figure 5.38 depict the deviation data visually. While these data show that the 16 states had increases in commerce beyond the expected value, the increase was concentrated in the state of México (54.5 percent). This strong gain is not unexpected given México's strong expansion in nearly every other economic sector and the lagging role the commerce sector plays in the economy.

The absolute gains in other states showing positive shifts were uniformly modest. Of the 16 states showing negative deviations from expected values, the Federal District was most prominent, absorbing 38.7 percent of the total. In view of the low rate of change in the commerce sector and the concentration of commercial employment in the large, highly urban states, such lack of expansion is predictable.

Implications for migration in commerce. Commercial activity is primarily an urban phenomenon, and lags behind other sector changes. In other words, employment opportunities in commerce are simply additions to other economic attractions of the major cities, and will influence migration chiefly among groups with relatively high level skills and income expectations. Commerce cannot be considered as a major determining influence on the character, direction, or magnitude of Mexican migration.

Insufficient Information Category

The insufficient information category does not qualify as a true sector of activity, but it is too large and has been growing too rapidly to ignore. According to the census definitions this category contains exactly what its name implies -- all those workers who cannot be readily classified elsewhere. It is, therefore, a residual category, but one in which such massive changes occurred between 1960 and 1970 that it must now be assumed to embrace large numbers of economically active persons who are in transit either occupationally or geographically, or both. In short, it is clear that the category is important, but it is not clear exactly what it means for any particular sector. Tables 5.20 and 5.21 present the distributions and change factors for the insufficient information category.

The insufficient information category seems clearly to be growing as a result of migration. It contained 9.2 times as many people in 1970 as in 1960, and it is difficult indeed to explain such changes in terms of reporting procedures, or any other process except movements from place to place or occupation to occupation, or both.

As Table 5.20 shows, just over 60 percent of the total 747,525 persons in the category are accounted for by the top 10 states, and these include all the key manufacturing states except Nuevo León, which is eleventh in the rankings. Three major variables seem to account for the growth of the category: overall growth in economic activity, aggregate population in the state and population density. These variables happen also to operate strongly in determining the extent of decline in agricultural employment in all but two or three states. It appears that strong movements out of agriculture are accompanied by similar changes in the insufficient information category.

Figure 5.39 and Table 5.22 shows the geographic distribution of positive and negative deviations from the national average in the insufficient information category. The correspondence between positive deviations in agriculture is apparent. (Figure 5.34). The very few exceptions to this inverse relationship can be explained in terms of the three major determinants operating in the insufficient information category: economic growth, population size, and density. Where

Table 5.20: Distribution by State of Economically Active Persons Enumerated in "Insufficient Information" Category

1960					1970				
Rank	State	Number	Percent of Nat'l. Sector	Cum. Percent	Rank	State	Number	Percent of Nat'l Sector	Cum. Percent
1.	Federal District	30,090	36.9	36.9	1.	Federal District	87,216	11.7	11.7
2.	Coahuila	9,059	11.1	48.0	2.	México	70,580	9.4	21.1
3.	Baja California	8,943	11.0	59.0	3.	Veracruz	57,095	7.6	28.7
4.	Chihuahua	4,542	5.6	64.6	4.	Jalisco	53,829	7.2	35.9
5.	Jalisco	4,011	4.9	69.5	5.	Michoacán	41,088	5.5	41.4
6.	Nuevo León	2,439	3.0	72.5	6.	Guanajuato	36,761	4.9	46.3
7.	México	2,332	2.9	75.4	7.	Puebla	32,626	4.7	51.0
8.	Chiapas	2,054	2.5	77.9	8.	Oaxaca	28,081	3.8	54.8
9.	Michoacán	1,723	2.1	80.0	9.	Guerrero	26,378	3.5	58.3
10.	Veracruz	1,532	1.9	81.9	10.	Chihuahua	25,573	3.4	61.7
11.	Aguascalientes	1,477	1.8	83.7	11.	Nuevo León	23,936	3.2	64.9
12.	Durango	1,379	1.7	85.4	12.	Sinaloa	22,540	3.0	67.9
13.	Tamaulipas	1,357	1.6	87.0	13.	Chiapas	20,953	2.8	70.7
14.	Guanajuato	1,286	1.6	88.6	14.	Tamaulipas	20,796	2.8	73.5
15.	Colima	1,072	1.3	89.9	15.	San Luis Potosí	20,099	2.7	76.2
16.	Campeche	991	1.2	91.1	16.	Coahuila	18,188	2.4	78.6
17.	San Luis Potosí	980	1.2	92.3	17.	Hidalgo	17,034	2.3	80.9
18.	Puebla	833	1.0	93.3	18.	Baja California	16,467	2.2	83.1
19.	Baja California T	830	1.0	94.3	19.	Sonora	16,121	2.2	85.3
20.	Guerrero	714	0.9	95.2	20.	Durango	15,300	2.0	87.3
21.	Hidalgo	703	0.9	96.1	21.	Morelos	14,472	1.9	89.2
22.	Sinaloa	628	0.8	96.9	22.	Tabasco	13,561	1.8	91.0
23.	Morelos	538	0.7	97.6	23.	Yucatán	12,224	1.6	92.6
24.	Sonora	517	0.6	98.2	24.	Zacatecas	12,060	1.6	94.2
25.	Yucatán	313	0.4	98.6	25.	Nayarit	9,184	1.2	95.4
26.	Oaxaca	282	0.3	98.9	26.	Querétaro	8,986	1.2	96.6
27.	Tlaxcala	279	0.3	99.2	27.	Aguascalientes	6,671	0.9	97.5
28.	Querétaro	224	0.3	99.5	28.	Tlaxcala	6,177	0.8	98.3
29.	Tabasco	198	0.2	99.7	29.	Colima	5,628	0.8	99.1
30.	Zacatecas	114	0.1	99.8	30.	Campeche	4,973	0.7	99.8
31.	Nayarit	107	0.1	99.9	31.	Baja California T	1,848	0.2	100.0
32.	Quintana Roo T	23	-		32.	Quintana Roo T	1,060	0.1	100.1
	National Total	81,570	-			National Total	747,525	-	

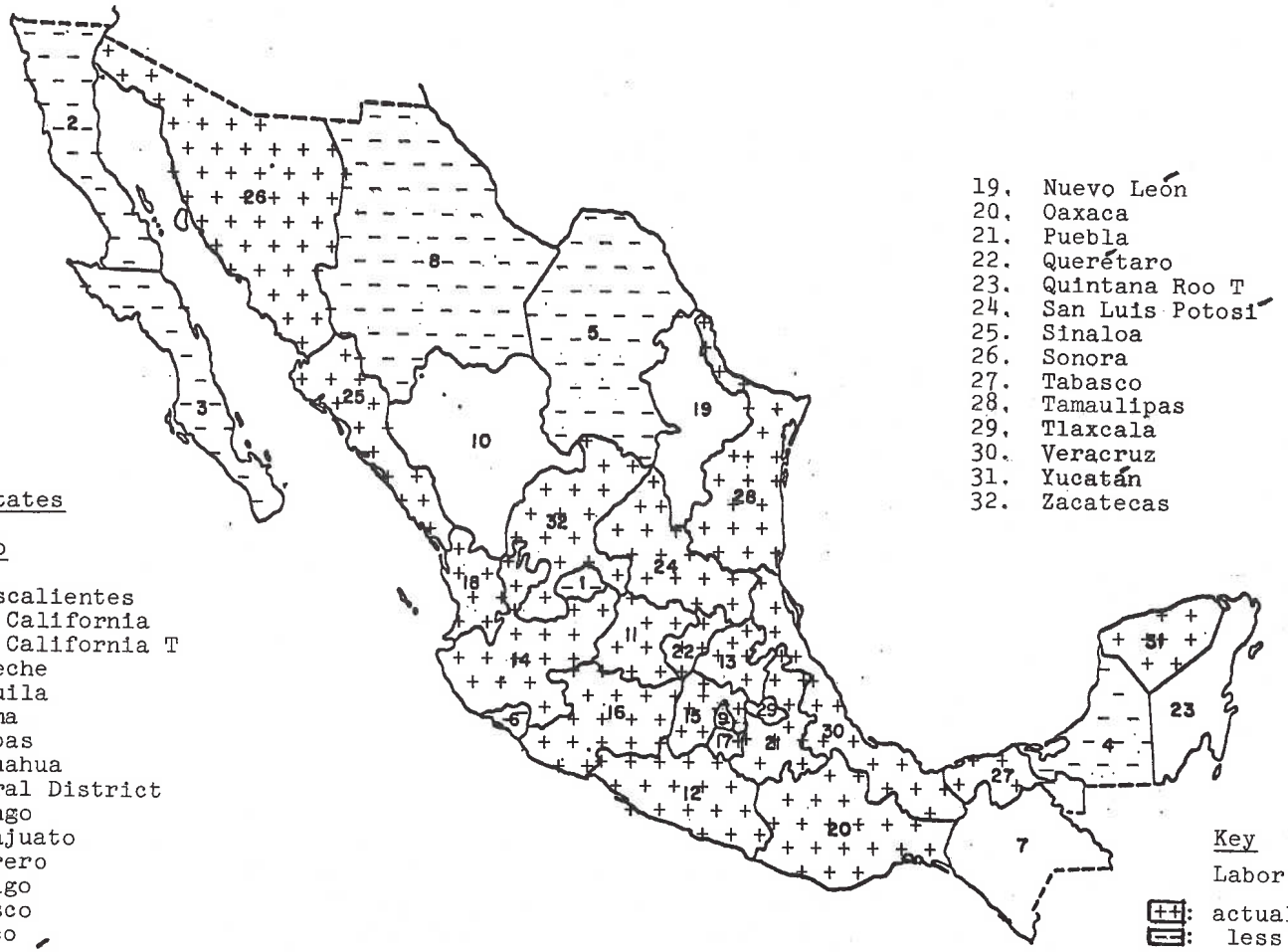
Source: U.S. Mexican Census 1960 and 1970

Table 5.21: Change 1960-70. "Insufficient Information" Category: State Rankings

State	1960 Percent State Labor Force	1960 Number	1970 Percent State Labor Force	1970 Number	Change	Increase
Zacatecas	.1	114	5.6	12,060	11,946	105.8
Oaxaca	.1	282	5.4	28,081	27,799	99.6
Nayarit	.1	107	6.3	9,184	9,077	85.8
Tabasco	.1	198	6.9	13,561	13,363	68.5
Quintana Roo T	.1	23	4.2	1,060	1,037	46.1
Querétaro	.2	224	7.0	8,986	8,762	40.1
Puebla	.1	833	4.8	32,626	31,793	39.2
Yucatán	.2	313	6.1	12,224	11,911	39.1
Veracruz	.2	1,532	5.7	57,095	55,563	37.3
Guerrero	.2	714	6.9	26,378	25,664	36.9
Sinaloa	.2	628	6.5	22,540	21,912	35.9
Sonora	.2	517	5.7	16,121	15,604	31.2
México	.4	2,332	7.1	70,580	68,248	30.3
Guanajuato	.3	1,286	6.5	36,781	35,495	28.6
Morelos	.4	538	8.5	14,472	13,934	26.9
Hidalgo	.2	703	5.7	17,034	16,331	24.2
Michoacán	.3	1,723	7.6	41,088	39,365	23.8
Tlaxcala	.3	279	5.8	6,177	5,898	22.1
San Luis Potosí	.3	980	6.1	20,099	19,119	20.5
Tamaulipas	.4	1,357	5.5	20,796	19,439	15.3
Jalisco	.5	4,011	6.0	53,829	49,818	13.4
Durango	.6	1,379	6.8	15,300	13,921	11.1
Chiapas	.5	2,054	5.2	20,953	18,899	10.2
Nuevo León	.7	2,439	4.9	23,946	21,497	9.8
Chihuahua	1.2	4,542	6.2	25,573	21,031	5.6
Colima	2.2	1,072	8.2	5,628	4,556	5.3
Campeche	1.8	991	6.9	4,973	3,982	5.0
Aguascalientes	1.9	1,477	7.7	6,671	5,194	4.5
Federal District	1.7	30,090	3.9	87,216	57,126	2.9
Baja California T	3.2	830	5.3	1,848	1,018	2.2
Coahuila	3.2	9,059	6.3	18,188	9,129	2.0
Baja California	5.3	8,943	7.4	16,467	7,524	1.8
Total	.7	81,570	5.7	747,525	665,955	9.2

Source: U.S. Mexican Census 1960 and 1970

Figure 5.39: Insufficient Information. Geographical Distribution of Deviation Between Actual and Expected 1970 Labor Force



United States of Mexico

1. Aguascalientes
2. Baja California
3. Baja California T
4. Campeche
5. Coahuila
6. Colima
7. Chiapas
8. Chihuahua
9. Federal District
10. Durango
11. Guanajuato
12. Guerrero
13. Hidalgo
14. Jalisco
15. México
16. Michoacán
17. Morelos
18. Nayarit
19. Nuevo León
20. Oaxaca
21. Puebla
22. Querétaro
23. Quintana Roo T
24. San Luis Potosí
25. Sinaloa
26. Sonora
27. Tabasco
28. Tamaulipas
29. Tlaxcala
30. Veracruz
31. Yucatán
32. Zacatecas

Key

Labor Force Distribution

++: actual greater than expected
--: less than expected
unmarked: actual within ± 1 % of expected

Table 5.22: Insufficient Information. Changes in Category 1960-70, Analysis of Deviation from Expected Size

	Labor Force 1960	"Expected" Labor Force 1970[1]	Actual Labor Force 1970	Positive Deviation	Percent of Total Positive Deviaiton
1970 Labor Force > Expected	81,570		747,525		
México	2,332	23,786	70,095	46,794	14.1
Veracruz	1,532	15,626	57,095	41,469	12.5
Oaxaca	282	2,876	28,081	25,205	7.6
Puebla	833	8,497	32,626	24,129	7.3
Guanuajuato	1,286	13,117	36,781	23,664	7.1
Michoacán	1,723	17,575	41,088	23,513	7.1
Guerrero	714	7,283	26,378	19,095	5.8
Sinaloa	628	6,406	22,540	16,134	4.9
Jalisco	4,011	40,912	53,829	12,917	3.9
Tabasco	198	2,020	13,561	11,541	3.5
Zacatecas	114	1,163	12,060	10,897	3.3
Sonora	517	5,273	16,121	10,848	3.3
San Luis Potosí	980	9,996	20,099	10,103	3.0
Hidalgo	703	7,171	17,034	9,863	3.0
Yucatán	313	3,193	12,224	9,031	2.7
Morelos	538	5,488	14,472	8,984	2.7
Nayarit	107	1,091	9,184	8,093	2.4
Tamaulipas	1,357	13,841	20,796	6,955	2.1
Querétaro	224	2,285	8,986	6,701	2.0
Tlaxcala	279	2,846	6,177	3,331	1.0
Nuevo Leon	2,439	22,438	23,936	1,498	0.5
Durango	1,379	14,066	15,300	1,234	0.3
Quintana Roo T	23	235	1,060	825	0.2
				(+332,827)	(100.3)
1970 Labor Force < Expected				Negative Deviation	Percent of Total Negative Deviation
Federal District	30,090	306,918	87,216	219,702	52.8
Baja California	8,943	91,719	16,467	75,252	18.1
Coahuila	9,059	92,402	18,188	72,214	17.8
Chihuahua	4,542	46,328	25,573	20,755	5.0
Aguascalientes	1,479	1,5065	6,671	8,394	2.0
Baja California T	830	8,466	1,848	6,618	1.6
Colima	1,072	10,934	5,628	5,306	1.3
Campeche	991	10,108	4,973	5,135	1.2
				(-416,317)	(100.0)

[1] Expected 1970 Labor Force = Y(Z)+Z
Y = Percent change national sector
Z = 1960 State Labor Force in sector

Source: U.S. Mexican Census 1960 and 1970

relatively small populations or low densities (or both) are involved, there can be large negative shifts out of agriculture without corresponding large positive shifts in insufficient information (e.g. Durango, Zacatecas, and Coahuila). Similarly, in states with strong growth, such as México, the shift out of agriculture may be small or non-existent. Another case is presented by Jalisco -- a strong growth state -- with large shifts out of agriculture, but relatively modest increases in the insufficient information category.

Conclusions

While the approach taken in this paper offers many advantages it employs highly aggregated data and therefore makes it difficult to identify economic changes occurring in specific industries or localities within a state. Such changes can in fact have pronounced effects on migration, and further research would be required to deal with this more detailed level of analysis. Nevertheless, certain broad generalizations are brought out in the work presented here.

1. Patterns of change in the various sectors of economic activity point to certain sectors that are more important than others as influences upon migration. Insofar as changes in the distribution of the labor force can be used as proxies for changes in economic activity, certain key sectors will be strongly associated with migration pressures. Construction, for example, is universally accepted as a leading sector and is a forerunner for changes in other sectors, the total effect of which is to exert a pull upon migrants. Manufacturing operates similarly as a leading sector for such sectors as services, commerce, and transport. Services activity may also operate as a leading sector in certain situations and thereby creates a migratory pull. All of these activity types are strongly associated with urban development, although certain types of heavy construction(roads, bridges, dams) can involve large numbers of workers in remotesettings. (In such cases, the construction activity affects the development of nearby urban terminals functionally related to the facilities in question.) Querétaro and Sinaloa provide examples of states where expansion in a leading sector may signal wider economic change and therefore potential impact on migration. The profile for Querétaro (Figure 5.23) generally conforms to the national pattern except for the expansion in the construction sector. Construction employment in Querétaro was well below the national level in 1960, but expanded to a level above average in 1970. While such an expansion could be non-urban road, rail, or pipeline development, it is more likely that this change represents a leading indication of impending expansion in other sectors. This is often true even when the related sector change is not yet manifest in the employment data. Sinaloa (Figure 5.24) shows little change in most sectors of economic activity in 1970, except for a seemingly anomalous expansion in services. The primary explanation for this lies in the fact that Sinaloa has two rapidly growing cities, Mazatlán and Culiacán, and a vigorously expanding tourist industry. It is also located along major traffic routes down the developing western coast. Both of these states had positive net in-migration for the 1960-70 period, (Chapter III), and such an inflow must be associated in some degree with perceived opportunities for employment in tourism and urban-related service activities. The pull effect of single-sector or dual-sector expansion in an otherwise commonplace profile remains to be rigorously tested. However, patterns such as those of Querétaro and Sinaloa suggest that certain sectors of economic activity may require differential weighting indicators of migration pull.

2. The absolute size of the labor force in any given sector is an important variable in assessing migration potentials. For instance, if a sector employs only a small portion of the available labor force, then contraction in that sector will displace few people in absolute terms, resulting in a relatively slight push. But if a sector employs a large portion of the labor force, then even a relatively small percentage decline in activity can release large numbers of people, with much stronger push effects. The importance of absolute size is illustrated by the agricultural sectors in Nuevo León (Figure 5.20) and Oaxaca (Figure 5.21). In Nuevo León there was a decline in the percentage share of the labor force employed in agriculture during the period 1960 to 1970 (from 32.18 percent in 1960 to 17.31 percent in 1970). This decline represented an absolute reduction of 31,496 agricultural workers. In Oaxaca, however, where there was a smaller relative decline in agriculture (82.0 percent in 1960 to 71.53 percent in 1970), the absolute reduction was quite large, releasing 132,065 people from the sector. Another example of the importance of absolute size is

provided by the Federal District (Figure 5.10). The percentage of national labor force employed in agriculture is extremely small and declined from 2.65 percent in 1960 to 2.20 percent in 1970. Despite the percentage decline, there was an absolute increase of 3,143 workers in the 1970 agricultural labor force.

3. States in which growth is slow tend to develop in rather uniform patterns across all sectors. Where major deviations occur among sectors there is the suggestion of rapid growth. In such cases, the data permit the inference that surrounding or adjacent regions will be affected by the state in which more rapid expansion is taking place. The best example of this phenomenon is the region surrounding the Federal District. The District itself deviates sharply in magnitude from the national pattern in the manufacturing, services, and commercial sectors, but the Federal District expansion during the 1960-70 period was very limited indeed. This suggests that some kind of saturation phenomenon was at work. The opposite was true, however, for the states immediately surrounding the Federal District (Hidalgo, México, Morelos, Querétaro, and Tlaxcala). All of these states show some expansion in the manufacturing, services or construction sectors. The profile of the state of México (Figure 5.16) is especially suggestive of the developmental influence flowing from Mexico City, as it follows closely the deviation pattern of the Federal District.

Further generalizations are suggested by the change patterns in specific economic sectors. Agriculture in Mexico has been described as "dualistic" referring to the coexistence of large, commercial, capital-intensive farm operations with small, privately-owned farmsteads primarily oriented to production for subsistence and local markets. Despite increased productivity at all levels of Mexican agriculture (Hanson 1971:58-60), the small farm units have achieved such gains mainly by improvements in the quality and intensity of farm labor rather than by new institutional relations, investments in infrastructure, or infusions of capital-intensive technology. It has been estimated that as recently as 1970, 85 percent of the aggregate small proprietary and ejidal holdings were still farmed "primitively" (Hanson 1971:75). Given the constraints upon size of holding, capital supplies, and institutional changes, further increases in productivity through intensification of labor are not likely. This explains perhaps, why the small-farm areas (Michoacán, Guanajuato, Oaxaca, etc.) are the major source of mass movements out of agriculture.

In 1960 there were an estimated 3.3 million landless agricultural workers in rural Mexico (Sanders 1974:5). The labor force data show that the net reduction in agricultural employment between 1960 and 1970 was roughly one million workers. It would appear that in spite of high productivity, increasing modernization and commercialization of the agricultural sector in Mexico, the sector still cannot keep pace with rural population growth.

The more modern sectors of the economy, manufacturing, services, construction, and commerce, have benefited from the problems in agriculture, enjoying a massive supply of cheap and ready labor which has had the effect of keeping wage levels low and profits high. In the modern sectors, favorable profit expectations have encouraged still further investment and expansion (Hanson 1971:56). These relationships are shown concretely in the rapid growth of the modern economic sectors in the 1960-70 period. Manufacturing, services, and construction have grown at a decade rate of approximately 40 percent, or around four percent per year. However, in spite of such rapid expansion, these sectors have not been able to provide employment opportunities on the scale needed to absorb the outflow from agriculture plus the normal growth in work force.

The non-agricultural sectors of manufacturing, services, construction, and commerce have added 1.5 million employees to their collective work force in the 1960-70 period. While this has been theoretically sufficient to absorb the surplus of nearly 1,000,000 workers displaced from agriculture, it is not sufficient to absorb also the 1.7 million new entrants to the national work force during this period. Approximately half of the job deficit (600,000 persons) is presumably accounted for by increases in the 1970 insufficient information category. The rest are presently displaced persons, lost to view, at least temporarily, in the Mexican labor force. An unaccounted for group of one-half million persons has major implications for the future, as do the underlying processes which gave rise to such a group (e.g. high birth rate, decline in agricultural employment). Either new jobs will have to be created at an even

faster rate than previously, or the pressures for international migration are apt to continue escalating to higher levels. In line with a suggestion made by Nolasco, (personal communication), it is interesting to speculate that the current controversy over the range of magnitudes assignable to the streams of illegal migrants into the United States might be illuminated by calculations relating known levels of legal migration to this measurable, but economically invisible pool of displaced labor.

The implications for migration of changes in the various sectors have been discussed in the appropriate sections and certain states have been mentioned as having high potential for further economic expansion. This, in turn, is interpreted to mean a high potential as prospective destination points for migrants. Other states have been identified as being relatively stagnant in the modern sectors of the economy and suggest themselves as highly probable points of origin for migration.

A brief recapitulation suggests that the states having high potential to attract migrant labor include Baja California, Jalisco, México, Morelos, Guerrero, and Sinaloa. All of these states manifest a relatively high level of economic development and considerable diversity in the modern sector of the economy. They have relatively high rates of change in one or more of the various sectors, and also have sufficiently high levels of agglomeration in their rapidly growing urban centers to sustain economic expansion. Such states would seem to provide strong incentive for in-migration.

Guanajuato, Michoacán, Puebla, Veracruz, and Tamaulipas are judged to be states with high take-off potential economically. They also have some diversification in modern economic sectors, and apparently have some of the necessary infrastructure. They are relatively underdeveloped in the size of certain key sectors relative to their population. Most of these states are predominantly rural but all have large and rapidly growing urban concentrations and locational advantages relative to the geography of the nation as a whole. Continued development in the national economy will have expansionary effects on the economies of these states.

Federal District, Nuevo Leon, Oaxaca, Chiapas, Tlaxcala, San Luis Potosí, and Aguascalientes are states which are viewed in the present analysis as having high potential for out-migration. The reasons vary and have been discussed in more detail in individual sections of the paper, but they include overdevelopment or saturation in most sectors of the modern economy Federal District and Nuevo León), or underdevelopment and lack of economic diversity in combination with high population relative to the economic base (Oaxaca, Chiapas, Tlaxcala, San Luis Potosí, Aguascalientes).

Many of the other states are difficult or impossible to assess on the basis of the present data. Baja Calfornia T has a rapidly expanding economy, but is geographically isolated and low in both total and economically active population. Yucatán, also geographically isolated, appears at present to be in a fairly intensive economic slump. Its population is relatively small, but Mérida is a rapidly growing central city on the Yucatán peninsula. Campeche and Tabasco are presently economically underdeveloped but both show some slight expansion in the modern sectors of the economy and both have high potentials for expansion in oil and petroleum-related activities and in commercial agriculture. Either or both of these developments could result in a more favorable economic profile.

The northern states, Coahuila, Sonora, and Chihuahua are variable in characteristics, but are all large states with state economies that are well-diversified but relatively stable in terms of expansion. No doubt such states will continue to attract migrants seeking appropriate points at which to cross the international border, but the orientation of these migrants toward the United States is likely to mean that their economic impact on the border states will continue to be negative.

The present study has focused on patterns of change and growth between 1960 and 1970, deducing implications for migration from various elements of contemporary economic structure (i.e. the sector analysis) and from recent changes affecting that structure. The analysis is unconventional in that it attempts to postulate future trends on the basis of structural relationships within the state economies and between the states and the national development.

Numerous factors impinging on migration as a result of structural changes have been discussed in the preceding sections. Differential changes in the various sectors, population sizes and densities, urban-rural ratios, and comparative levels of overall development have all been set forth as influencing the direction and magnitude of migration. But the relationships between these factors are extremely complex, particularly in view of their susceptibility to major change as a result of regional and national economic policy and world price trends for such major Mexican commodities as copper, oil, sugar, and coffee. In the absence of major departures from the development policies of the recent past, the inferences for migration advanced in the preceding pages can be assigned a reasonably high degree of confidence: agriculture will continue to supply large numbers of workers to other sectors, and those workers will come predominantly from the states indicated in the sector discussions. Similarly, the strongest thrusts toward modernization will be directed first to the areas surrounding the Federal District and then to the states judged to be at or near a takeoff position for general growth. These two groups of states, will be major destination targets for the migrations of the next 10 years.

CHAPTER VI

THE USE OF INDICATORS IN MEXICAN POPULATION ESTIMATION

MARY MCCUTCHEON

The study of migration is closely dependent on the knowledge of population changes over time. State by state census enumerations in Mexico provide population data every decade, but more refined research requires that this information be given for intervening years as well. Thus the Mexican migration project involves, in part, research on inter- and post-censal population estimation. This chapter addresses the problem of deriving population estimates in general and deals in particular with those methods involving the use of recurrently published economic and social statistics.

Statistics on consumption of commodities and utilization of resources are meticulously tabulated for states in Mexico. Usually these data are published yearly but in some cases can be obtained as frequently as every month. Though this information is extensively used in marketing research and planning, the possibility of applying it to population estimation is attractive. It cannot be expected that the methods proposed here are sufficient to replace previously used techniques, but we are hopeful that they can give clues to population changes not "sensed" through the other methods available.

The Mexican government and Mexican marketing agencies have devised various methods of calculating inter- and post-censal population estimates for states. Following the terminology of the U.S. Department of Commerce (1971), these techniques are called (1) the "component method" based on birth and death data and estimates of migration, (2) the "assumed rate of growth method," and (3) the "symptomatic series method."

Component Method

The Mexican Dirección General de Estadística publishes monthly and annual birth and death statistics (Revista de Estadística, Anuario Estadística de los Estados Unidos Mexicanos) and annual estimates of in- and out-migration by state (Anuario Estadístico de los Estados Unidos Mexicanos). From this information an estimation of state population change can be determined for each year (Bogue 1969: 759; UNESCO 1970:24; U.S. Department of Commerce 1971:747) which would be equal to:

Births - Deaths + In-migrants - Out-migrants.

The annual estimates for each state's population can be computed by updating the previous year's population estimates by this value.

One factor leading to the inaccuracy of the component method as used in Mexico is the error in the census-based population figures. Even systematic house to house population enumerations fail to include everyone or may even count individuals more than once. Because post-censal population estimates are based on census surveys they naturally reflect any errors of over or under enumeration made in the original tabulation.

The vital statistics are calculated directly from registration of births and deaths. Secular registration of these events is rarely 100 percent accurate even in highly industrialized urban areas. Frequently individuals are born and die outside of hospitals where these statistics are more likely to be carefully tabulated. A small error in the component method would naturally derive from this problem.

The greatest inaccuracy, however, stems from the estimates of migration volume. Given the 1960 and 1970 census populations in addition to the data available on births and deaths in the intervening decade, it is possible to calculate net migration over the ten-year period. This can be compared to the estimated net migration given by the Dirección General de Estadística. It can be seen (from

Table 6.1 that, as a general rule, net in-migration is vastly exaggerated. The total nation-wide overestimation amounts to 2,837,591.

Table 6.1 also shows the discrepancies between the actual population of 1970 (based on the census) and the 1970 estimates derived from the component method. These differences together with the error in the estimates of migration force the conclusion that this method, in itself, is unreliable. Supplemented by additional information on trends in population movements, however, it may prove more useful.

Assumed Rate of Growth Method

The simplest method of population estimation is to assume a constant rate of growth, usually based on past intercensal trends, and apply it to post-censal time periods. This technique has been used in Mexico to obtain population estimates by states.

Calculations of this type were performed by the marketing research agency, Walter Thompson de Mexico (1963) to estimate and project state populations for the years 1961-65. Once the ten-year rate for the previous intercensal interval (1950-60) was calculated for each state, a yearly rate of change was derived by dividing these values by 10. Thus for Aguascalientes, whose 1950-60 rate of change was 29.41 percent, an annual rate of increase of 2.941 percent was used. The method is straight-forward and simple to apply, but fundamentally unsound. Rates of population growth are cumulative and describe a geometrically increasing curve. The method used by Walter Thompson de Mexico postulates an arithmetically changing population between 1950 and 1960 but accepts the geometric nature of population increase following 1960.

The U.S. Department of Commerce (1971) gives a formula for deriving an annual rate of population growth which accounts for its cumulative nature:

$$\frac{Pop(1)}{Pop(0)} = e^{rt}$$

Thus: $$rt = \ln\left[\frac{Pop(1)}{Pop(0)}\right]$$

And: $$r = \left\{\ln\left[\frac{Pop(1)}{Pop(0)}\right]\right\} \Big/ t$$

Where: Pop(1) and Pop(0) are the populations for two years, 0 being prior to 1,

r is the annual rate of population change,

t is the number of years between 0 and 1,

e is the base of the natural logarithm function,

ln is the natural logarithm function.

After finding the value of r (annual rate of population change), population estimates would be calculated as:

$$Pop(U) = Pop(K) \cdot e^{rt}$$

Where: Pop(U) is the population for the unknown year,

and Pop(K) is the population for the last known year.

A more understandable way of making the same calculation is to find some number z, which represents the annual relative increase in population over each previous year:

$$z = \frac{Pop(1)-(Pop(0)}{Pop(0)}$$

Where: Year 1 is one year after year 0

Table 6.1: Population Estimates Based on Births, Deaths, and Estimates of Net Migration

State	Pop. 1960[1] (Census)	Natural Change[2] (Birth-Deaths)	Net Mig.[2] (In-Mig.-Out-Mig.)	Pop. Estimation 1970 (Pop.60+Nat.Δ+ Net Mig.)	Actual Pop.[1] 1970 (Census)	Difference (Actual Pop.70- Est.Pop.70)	Net Mig. (Pop.70-Nat.Δ- Pop. 60
Aguascalientes	243,363	119,106	5,967	368,436	338,142	30,294	-24,327
Bajo California	520,175	264,482	148,084	932,731	870,421	62,310	85,774
Baja California T	81,594	37,056	66,315	184,965	128,019	56,946	9,369
Campeche	168,219	78,749	242	247,210	247,114	96	146
Coahuila	907,734	400,655	62,435	1,370,824	1,114,956	255,868	-193,433
Colima	164,450	75,257	3,855	243,562	241,153	2,409	1,446
Chiapas	1,210,870	398,358	-15,888	1,593,340	1,569,053	24,287	-40,175
Chihuahua	1,226,793	497,331	158,293	1,882,417	1,612,525	279,892	-111,599
Federal District	4,870,876	1,858,785	639,655	7,369,316	6,874,165	495,151	144,504
Durango	760,836	343,007	15,791	1,119,634	939,208	180,426	-164,635
Guanajuato	1,735,490	694,004	56,358	2,485,852	2,270,370	215,482	-159,124
Guerrero	1,186,716	550,311	-175,795	1,563,232	1,597,360	-34,128	-139,667
Hidalgo	994,598	374,532	912	1,370,042	1,193,845	176,197	-175,285
Jalisco	2,443,261	1,009,953	223,270	3,676,484	3,296,586	379,898	-156,628
México	1,897,851	812,718	703	2,711,272	3,833,185	-1,121,913	1,122,616
Michoacán	1,851,876	837,659	56,219	2,745,794	2,324,226	421,568	-365,309
Morelos	386,264	183,261	2,538	572,063	616,031	-44,056	46,594
Nayarit	389,929	183,475	9,725	583,129	544,031	39,093	-29,373
Nuevo León	1,078,848	533,241	252,386	1,864,475	1,694,689	169,786	82,600
Oaxaca	1,727,266	564,421	4,350	2,296,037	2,015,424	280,613	-276,232
Puebla	1,973,837	735,864	2,302	2,712,003	2,508,226	203,777	-201,475
Querétaro	355,045	166,241	658	521,944	485,523	36,421	-35,763
Quintana Roo T	50,169	21,229	-3,152	68,246	88,150	-19,904	16,752
San Luis Potosí	1,048,297	450,107	15,908	1,514,312	1,281,996	232,316	-216,408
Sinaloa	838,404	437,741	78,253	1,354,398	1,266,528	87,870	-9,617
Sonora	783,378	363,520	589,099	1,706,097	1,098,720	607,377	-48,179
Tabasco	496,340	242,438	496	339,274	768,327	-429,053	429,549
Tamualipas	1,024,182	416,734	53,363	1,494,279	1,456,858	37,421	15,952
Tlaxcala	346,699	151,256	64	498,019	420,638	77,381	-77,317
Veracruz	2,727,899	947,255	6,502	3,681,626	3,815,422	-133,796	140,298
Yucatán	614,049	236,546	89,197	939,792	758,355	181,437	-92,240
Zacatecas	817,831	381,170	18,372	1,217,373	951,462	265,911	-247,539

Sources: [1]Mexico, Dirección General de Estadística, Censo de la Poblacion 1960, 1970.
[2]Dirección General de Estadística, Anuario Estadistico de los Estados Unidos Mexicanos 1960-71.

For example:

$$Pop(61) = z \cdot Pop(60) + Pop(60)$$

$$= Pop(60) \cdot (z+1)$$

$$Pop(62) = z \cdot [Pop(60) \cdot (z+1)] + Pop(60) \cdot (z+1)$$

$$= Pop(60) \cdot (z+1) \cdot (z+1)$$

$$= Pop(60) \cdot (z+1)^2$$

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$$Pop(70) = Pop(60) \cdot (z+1)^{10}$$

Although the exponential rate of increase "r" is not the same as the geometric rate "z," it can be shown that these two techniques ultimately yield the same results:

Key: Pop(0) is the population at time 0
Pop(1) is the population at time 1
Pop(2) is the population at time 2
time 2 > time 1 > time 0
t_2 = time 2 - time 1
t_1 = time 1 - time 0

Technique I

$$\frac{Pop(1)}{Pop(0)} = e^{rt_1}$$

$$r = \frac{\ln\left[\frac{Pop(1)}{Pop(0)}\right]}{t_1}$$

$$\frac{Pop(2)}{Pop(1)} = e^{t_2\left\{\ln\left[\frac{Pop(1)}{Pop(0)}\right]/t_1\right\}}$$

$$Pop(2) = Pop(1) \cdot e^{t_2\left\{\ln\left[\frac{Pop(1)}{Pop(0)}\right]/t_1\right\}}$$

Technique II

$$\frac{Pop(1)}{Pop(0)} = (z+1)^{t_1}$$

$$z = \sqrt[t_1]{\frac{Pop(1)}{Pop(0)}} - 1$$

$$\frac{Pop(2)}{Pop(1)} = \left\{\left[\sqrt[t_1]{\frac{Pop(1)}{Pop(0)}} - 1\right] + 1\right\}^{t_2}$$

$$Pop(2) = Pop(1) \cdot \left\{\left[\sqrt[t_1]{\frac{Pop(1)}{Pop(0)}} - 1\right] + 1\right\}^{t_2}$$

The problem here is to demonstrate that the population estimates for time 2 using these techniques, are equal. This will involve simplifying both sides of the equation until this equality or non-equality is proved.

Question:

Is $Pop(1) \cdot e^{t_2\left\{\ln\left[\frac{Pop(1)}{Pop(0)}\right]/t_1\right\}}$ equal to $Pop(1) \left\{\left[\sqrt[t_1]{\frac{Pop(1)}{Pop(0)}} - 1\right] + 1\right\}^{t_2}$?

Divide both sides of the equation by Pop(1):

$e^{t_2\left\{\ln\left[\frac{Pop(1)}{Pop(0)}\right]/t_1\right\}}$ equal to $\left\{\left[\sqrt[t_1]{\frac{Pop(1)}{Pop(0)}} - 1\right] + 1\right\}^{t_2}$

Take the t_2^{th} root of both sides:

$$e^{\left\{\ln\left[\frac{Pop(1)}{Pop(0)}\right]/t_1\right\}} \quad \text{equal to} \quad \sqrt[t_1]{\frac{Pop(1)}{Pop(0)}} - 1 + 1$$

$$\text{equal to} \quad \sqrt[t_1]{\frac{Pop(1)}{Pop(0)}}$$

Take the t_1^{th} power of both sides:

$$e^{\ln\left[\frac{Pop(1)}{Pop(0)}\right]} \quad \text{equal to} \quad \frac{Pop(1)}{Pop(0)}$$

$$\frac{Pop(1)}{Pop(0)} \quad \text{equal to} \quad \frac{Pop(1)}{Pop(0)}$$

It can thus be shown that techniques I and II yield the same values for the estimated population at time 2.

Because it is simpler, I shall be using the second of the two computations in the discussion of the "assumed rate of change method" as it is applied to Mexico. The Dirección General de Estadística made use of this method to derive its annual population estimates for states until 1966. Had they continued through 1970, they would have drastically underestimated the 1970 population. This can be seen in Table 6.2.

The reason for the failure of the assumed rate of change method is that constant rates of change cannot be assumed unless birth rates, death rates, and percentages of migrants entering and leaving the population all remain roughly the same. In some rare situations -- an isolated community affected by no forces changing its birth and death rates -- this has been useful. There is no reason to doubt its utility, for example, on a pre-contact Pacific Island not yet experiencing the ravages of European diseases, colonization and medical technology; or in a remote Swiss mountain village isolated by environmental barriers from its neighbors (Ellis 1975). In Mexico, however, where the birth rate is rarely constant, the death rate is decreasing at an irregular rate, and sporadic internal migration and increasing international migration are occurring, this method can only give the roughest idea of post-censal or even intercensal populations.

The inescapable conclusion derived from this exercise is that additional techniques for population estimation must be tried. Even if no single population estimate is exactly right, a reasonably close approximation can be made by considering a large number of alternatives.

Indicator or Symptomatic Series Method

The method I will describe has been called the symptomatic variable or symptomatic series method (U.S. Department of Commerce 1971), though Weaver and Downing's (1974) suggestion of its utility grew more out of the social and economic indicator movement (UNESCO 1975; Wilcox and others 1972; Sheldon and Parke 1975).

The literature on the subject makes use of both terms, "symptomatic variables" and "indicators" (U.S. Department of Commerce 1971:754). In the following discussion the word "indicator" will be used in an effort to reflect our derivation of the concept. The basic idea behind the use of indicators is to select from the abundance of annually published statistics in Mexico, those which might reflect population size. These indicators must then be tested and evaluated by studying their relationship to population during the census years for each state. Once a core group of indicators is isolated for each state, algorithms can be formulated which convert the data to population sizes for inter- or post-censal years. Methods similar to this have been employed to make state and county population estimates in the United States (U.S. Department of Commerce 1971; Schmitt 1952) using such statistics as voter registrations, automobile registrations, and school enrollment figures.

Table 6.2: 1970 Population Estimates Based on 1950-60 Growth Rate

State	10 Yr. Rate	1 Yr. Rate	1970 Estimate	Actual 1970 Pop.	Difference
Aguascalientes	.2939	.0261	314,887	338,142	-23,255
Baja California	1.2918	.0865	1,517,841	870,421	647,420
Baja California T	.3404	.0298	106,567	128,019	-21,452
Campeche	.3777	.0325	231,755	247,114	-15,351
Coahuila	.2597	.0233	1,143,472	1,114,956	28,516
Colima	.4641	.0390	240,771	241,153	-382
Chiapas	.3391	.0290	1,616,391	1,569,053	47,338
Chihuahua	.4494	.0380	1,778,113	1,612,525	165,588
Federal District	.5968	.0480	7,777,814	6,874,165	903,649
Durango	.2079	.0191	919,013	939,208	-20,195
Guanajuato	.3061	.0270	2,266,723	2,270,370	-3,647
Guerrero	.2908	.0258	1,531,219	1,597,360	-66,141
Hidalgo	.1696	.0157	1,163,281	1,193,845	-30,564
Jalisco	.3987	.0340	3,417,389	3,296,586	120,803
México	.3628	.0320	2,584,873	3,833,185	-1,248,312
Michoacán	.3016	.0264	2,410,401	2,324,226	86,175
Morelos	.4157	.0355	546,833	616,119	-69,286
Nayarit	.3440	.0300	524,064	544,031	-19,967
Nuevo León	.4575	.0380	1,572,420	1,694,689	-122,269
Oaxaca	.2153	.0198	2,099,146	2,015,424	83,722
Puebla	.2140	.0197	2,396,238	2,508,226	-111,988
Querétaro	.2404	.0219	440,397	485,523	-45,126
Quintana Roo	.8604	.0650	93,334	88,150	5,184
San Luis Potosí	.2246	.0205	1,283,744	1,281,996	1,748
Sinaloa	.3189	.0280	1,105,771	1,266,528	-160,757
Sonora	.5342	.0440	1,201,858	1,098,720	103,138
Tabasco	.3684	.0320	677,404	768,327	-90,923
Tamaulipas	.4261	.0363	1,460,585	1,456,858	3,727
Tlaxcala	.2184	.0200	422,418	420,638	1,780
Veracruz	.3371	.0295	3,647,473	3,815,422	-167,949
Yucatán	.1879	.0172	729,428	758,355	-28,927
Zacatecas	.2283	.0208	1,004,541	951,462	53,079

ERROR

$$(1 \text{ yr. rate}) = \sqrt[10]{(10 \text{ yr. rate}) + 1} - 1$$

The U.S. Department of Commerce outlines two ways in which indicators can be applied: (1) the ratio-correlation method, and (2) the censal-ratio method. The ratio-correlation method involves relating changes in several indicators over time to population changes by means of multi-variate correlation tests. The regression equation yielded by this kind of analysis allows population estimates to be made for any time during which the relevant indicator data is known. In a United States example, this method has been shown to be less reliable than other means of population estimation. The indicators that were used in making that particular evaluation were births, deaths, elementary school enrollment, tax returns, motor vehicle registrations, non-agricultural employment, votes cast, and building permits (U.S. Department of Commerce 1971:756).

Also used in United States population estimates is the censal-ratio method, which closely approximates the system proposed in this paper. It involves:

1. computing the ratio of the symptomatic data to the total population at the census date,

2. extrapolating the ratio to the estimate date, and

3. dividing the estimated ratio into the value from the symptomatic series for the estimate date (U.S. Department of Commerce 1971:753).

School enrollment, electric, gas and water installations, bank receipts, and post office statistics have been the bases for these estimates in the United States.

To allow for more than one symptomatic variable to be used at once, Schmitt (1952) proposed that several variables be combined and weighted. The weighting system relies on computing the coefficient of variation across counties within a state during a single census year; variation is defined synchronically across geographical bounds rather than diachronically within a given area as will be proposed here. The latter approach has certain advantages over the former; it is sensitive to variations from place to place and insures that estimates be made without interference of regional differences.

Suggested Method for Mexican Population Estimation

Although the variant on traditional indicator techniques which was derived for this project was designed specifically for estimating Mexican populations, some of the methodological contributions may have more general value. Our method involves five steps: primary selection of indicators, data collection, secondary selection of indicators, algorithm formulation, and population estimation.

Primary Selection of Indicators

Several criteria must be satisfied for a social statistic to be valuable in population estimation. First, it must vary with population size, and second, it must reflect population changes in all elements of the population -- both sexes and all ages, socioeconomic strata and ethnic groups. If this requirement is not satisfied, differential growth in one group will be reflected differently in the indicator and population estimates will be skewed. Third, the relationship between the indicator and population must either remain constant or vary regularly over time. The fourth and final constraint on an indicator of population is that statistics be both consistently tabulated and collected on a regular basis. It is this initial intuitive selection from the plethora of published data that comprises the primary indicator selection stage.

It is difficult to satisfy all of these requirements at once. The possibility exists however, of devising an index based on two or more indicators, each of which skews population estimates toward a different element of society (Lazarsfeld and Rosenberg 1966:16). For example, if beer consumption gives inordinate attention to the adult population and school enrollment measures numbers of children, then theoretically the combination of the two might be a valid measure of overall population. Statistics relating to the consumption of goods and the utilization of cultural and educational resources were logical initial choices. The specific statistics selected and their sources are listed in Table 6.3, but it is necessary to make some comments concerning their utility.

Beer in Mexico is consumed primarily by adult men. The use of beer consumption, therefore, should give an accurate idea of the number of men in a Mexican state. If the number of women and children vary closely with the number of men, it is reasonable to use it as an indicator of total population. It is likely that per capita beer consumption fluctuates with changes in social and economic conditions in the state; whether it rises as economic well-being rises, or rises when the situation evokes a feeling of despair, is not clear.

Sugar is used by almost all of Mexico, and even in rural, sugar-producing areas, is purchased through the usual commercial channels since it must go through various specialized, technically complex processes to make it adequate for consumption. Sugar, however, is used in large amounts in such urban industries as soft drink and beer production, convenience foods and candies. Unless domestic consumption is considered apart from industrial consumption, it is likely to give undue weight to urban areas. Domestic consumption, however, is irregularly published (Olizar 1960). The data published in the Revista de Estadistica is tabulated by month with monthly averages given for years. It is the monthly average that was used in this study rather than the yearly total. Thus, per capita consumption rates measure average monthly consumption rather than total yearly consumption.

Primary and secondary school enrollments are age-specific indicators, which depend on the assumption that the population of adults varies closely with the

Table 6.3: Indicator Source List

Indicator	Frequency	Unit	Source
beer consumption	yearly	1000 liters	1,7
sugar consumption	monthly	tons	3,4,7
primary school enrollment	yearly	student	2,7
secondary school enrollment	yearly	student	2,7
soft drink sales	yearly	1000 bottles	5,7
cigarette sales	yearly	1000 packs	2
marriages	yearly		7
cinema tickets sold	yearly	1000 tickets	2,7
bullfight tickets sold	yearly	1000 tickets	2
theater tickets sold	yearly	1000 tickets	2
public spectacles tickets sold	yearly	1000 tickets	2
sports events tickets sold	yearly	1000 tickets	2
gasoline consumption	yearly	1000 liters	2,7
auto registration	yearly		2,7
motorcycle registration	yearly		2,7
passenger bus registration	yearly		7
newspaper circulation	yearly ↔ paper		6,7
magazine circulation			6,7
temporary housing	yearly	number rooms	2,7

Sources:

1 Asociacion de Fabricantes de Cerveza. M. Ma Contreros 133-50, Mexico City
2 Direccion General de Estadistica, Anuario Estadistico de los Estados Unidos Mexicanos
3 Dirección General de Estadistica, Revista de Estadistica
4 Union Nacional de Productores de Azucar
5 Industria Embolletadora de Mexico, Prolg Topacio 92
6 Medios Publicitarios Mexicanos, Avenida Mexico 99-303, Mexico City
7 Olizar, M., Guide to the Mexican Markets

population of children. Enrollment, especially in trade schools, colleges and other types of post-primary educational programs, probably occurs more frequently in cities and is closely related to increased industrial growth and the development of higher degrees of specialized economic activity.

Soft drinks are consumed by almost everyone in Mexico. It is probable that economic factors affect the per capita rate of consumption. When incomes rise, so would sales of bottled drinks. The statistics on soft drink sales are given by numbers of bottles rather than numbers of fluid ounces. It was necessary to assume that the same proportions of the different bottle sizes are sold over time within a state, to make the use of this indicator valuable.

Cigarettes are smoked to a greater extent by adult men in Mexico than by women and children. Also, because it takes little technological sophistication to manufacture a cigarette or cigar from leaf tobacco, many people in rural tobacco-producing areas make their own, thus reducing, one supposes, the number of commercially produced cigarettes smoked. The data on cigarette sales, therefore, does not reflect the actual consumption of cigarettes or cigars by the population, and population estimates based on this indicator are likely to underrate the rural population in tobacco-producing areas.

Gasoline consumption and automobile and motorcycle registrations are likely to respond as much to economic conditions and rural or urban residence as they would to population size. Furthermore the need for gasoline in certain industries and economic sectors (mining, manufacturing, and so forth) may skew estimates to the segments of the population engaged in these activities.

The frequency of marriage in a state is likely to respond closely to population, although the age distribution of the participants in this activity tends to cluster between 17 and 30. It must be assumed that the percentage of the population consisting of children and older adults does not change markedly over time. Where major medical advances are prolonging the average life span and efforts at population control are lessening the numbers of births, this assumption may not be justified, but over relatively short time spans (ten years or less) it is probably reasonable.

Sales of tickets to movies, plays, bullfights, sports events, or other forms of amusement would be localized in centers in which these activities exist -- for the most part cities and large towns. In many states, notably Campeche, there are no legitimate theaters, bullfight stadiums or major sports arenas. The only amusement universally present in states is the cinema. Population estimates can be seriously affected by the construction of a center of amusement (stadium, theatre, etc.) where one of its kind did not previously exist. I chose to consider the sum of all amusement ticket sales and, in addition, to consider cinema ticket sales separately.

The public bus is a popular form of transportation in Mexico both within and between cities. If the number of passenger buses registered is to be used in population estimates, it must be assumed that all members of the population travel to the same extent and all buses carry, on the average, the same number of passengers.

Newspaper circulation gives the distribution of papers by the state of their origin. Newspapers published in Mexico City, and purchased in Coahuila, therefore, would be tallied for Mexico City. Statistics on newspaper distribution by state of reader, are not available. It is likely that this indicator will give inordinate weight to large urban centers, and the well-educated population. Furthermore, newspaper titles whose circulation is listed vary from year to year. We must hope, therefore, that the overall number of readers is not affected.

Magazines are tabulated according to residence of consumer. Over time, however, as in the case of newspapers, the magazine titles listed in the sources change. In recent years the total number of magazine titles listed has increased, thus rendering statistics on readership incomparable. Because of this inconsistency in the data, the indicator was belatedly discarded altogether.

Temporary housing, like passenger bus registration would be affected more by population movement than by population itself. Also hotels and rooming houses in large metropolitan areas are likely to be used as much by visitors from other states and nations as by travelers within the state. If we assume that visitors and travelers to a state vary in direct proportion to original inhabitants of that state, temporary housing is a valid indicator.

In conclusion, although no indicator serves as a perfect reflection of population size, each skews estimates to a different portion of the population. The end result, considering the whole cluster of indicators at once, should yield reasonably sound estimates.

Data Collection

This study required data for two sequential census years and for all intermediate and subsequent years. Nineteen sixty and 1970 were chosen as the anchor years, and data for all other years following 1960 were collected. Because of the lag between tabulation of statistics and their publication, it has been impossible to obtain data for the years since 1973. The sources that yielded significant amounts of information are listed in Table 6.3 The cooperation of agencies within the Mexican government, notably the Direccion General de Estadistica, and the help of librarians around the country have enabled the gathering of much of the necessary data.

Secondary Selection of Indicators

It was assumed that some of the assortment of variables available would be better than others as indicators of population. If this were true, then a way to weight them needed to be devised. Three alternatives presented themselves, each involving a different set of assumptions.

Scattergram Method. The scattergram approach is designed to select and give greatest weight to those indicators which vary regularly with population over all of Mexico. First, scattergrams were drawn for each indicator by the computer program SCATTERGRAM, a part of the Statistical Package for the Social Sciences (Nie et al 1975), to give a visual impression of the degree of correlation between population size and the value of the indicator in question. This correlation was performed for the census years 1960 and 1970 in each of the states in Mexico. Thus for each indicator there was a sample of 64 cases (32 states in two years) to check the significance of any possible correlation. A perfect correlation would appear as a straight line connecting the points on the scattergram; selection and weighting of indicators would be based on the degree of conformity to this hypothetical perfection. Although two different census years were considered, this approach is incapable of distinguishing temporal from spatial units; data for Coahuila in 1960 and 1970 were used as if they were from two different states at one indeterminant time. In many respects the selection for synchronic stability over space is similar to the system proposed by Schmitt (1952).

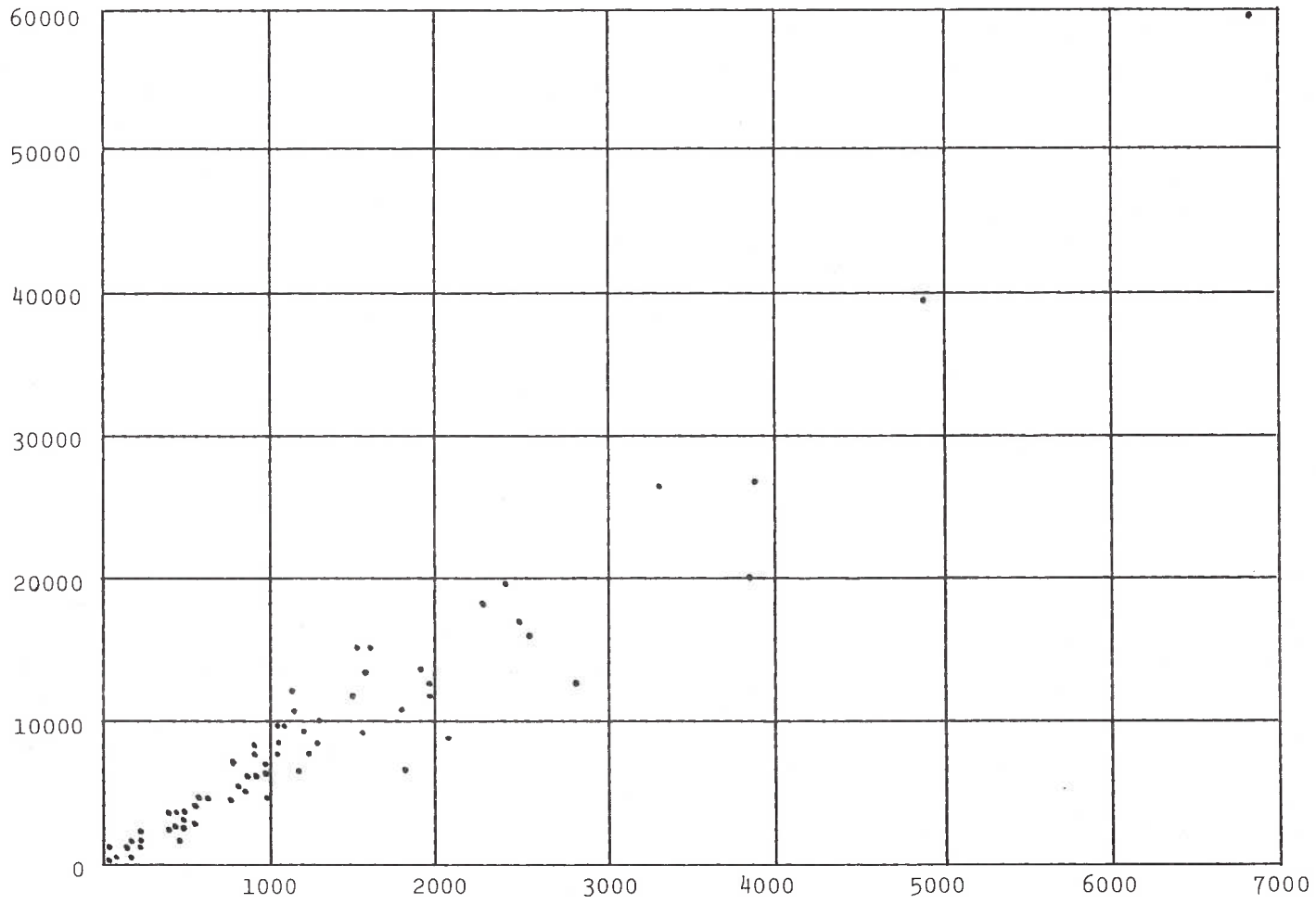
To exemplify this method, I shall use two indicators: marriage and elementary school enrollment (Figures 6.1 and 6.2). Simple observation reveals that the elementary school enrollment graph conforms more closely to a straight line than does the marriage graph. The Pearson's product moment correlation coefficients together with the standard errors of the estimates calculated only for 1960 data quantify this observed relationship.

The disadvantage of the method is that correlations of a significantly high value are uncommon and the use of the method would result in discarding almost all indicators. The reason for the poor showing of the indicators is that regional variation in consumption of commodities and utilization of cultural and educational resources is great. The ratio of automobile registration to population in Baja California in 1970 was .0808 while this same ratio for Zacatecas was .0035. The per capita beer consumption in Baja California in 1970 was .0666, but in Tlaxcala this rate was .0169. It is clear that state to state differences in consumption patterns preclude the use of the scattergram method.

Constant Rate of Consumption Approach. Avoiding the pitfalls of the scattergram method, the constant rate of consumption approach deals with each state independently. The object of this technique is to select a different group of indicators for each state, each of which relates to population at the same rate over time. In contrast to the scattergram method, the emphasis is on diachronic stability within a given geographic region.

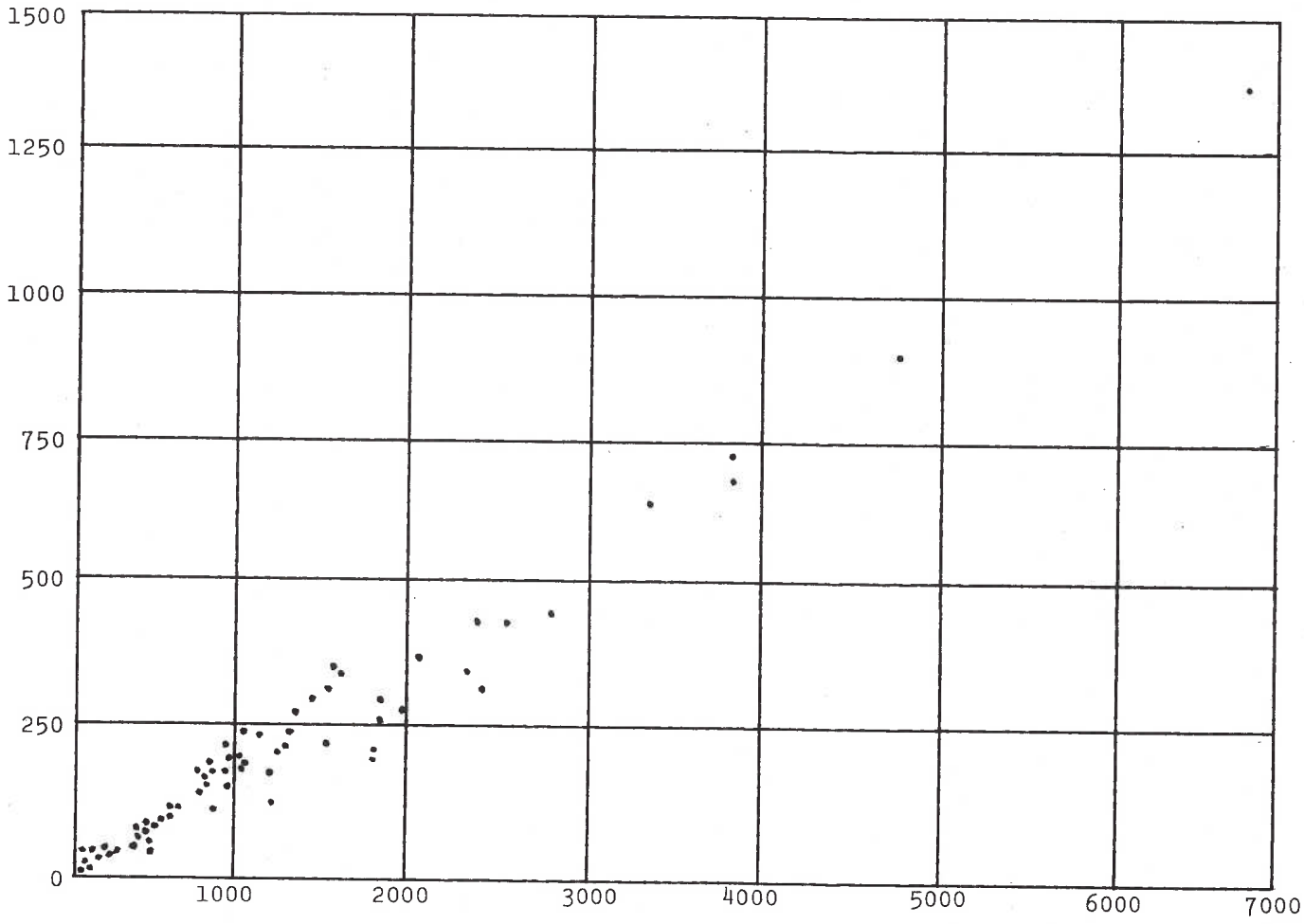
For every state and indicator, a rate of per capita consumption or utilization was computed for the two anchor years 1960 and 1970. Where these rates were similar the indicator earned a high weight; where they varied considerably the indicator was discarded. The assumption underlying this is that if per capita consumption remains constant at two points in time it is likely to remain constant at points in between and for the time period following this interval. This is shown in the samples of two states given in Table 6.4. Weighting of each indicator for each state is inversely proportional to the difference between the

Figure 6.1: A Scattergram Correlation Between Marriage and Population



Pearson's R Correlation Coefficient: .935
R Squared: .875
Significance of R .00001

Figure 6.2: A Scattergram Correlation Between Primary School Enrollment and Population



Pearson's R Correlation Coefficient: .995
R Squared: .991
Significance of R: .00001

Table 6.4: Constant Rate of Consumption Selection Based on Low Values of Relative Difference

Coahuila	1960 Per capita Rate	1970 Per capita Rate	Relative Difference
Beer Consumption	.0266	.0393	.4735
Sugar Consumption	.0035	.0042	.1792
Primary School Enrollment	.1661	.2130	.2827
Secondary School Enrollment	.0177	.0457	1.5861
Soft Drinks Sales	.4794	.3347	-.3019
Cigarette Sales	.0749	.0777	.0379
Marriages	.1627	.2386	.4668
Amusement Ticket Sales	.0192	.0319	.6627
Gasoline Consumption	.0092	.0107	.1633
Autos and Motorcycles	.0203	.0172	-.1504
Automobile Registrations	.0186	.0284	.5238
Passenger Bus Registrations	.0005	.0006	.2069
Newspaper Circulation	.1634	.1642	.0052
Cinema Tickets Sold	.0100	.0083	-.1641
Magazine Circulation	.0300	.0243	-.1893
Temporary Housing	.0020	.0023	.1592
Colima			
Beer Consumption	.0323	.0369	.1419
Sugar Consumption	.0026	.0035	.3687
Primary School Enrollment	.1775	.2081	.1724
Secondary School Enrollment	.0302	.0420	.3908
Soft Drinks Sales	.2281	.4098	.7963
Cigarette Sales	.0995	.0628	-.3687
Marriages	.1578	.1574	-.0029
Amusement Ticket Sales	.0062	.0170	1.7581
Gasoline Consumption	.0054	.0062	.1518
Autos and Motorcycles	.0143	.0175	.2245
Automobile Registrations	.0059	.0139	1.3734
Passenger Bus Registrations	.0005	.0004	-.1866
Newspaper Circulation	.0535	.0788	.4724
Cinema Tickets Sold	.0070	.0086	.2308
Magazine Circulation	.0235	.0238	.0140
Temporary Housing	.0077	.0086	.1151

1960 and 1970 per capita rates. Thus for newspaper circulation in Coahuila a high weight would be expected, but for amusement ticket sales in Colima, a weight of zero would be likely.

The advantage of this method is that it accounts for variation from state to state without reducing the number of indicators that are acceptable. The selection for indicators which remain stable with respect to population over time has a logical and straightforward appeal. Theoretically the indicators selected will be those most basic to life and those which people require in unvarying quantities.

One of the disadvantages of this method is that the assumption of a constant rate of consumption based on two sample years may be unmerited. The likelihood that these two-year similarities have only occurred by chance is high. Another disadvantage is that, using this method, very few indicators are selected; differences between 1960 and 1970 were usually too great to allow reliable acceptance of the assumption of constant consumption. Upon closer inspection it was found (Downing 1975: personal communication) that with few exceptions, the ratio of commodity or resource to population increased over time. Downing suggested an alternative technique designed to incorporate expected changes in consumption rates into the method.

Changing Rate of Consumption Approach. Almost all of the indicators for which recurrent data exists respond not only to population size but also to

socioeconomic factors. Thus, as economic development occurs in Mexican states, per capita consumption of resources and products rise. This may be because of actual increases in consumption rates, or it may be due to the perceived increase in consumption rates. In Quintana Roo, T an average of 14.5 liters of beer was consumed per person in 1960 as compared to 38.6 liters per person in 1970. This is close to an actual consumption rate since beer is largely unavailable outside the market system in which sales are carefully tabulated. Actual per capita water consumption, on the other hand, probably did not increase in Quintana Roo T, but the perceived increase would be startling. In 1960 only 2.8 percent of the households in Quintana Roo, T had running water while in 1970 the rate dramatically increased to 19 percent (Mexico Dirección General de Estadistica, Censo de la Población 1960, 1970). When statistics are available, water consumption may reflect a change in recorded water use, not necessarily a change in actual water use. In either case, per capita consumption rarely remains constant for any commodity. The problem now is how to incorporate such a rate change as a means to select the best indicators of population.

The computer program SELIND performs this selection process. For every indicator it calculates a national rate of per capita increase based on the 1960 and 1970 censuses. This, then, is taken to be the expected rate of increase. For each state, per capita consumption or utilization rates for each indicator are computed and the ten-year rate of increase is compared to the national average decade increase for that indicator. If the difference is minimal, the indicator is selected and given a high weight. Weighting descends from five to zero as the difference grows. The relevant output is seen on the top half of each of Tables 6.5 through 6.37.

One of the assumptions underlying this method is that a state change in indicator consumption over 10 years that is close to a national change implies that the state's per capita rate varies constantly for the intervening years. On the other hand, however, it allows for the selection of more indicators than the "constant rate of consumption" method and accounts for per capita consumption increases as well. It provides a different set of indicators for each state thus accounting for regional variation. This method was chosen only after extensive experimentation with others.

Algorithm Formulation

Now we must consider the formulation of the algorithms that will actually convert indicator data to population estimates. The determination of population estimates is based on a knowledge of the following factors:

1. the year of the last census enumeration (C)
2. the year in question (Y)
3. the values for the N relevant indicators (X_i, i = 1, N)
4. the respective weights of those indicators derived from the program SELIND (W_i)
5. the ratio of each indicator to population in the most recent census year (R_i) (from the Program SELIND)
6. and the decade rate of change in this ratio for the time between the two previous census enumerations (from SELIND) (D_i)

A state's population for any post-censal or intercensal year (Y) can be estimated to be:

$$Pop(Y) = \frac{\sum_{i=1}^{n} \frac{W_i \cdot X_i}{R_i + R_i X D_i/10(Y-C)}}{\sum_{i=1}^{n} W_i}$$

Each indicator independent of the others is sufficient for the rough estimation of population. Each of these single indicator-based values can be considered an intermediate estimate.

$$\text{Intermediate Pop}(Y) = \frac{X}{R + R(D/10)(Y-C)}$$

Explanation: The value of the indicator must be multiplied by the reciprocal of the estimated per capita rate because the rate R has been computed in SELIND to be the indicator divided by the population. To be useful, we require that the value of the indicator be multiplied by the population divided by the indicator.
For example: In 1970, if 52,309 liters of beer were consumed by 1,612,525 people in Chihuahua, then R would be X/Pop, or .0324. If the ten year rate of change between 1960 and 1970 of this quotient is found to be .1723, then we assume that each year's change is likely to be D/10 or .0172. The estimated per capita consumption rate for 1973 would be:

$$R + R(D/10)(Y-C) = .03407$$

This is an estimate of the ratio of the indicator value and population for 1973 as if it were written:

$$\frac{X(73)}{Pop(73)}$$

It is obvious that the value needed to make population estimates for 1973 is the reciprocal: an estimate of the ratio of population to indicator value:

$$\frac{Pop(73)}{X(73)}$$

Taking the reciprocal:

$$\frac{1}{R + R(D/10)(Y-C)}$$

solves this problem.
The annual rate of change is assumed to be 1/10 the decade rate of change. Because there is no clear evidence to support the contention that per capita consumption rates increase in anything other than a linear fashion, an arithmetic rate increase was chosen for maximum simplicity.

Thus, for every indicator there is an intermediate population estimate. The task now becomes to devise a way to consider all of these estimates at once. A simple average would suffice if all indicators were considered equally reliable:

$$\frac{\sum_{i=1}^{n} \frac{X_i}{R_i + R_i\ (D_i/10)(Y-C)}}{N}$$

But the technique involved in the secondary indicator selection built into the program SELIND, places differential weight (on a scale of zero to five) on indicators depending on likely reliability. To give the better indicators a greater influence in population estimation, these weights must be included in the average. Instead of averaging N separate intermediate population estimates, we are actually pretending that there are $\sum_{i=1}^{n} W_i$ estimates, composed of groups of between one and five duplicated values.

Hence:

$$\text{Pop}(Y) = \frac{\sum_{i=1}^{n} \frac{W_i\ X_i}{R_i + R_i\ (D_i/10)(Y-C)}}{\sum_{i=1}^{n} W_i}$$

Population Estimation

A subroutine, POPEST, was designed to be appended to SELIND to transform data on indicators to population estimates using the algorithm described above. The program has been applied to data for five intercensal years evenly spaced in the interval between 1960 and 1974: 1962, 1964, 1966, 1968, and 1972. In some cases it was necessary to deal with missing data, and in such circumstances the indicator was ignored and the denominator of the equation, $\sum_{i=1}^{n} W_i$ was computed without the weights of the absent indicators. Almost all state estimates are based on eight or more indicators, so that occasional lapses should not substantially impair estimate accuracy. The results of this exercise are listed on the bottom half of the tables in Appendix D. There is no way to tell at this point whether the method is accurate, though tentative evaluation can be made by comparing the 1968 and 1972 estimates with the 1970 actual population. In all but seven cases the estimates conform closely to expectation. The 1968 population estimate surpassed the 1970 census figures in Baja California T. while in Baja California, Coahuila, Colima, Federal District, Nuevo León, and Veracruz, the 1972 estimate was smaller than the 1970 populations. Where most errors occur, therefore, they are errors of underestimation. It is likely that our assumed increases in per capita consumption rates have begun to taper off during the late 1960's and are currently continuing this process. This is characteristic of nations whose industrial, social, and economic development is reaching a plateau. That Baja California T. is the sole exception is understandable in view of the rapid development taking place there. Applying our error to future experiments in Mexican population estimation should reveal a need to incorporate a decreasing instead of a constant rate of increase in per capita consumption.

Conclusion

We will not know with any certainty how well any method works until the 1980 census data is published. In the meantime, it seems presumptuous to declare categorically that indicators (or symptomatic variables) can replace former methods of population estimation. These other techniques fail in their ability to make reliable statements concerning changes in past trends. The component method supplies estimates for in- and out-migration which are far from being correct, and the assumed rate of growth method avoids making any allowances for the sometimes irregular growth patterns seen in Mexican states.

What these methods so desperately need is an additional monitoring device to sense population growth rates which they are not designed to detect. Quintana Roo T. for instance, has experienced a rate of population growth which outstrips the highest estimate based on 1950-1960 trends, and guesses about migration volume to and from Quintana Roo T. are unreliable. I suggest, then, that indirect indicators, such as elementary school enrollment, gasoline consumption, and consumption of foodstuffs be used to supplement the traditional estimates, since these symptomatic variables suggest increases in population for Quintana Roo T. which are far greater than those derived through the other methods.

The unprecedented need among politicians, social scientists, and members of the business community for knowledge of population trends and rates of migration requires unprecedented accuracy in intercensal population estimates. There will always be a use for additional means to make these estimates maximally sensitive and reliable and this design may satisfy this requirement.

CHAPTER VII

MIGRATION: A COMPUTER SIMULATION MODEL

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AND

THEODORE E. DOWNING

In an attempt to explore the potential of simulations for estimating and projecting migration, the Bureau of Ethnic Research has developed a computer model to mimic inter-state and international migration of Mexicans. This modelling exercise was aimed at providing a working theory of migration -- that could be experimentally manipulated and offer insights into the migration process. The simulation was designed as a general model capable of rapid modification so its usefulness would extend to the analysis of migration in other countries as well.

Structure of the Model

An Analogy

What is a simulation? How does it work? To explain, we offer an analogy drawn from a first-cousin of simulation, parlor games. Let's play a game called "Mexican migration." To begin, cover your living room floor with shoe boxes, each representing a state of Mexico. Partition the boxes into several parts, each representing different sectors of the state's economy, one for agriculture, another for manufacturing, yet another for construction, and so on. Next, you will need some marbles, one color to represent females, another for males. Write an age on each marble, corresponding to the number of individuals of each age in the country. These are called age and sex "attributes" of the population. Fill the partitions in each shoe box with as many marbles as there are males and females of each age in that economic sector. The total number of marbles in all the boxes, therefore, replicates the age-sex distribution of the entire population of the country at the start of the game, for example, 1960. Having laid out the game, set an alarm clock to buzz at fixed intervals, say every 20 minutes, and play as if the period between buzzes is equivalent to a year in real time.

The action begins by spinning a wheel to randomly select a state. Once selected, the wheel is spun again to select certain attributes of the state's population (for example, a male in the transportation sector between the ages of 20 and 24). Next, we move the marble between different boxes according to rules we have established concerning the likelihood that a person with those attributes will migrate. These rules are based on detailed observations (or hypotheses) about the past behavior of similar people under similar conditions. Obviously a large rule book is needed since the possible combinations of characteristics of people and economic sectors are large and the rules governing which kinds of people are moved can be complex.

We play the game over and over again; spinning the wheel, selecting a marble, consulting the rule book, and making the appropriate moves. Eventually, the alarm clock rings marking the end of a year's play. After repeating the game for 10 "years" the population has been redistributed, represented by the fact that many marbles are now in different boxes. We compare the final distribution with the original distribution to determine the correspondence of the simulated distribution to the correct resolution of the game. i.e. where the marbles should be after 10 years according to the known distribution in 1970. If the marbles turned up in the places other than where they should be in 1970, we rewrite some of the rules, and repeat the game. Each rule change is used to align the outcome to what is expected, making the game a little more realistic by discovering more accurate rules.

Just as playing the game of Monopoly tells us something about real estate, so also playing this game should tell us something about migration. By changing the

rules and observing the outcome of many games, we could determine the sensitivity of the game to changes in particular rules. In this sense, the game would be a test of a theory (the rule book) as an explanation of migration. Repeated plays of the game would also indicate what rules lead to nonsensical outcomes. For instance, it might be discovered that a slight alteration of a rule quickly leads to the complete migration of all marbles to one box. This would indicate that the rule needs to be rewritten or counterbalanced by other rules which mitigate such unwarranted consequences.

It would take a long time, great patience, and a messy living room to play this hypothetical game. Fortunately, there is an alternative. A computer can be programmed to play the game, and migrate millions of imaginary people between imaginary states in minutes. Essentially this is what we have accomplished in this phase of the Bureau's Mexican Migration Project; we developed a computer program which closely resembles the geographical and population structure of federal states in Mexico and formulated rules which seem to govern migration between these states.

Theoretical Structure

For the purposes of this model, migration may be viewed as the movement of people across some arbitrarily defined boundary. The area which the migrant leaves will be called the origin; the area where the migrant arrives, the destination. Naturally, an area may be, simultaneously, a destination to some migrants, a point of origin to others. Like most migration theorists, we feel that migration is a consequence of many circumstances at the area of origin and destination, including varying opportunities and obligations facing different types of people. Above all, migration is selective; the same circumstances at an origin or destination will affect different types of people differently. Thus, the first task of our model is to take into account characteristics of the place of origin, destination, and the migrants themselves.

A theoretical structure underlies any game or model. This structure is formed by data requirements, assumptions, simplifications of reality, causal chains, correlations, concepts, and a host of other characteristics. The best way to see the theoretical structure of this model is to go through its sequence of operations, step by step.

To begin, we create a map of Mexico in the computer by digitizing a matrix to represent state boundaries. Since we are interested in inter-state migration in Mexico and Mexico to United States migration, this map consists of Mexico's 32 federal entities and the four United States border states. To form the initial conditions of the simulation, we select and store in the computer's memory thousands of values of attributes for Mexico's population and characteristics of states. Attributes and characteristics were selected which previous migration studies indicated would influence the volume of migration between states and the selection of migrants (Table 1). Next, we set the model's clock at 1960, the initial year for calculating the first set of migrations.

Table 7.1: Inputs to Mexican Migration Simulation

I. For Each State

1. Age and sex distribution in rural and urban areas 1960, 1970
2. Education distribution by sex 1960, 1970
3. Income distribution by sex 1960, 1970
4. Economic sector distribution by age 1960, 1970
5. Birth rates by year 1960, 1970
6. Death rates by age by sex 1970
7. Rural-urban death rates (mean of 1960 to 1970 period)
8. Net lifetime migration into and out of the state 1950-60

II. For Nation

Male to female birth ratio (mean of 1960 to 1970 period)

The operation of the model begins with the selection of one of Mexico's 32 federal entities as an area of origin (Figure 7.1). The selection is random, with a state's likelihood of selection being weighted according to its proportion of all of Mexico's population. For example, Jalisco had approximately 2,443,000 inhabitants in 1960, roughly seven percent of Mexico's 34 million people. Therefore, in the selection process, Jalisco has seven chances out of 100 of being chosen. This sampling procedure guarantees that all Mexicans have an equal opportunity to become migrants, although this does not mean that all states will have equal proportions of their populations actually migrating, as will soon become apparent.

Once a state is selected, we define a particular group of people as potential migrants. To do this, we calculate the proportions of people in a state's population with different attributes of sex, age, income, education, rural or urban residence, and who are members of the various sectors of the labor force. We then randomly select a specific value for each attribute; one for sex, age, income, and so on. Once again, this selection is proportionate to the frequency of each attribute in the state's population. For example, Jalisco's population has approximately 16 percent of its people in the agricultural sector, therefore, in the simulation agriculturalists had approximately 16 chances out of 100 of being considered potential migrants. The selection of attributes continues until a potential migrant group, with a sex, age, income level, and economic sector membership is defined.

Once a state's potential migrant group is selected, we turn to the rule book. The rule book contains a set of graphs for each attribute, indicating likelihood that a group defined by a particular value of the attribute will migrate. Checking the graphs, attribute by attribute, we arrive at a string of probabilities, one for each attribute. To this list we add yet another probability based on how the economic characteristics of the area of origin affect its propensity to expell out-migrants. Combining these probabilities, we establish the migration potential of the group, a number representing the probability that this group in this particular state will migrate.

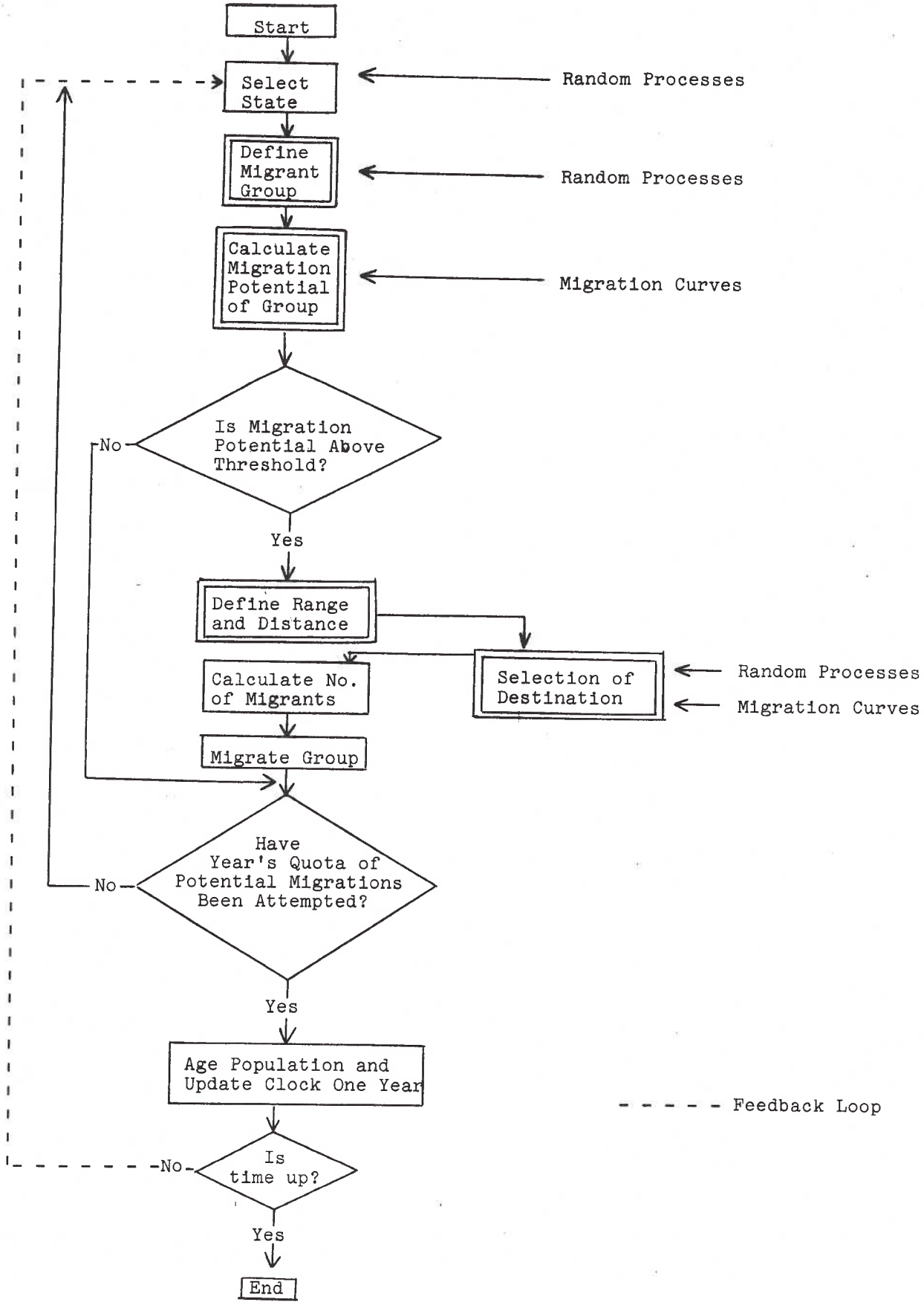
Next, we compare this group's migration potential with an arbitrarily chosen value called a "threshold." If the group's migration potential falls above the threshold, the decision is made to migrate them and we move on to another section of the rule book which determines a destination. If the group's migration potential falls below the threshold, then the group does not migrate and we check to see if any arbitrary quota for attempted migrations in one year has been exceeded. If it has not, then we begin once more the process of selecting a state, defining a migrant group and determining whether it will actually migrate (note feedback loop in Figure 7.1).

However, assuming that the migration potential for the group selected is high enough that they are chosen as migrants, the simulation must now select a destination. Once again, the characteristics of states enter into the operation of the model. Potential areas of origin are evaluated according to theoretical expectations of being attractive to this particular migrant group. After the destination is selected, the size of the group is defined and the migrants are moved to their new destination. Following this migration, the model determines whether the quota for attempted migrations has been exceeded. Assuming that it has, then the entire national population is aged and the clock is moved ahead by one year. Automatically the out-migration population and their attributes are subtracted from the population at the place of origin and added to the state of destination.

The process starts again by selecting a new state and once again defining a new group of potential migrants. The cycle continues, over and over, until a pre-established limit of years to be simulated is reached. At this point, the model automatically generates adequate statistics for evaluating the distribution of the population and its attributes in the ending year (1970) and all intervening years since 1960. These statistics include all flows of migrants into and out of states classified by their sector, income, age, and sex. It is important to remember that unlike the parlor game, all the events we have just described occur in seconds. In essence, time is compressed in the model, allowing for multiple operations of the model in a single computer run.

The "rule book" dictates the expected behavior and characteristics of migrants. It is divided into rules which determine what segment of a state's population will

Figure 7.1: Main Program



migrate and rules for determining a migrant group's destination. To see how these rules are formed and used in the simulation, we shall back track over the simulation once more, this time referring to how specific decisions are made.

Selection of Migrants

In this model, a group of potential migrants is defined by five attributes: (1) age, (2) sex, (3) income, (4) sector of employment, and (5) economic characteristics of the state of origin. Combining these factors determines whether a group of potential migrants actually moves.

Each of the first four attributes have certain dimensions or values. For sex, there are an established number of females and males; for age, a given number of people in different age categories. Likewise, there are so many people living in urban and rural areas, and so on. Possible combinations of the dimension of these attributes is large, but finite. Some combinations are quite rare, for example, a rural female construction worker making 100,000 or more pesos a year. Rather than determine the migration potential of every possible combination, we define the specific attributes of a potential migrant group which approximates the group's relative frequency in a population. We draw a random sample for each attribute, weighting the selected value in proportionto its distribution in the state's population. Thus, if agriculturalists represent 85 percent of a state's population, approximately 85 of every 100 persons selected will be agriculturalists. The selection process continues for each attribute until we have defined a potential migrant group.

We know that migration is selective; the probability that a person with a particular set of attributes will migrate varies with the value of that particular factor. For instance, it is more likely that individuals in their early twenties will migrate than individuals in their late sixties.

Phrased another way, we may say that the migration probability of a 20 year old is higher than that of a 60 year old. We represent these probabilities by means of a "migration curve" of that attribute. Ideally, we should establish migration curves for all attributes. For the attribute of age, this would mean plotting the probability of migration for people of different age categories. Then we should do the same for sex and residence. After doing this, we would be faced with the problem of resolving the interactive effects of these characteristics. For example, given that a 25-29 year old person hasa migration probability of 0.005 and that males migrate more frequently than females (0.59) and that urban people have a greater probability of migration than rural people (0.54), then we wish to calculate the probability that an urban male, between 25-29 years old, would move. Since we wish to arrive at a single migration probability we are faced with problems of not only the relative importance of each attribute, but also the relative interaction of these variables, i.e. determining the degree of interdependence of the attribute's probabilities.

The literature on Mexican migration does not always provide easily accessible information for answering these questions. The existing theories and information on Mexican migration are based on different research methodologies, geographical units of analysis, and degrees of theoretical sophistication. Some findings are derived from analyses of national census data (Cabrera 1967, 1970, 1972), others are from sample surveys of regions (Browning and Feindt 1967, 1969: Balan, Browning and Jelin 1973) or select communities (Ball 1967, 1971) and yet others from studies of migrants from a particular ethnic group or at a specific place of origin (Butterworth 1962, 1963, 1965, 1972). How did we decide which studies provided adequate rules for the simulation? We first checked sources for demonstrated relations between an attribute (such as age) and its effect on a group's potential for migration. "Demonstrated relation" means that a national study of the phenomena had been conducted on this characteristic. For example, Gustavo Cabrera (1972) using census materials, empirically measured the importance of age as a selectivity factor in Mexican migration. With slight modification his study fit our requirements of a demonstrated relationship and was preferred over more regional studies.

When national studies were unavailable, we relied on less exhaustive regional studies for determining an attribute's influence on migration (such as the work on Monterrey by Balan, Browning, and Jelin 1973). Alternatively, had data been available for other areas of Mexico, we might have compared this regional study

to other similar studies. When we based our migration probability on a regional study, such as the Monterrey work, we assumed that the pattern of migration for Monterrey is representative of the entire nation.

If neither national nor regional studies for the attributes impact on migration potential could be found, we formed migration rules based on the best available information, i.e. relations which appear to be true according to studies conducted in other countries. For example, in some situations we had to rely on generalized propositions made by Ravenstein (1885) and Lee (1969). Finally, if we are unable to base our probabilities on either demonstrated relations, regional studies, or hypothesized relations tested in another context, then we made an educated guess based on what we intuitively felt was a valid relation. Naturally, a guess was the weakest of the four alternatives and avoided as much as possible. Some might object to this style of modelling, however, an operational model requires that all relations between variables be defined, otherwise it would not run.

Age Selectivity

We can examine these difficulties in determining who will migrate by looking at one of the more critical decisions made in this part of the simulation. Cabrera (1972) examines the relative influence of age, sex, and place of residence on migration selectivity. His data, for the period 1930-60, is based on inter-state migration, migration to urban zones (with populations over 15,000), and Mexico City. Using the method of intercensal survival indices, he discovers that age selectivity is greater among migrants to urban centers than among migrants to rural areas. He suggests an "inverse relationship between the growth in the absolute number of migrants and the importance of age selectivity." That is, the greater the volume of migration the less likely it is that migrants concentrate in certain age groups. Furthermore, Cabrera discovers that females are more likely than males to migrate to urban areas and Mexico City, with a trend toward equilibrium of the sex of migrants occurring as the migrant stream ages, a finding consistent with the argument made by Balan, Browning, and Jelin's (1973).

Cabrera's work permits us to solve the previous mentioned problem of the interdependence of attributes. Reanalyzing his data, we can estimate the probability that males and females of different ages will migrate. The manner in which his results are tabulated permits us to ignore the interaction of age and sex probabilities, for he provides data on the intersecting sets of males by age and females by age. Furthermore, Cabrera discovered that the selectivity of migrants to urban areas differs from that of all migrants. By inference, we may assume that the curves of rural to rural migrants are more closely aligned to the between-states curves than they are to the urban curves. Thus, the migration simulation model incorporated Cabrera's findings into its rule book by using them to set the migration potential curves for age, sex, and residence (Figures 7.2 through 7.5).

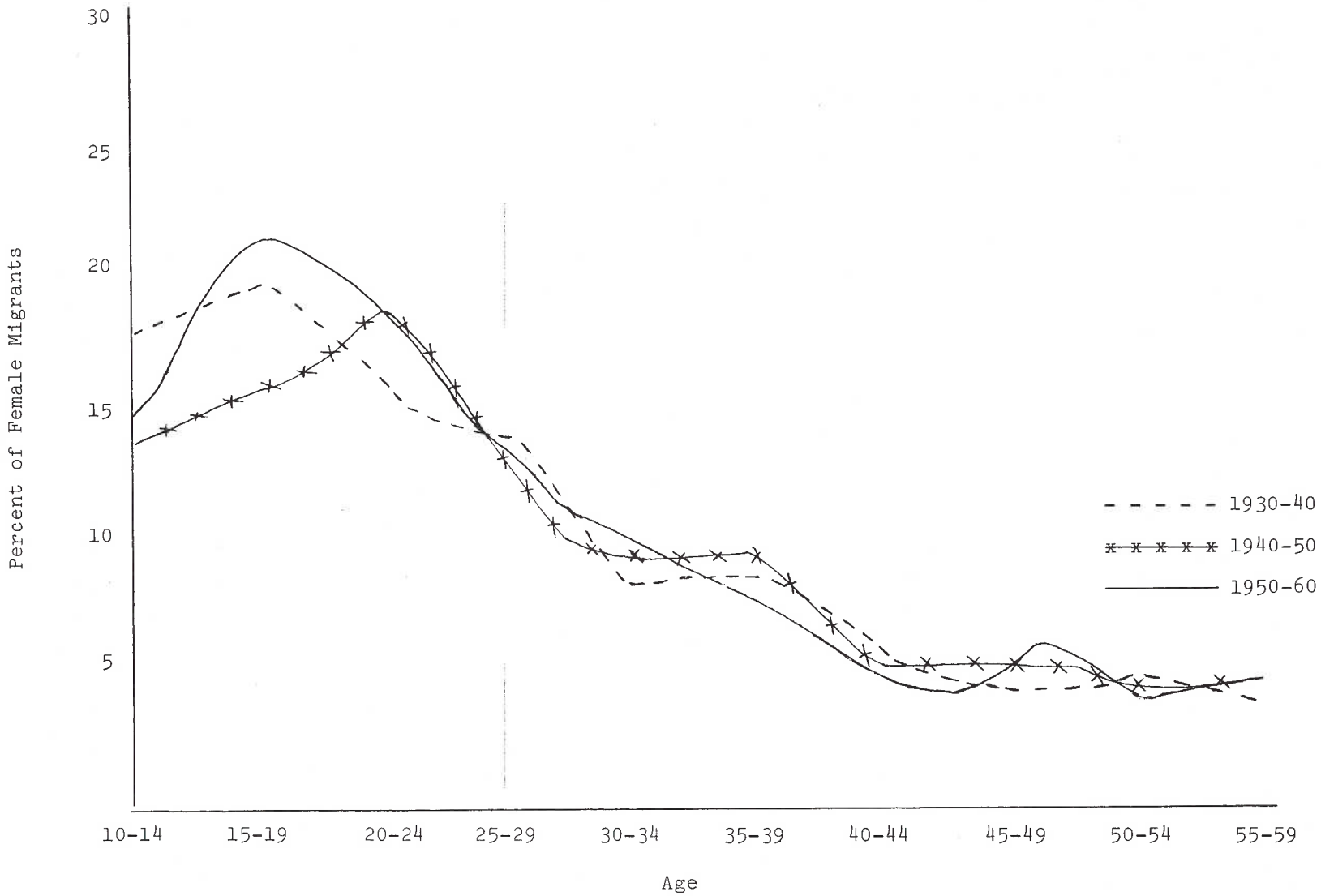
It must be stressed that certain assumptions are required before assignment of the relative importance of any attribute on a group's migration potential. For example, accepting Cabrera's information as part of the "rules" requires the following assumptions:

Assumption 1: The selectivity of migrants for age and sex does not change from 1950-70.

Cabrera's data is based on the 1950-60 period, but the model is being calibrated for the 1960-70 period. If we use the curves in Figures 7.2-7.5, then we must assume that no changes took place during the second decade (1960-70). Naturally, if additional information were to become available, then this assumption could be relaxed or modified.

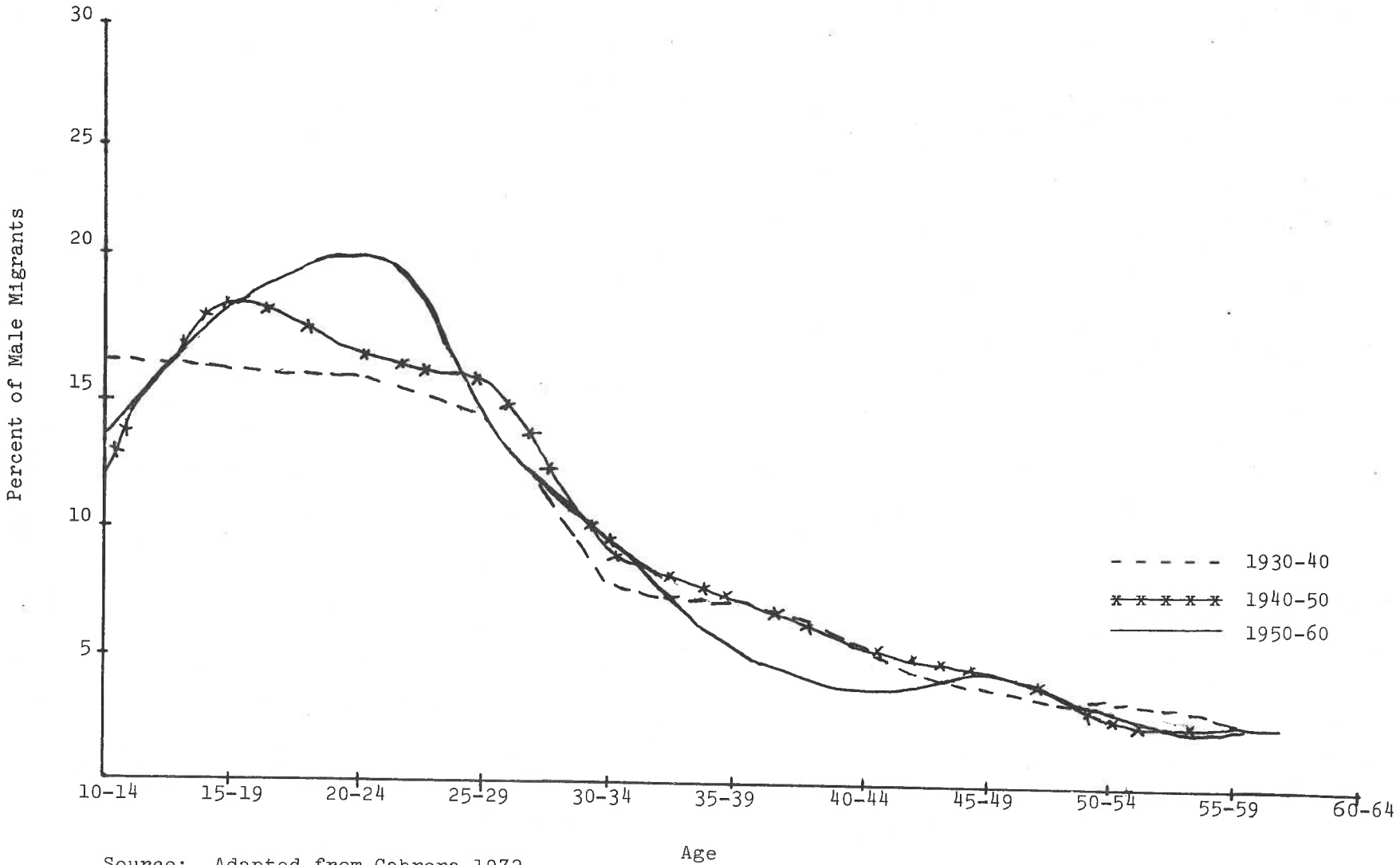
As an alternative, we might have extrapolated a trend from the 1930-60 period into the 1960-70 period. Unfortunately, inspection of the tables reveals there are no distinguishable national trends toward greater or lesser selectivity of age, sex, and place of residence. If anything, there appears to be a cyclical pattern. For females, selectivity for age was more pronounced in the 1930-40 period and the 1950-60 period than in the intermediate decade (1940-50). In contrast, male migrants to all areas show a long term trend,

Figure 7.2: Net Migration of Inter-State Females of Different Ages



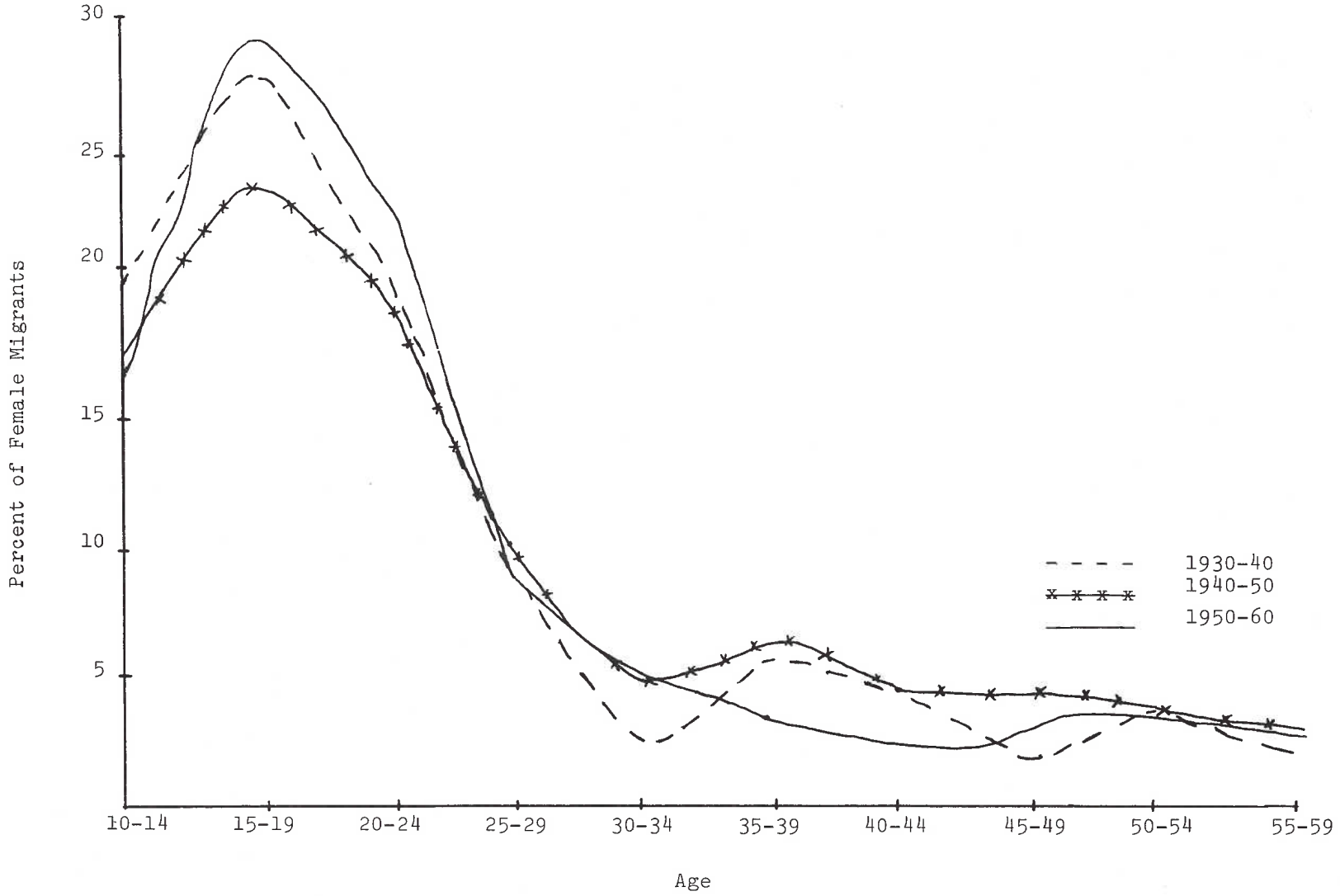
Source: Adapted from Cabrera 1972

Figure 7.3: Net Migration of Inter-State Males of Different Ages



Source: Adapted from Cabrera 1972

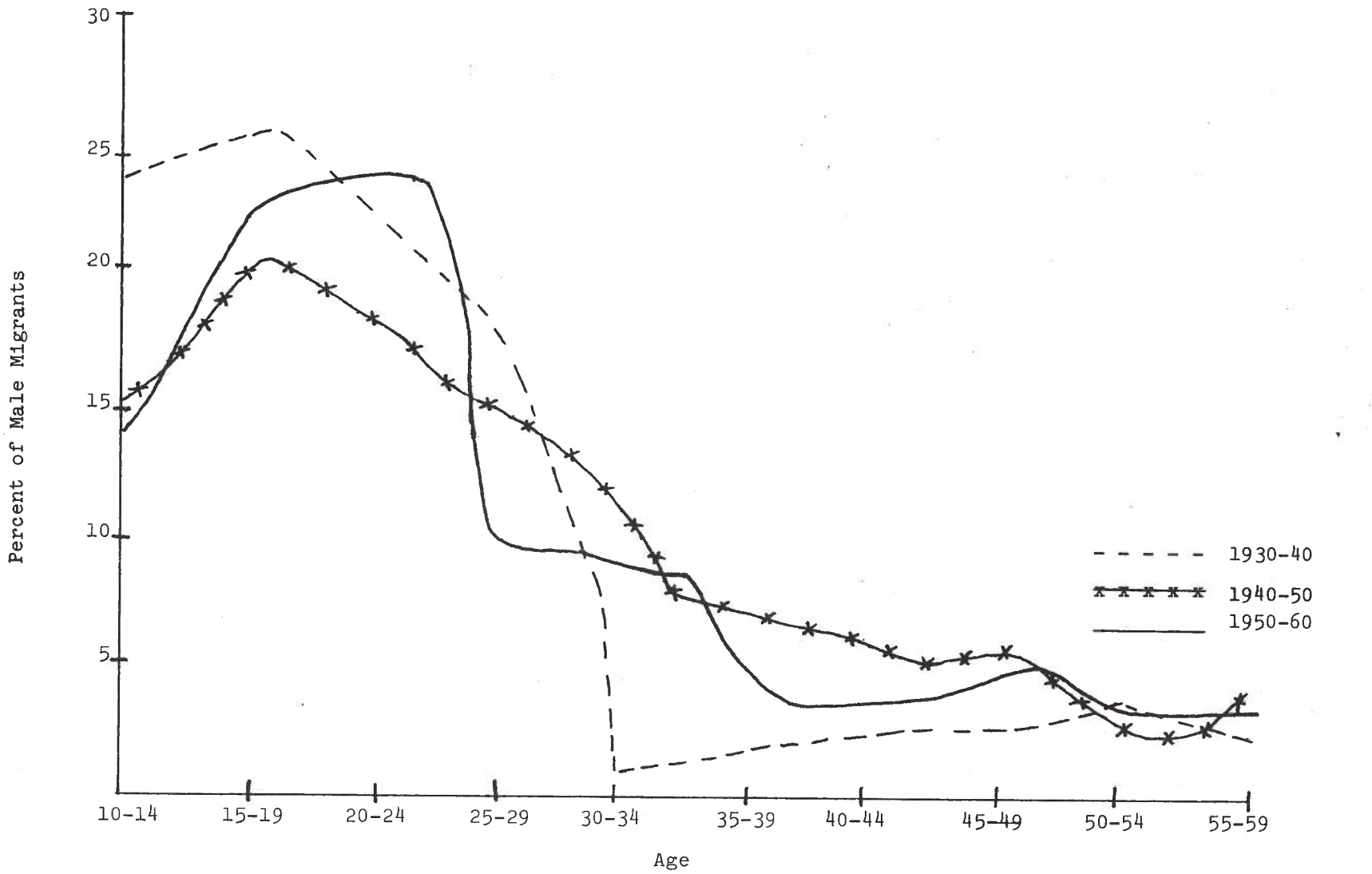
Figure 7.4: Net Migration of Inter-state Females of Different Ages in Urban Zones



Source: Adapted from Cabrera 1972

Note: Urban means 15,000+ people

Figure 7.5: Net Migration of Males of Different Ages in Urban Zones



Source: Adapted from Cabrera 1972

Note: Urban means 15,000+ people

with the age selectivity increasing in favor of 10-24 year olds from 1930-60 (Figure 7.3). However, male migrants to urban areas appear to be following a different trend, decreasing their selectivity during the intermediate decade (1940-50). The lack of data points, however, prevents extrapolation of these shifts into a trend.

Assumption 2: The selectivity of non-urban migrants resembles the inter-state migration pattern more than it does the urban migrant pattern.

Cabrera did not present data on rural migrants which corresponds to Figures 7.4 and 7.5. Figures 7.2 and 7.3 include urban and rural migrants, they more closely approximate the movement of rural migrants than any other data we have. Comparing these four tables, it appears that migration to urban areas is more selective for age than migration to rural areas, a conclusion holding for males and females. We also find from studies by Tobah and Cosio (1970) that migration to urban areas is more selective for age than migration to rural areas.

Assumption 3: The selectivity of migrants for age and sex is the same for all migrant streams.

In reality, this assumption is probably false since it appears that the selectivity of migrant streams changes as the migrant stream gets larger (in absolute numbers) or older. However, until more quantitative studies which specify this relationship are available, we decided to use these four curves for all migrant streams between states.

In the case of income, education, and labor force sector membership, it was immediately apparent that there were no useful empirical studies comparable to Cabrera's work by which we could define the impact of these variables on migration potential. Most studies have been too specialized to apply to nation-wide data, and as a consequence, assumptions were made about how these characteristics were to be treated. Those unfamiliar with formal modelling might be puzzled as to the need for so many, often unrealistic assumptions. In response, we wish to point out that assumptions are a necessity in any modelling. In verbal models they are made unconsciously or left unstated. Formal model building forces the theorist to be aware and make explicit the assumptions. Furthermore, any assumption can be modified or "relaxed" to test their relative importance to the results of the model. Unlike verbal models, a simulation model's design permits a rather rapid relaxation or modification of many of its assumptions, a process which would permit an experimental test of the theory's sensitivity to the modified assumptions.

To return to the decision as to who will migrate, it may be noted that all the attributes considered thus far are essentially demographic, common to people but not to the region itself. However, we know that out-migration is also related to economic conditions in the state of origin (Rogers 1965, Bogue 1969, also see Sayers and Weaver, Chapter II in this report). To mimic the economic situation, we need a measure of the economic well-being of the major labor sectors in each state. Unfortunately, Cauthorn and Hubbard's analyses of the economic sectors coincided with the building of this model, preventing the inclusion of detailed information on economic sectors. As a result, the current version of the model employed a less-than-optimal data. The project's economist estimated the relative health of the economic sectors in each state. This estimate establishes a migration probability for all state economic sectors. We assume that the poorer the economic condition of a state's non-agricultural sector, the higher the probability of out-migration. The sectors selected for consideration were agriculture, oil, gas, mining, manufacturing, construction, electrical, commerce, transportation, service, and a category called "insufficient information." The specific impact of each of these sectors on migration is discussed by Cauthorn and Hubbard in Chapter V of this report.

To summarize, we used five personal attributes and one statewide characteristic to calculate the migration potential of randomly selected groups. They were:

1. Age
2. Sex
3. Rural/Urban Residence

} Combined into one set of curves, see Figure 7.2-7.5

4. Education
5. Income
6. Labor Sector Condition

Fortunately, we had Cabrera's analysis which enables us to combine the first three of the five personal attributes into a single probability.

Weighting Probabilities

Thusfar, we have assumed that a group's potential for migration is a function of its age, sex, residence in rural or urban areas, education, income, and the relative economic condition of the labor sector to which the group belongs. We have not, however, specified the relative importance of the list of factors, with respect to each other, in determining if a group will actually migrate. The best empirical research we have concerning the relative importance of these factors is Tarver's (1961) study of intercensal net migration in the United States between 1940-50. He performs a linear multiple-regression analysis of white and non-white migration in which the independent variables were represented by clusters of social, economic, and demographic variables. This analysis revealed that information on all three clusters of independent variables, including their interdependence, was necessary to derive an accurate estimate of internal migration. It is possible, of course, to adopt Tarver's relative weightings in the Mexican migration model, but it must be assumed that the factors underlying migration in Mexico are operating in a similar fashion to those in the United States. Tarver's own analysis makes us hesitant to make this assumption. To attain the same level of accuracy for estimating non-white migration that he had for white migration, he had to introduce nine more independent variables into his clusters (14 vs. 5). If we assume that the category "non-white" is indicative of a cultural difference in migration patterns, then his analysis is telling us that the relative influence of the same variables may vary for different cultural groups. Since, we know that Mexico is radically different, culturally and institutionally from the United States, it is likely that Tarver's weightings are inapplicable to Mexico.

What, then, do we do? Unlike verbal theories, computer models cannot encompass ambiguities: the operation of a simulation requires an explicit specification of the relative importance of factors assumed to influence migration. Lacking any empirical research on this topic, we opted for an experimental determination of the weights. Initially, we decided to arbitrarily set the relative influence of the independent probabilities of migration at 35 percent for the cluster of age-sex and residence, 35 percent for labor force sector membership, 15 percent income, and 15 percent education. The relative weightings of these factors are adjustable, meaning that various combinations could be tried on different runs of the model to determine the effects of different weightings.

The combination of the four probabilities yields a single value which we call a "group's migration potential." The specific value of this probability is based on the heterogeneity of the population within a state and on the economic conditions of the potential migrant's labor sector. It depends on (1) the particular attributes of people selected during the random sampling of the state's population, (2) the economic condition of the area of origin and (3) the weightings assigned to the algorithm for calculating a group's migration potential. The operators of the model have no deterministic control over who is selected to be considered for migration. However, they can control the theoretical assumptions underlying how a particular attribute effects a group's pattern of migration. For example, if a subsequent study shows the precise relation between income and migration, then this information can be immediately added to the model to improve its estimation and projection of migration. This ability of the model to assimilate future studies is one of the strengths of simulation modelling.

The Threshold

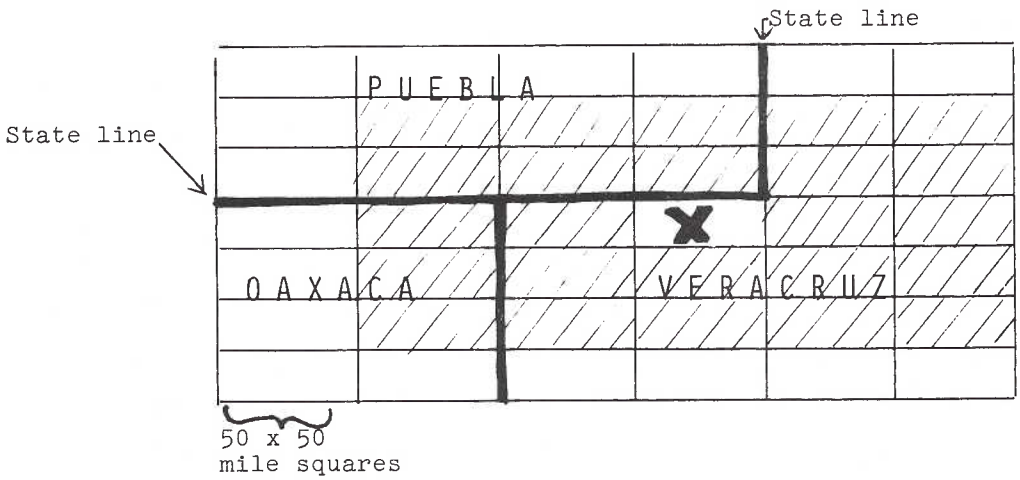
The newly calculated "migration potential" of a group is compared to an arbitrary value called the "threshold." The threshold value forms a very convenient valve, controling the national gross rate of migration. Indirectly, the threshold also effects the composition of the migrant group. Set very high, only individuals with attributes that give them a high probability of migration will migrate. Set at zero, any combination of attributes, no matter how unlikely, will result in the group migrating. When the model is used to estimate intercensal migration, the threshold value permits us to align the total intercensal net migration of the model to the volume of migration which actually occurred in the population. In future experiments with the model we hope that the threshold value can be used to control the influence of national economic trends, such as GNP or the rate of inflation, on gross migration within the country.

Selection of a Destination

Deciding whether a group will leave an area is only half the task of modelling migration. A destination for the group must also be chosen. We divided the task of selecting a specific destination into two problems. First, we developed an algorithm to calculate the farthest range that a particular group may migrate. Then, we evaluated all potential destinations within this range to determine exactly where the migrants move.

To perform this task, we programmed into the computer a more refined picture of Mexico's geography. A grid of 50 by mile squares is superimposed over a map of Mexico. For example, the intersection of the states of Oaxaca, Puebla and Veracruz might be represented as in Figure 7.6.

Figure 7.6: Representation of Distance in Model



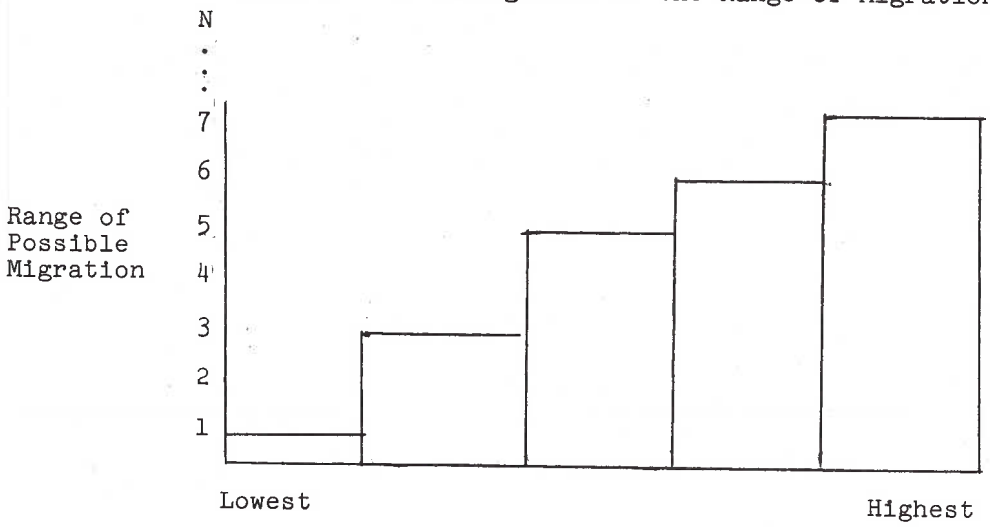
Thus, the larger the state in absolute area, the more squares it contains. The exact location of the migrant's origin is determined by assigning an urban classification to all squares with over 10,000 population. All others are classified as rural. If the migrant group selected is of an urban origin, then we make a list of all urban areas within the migrant's state of origin and randomly select one of them as the urban area of origin. For example, if Veracruz was selected as origin for an urban migrant group, we would list all the areas in this state having populations over 10,000 and assign an equal probability of being selected in a random draw. We then pick one, which we indicate by X on Figure 7.6.

From this area, we decide on a likely range for migration. Previous migration research had established that the probability of migration decreases with distance (Zipf 1946, Stouffer 1940, 1960). Moreover, the importance of distance seems to

vary with characteristics of the migrant group. Highly educated migrants are more likely to make long distance moves than less educated migrants, richer people move longer distances than poorer people, younger people (15-30 years old) move longer distances than other age groups, and so on. To combine all the possible combinations of characteristics (income, age, sex, etc.) and assign these combinations an accurate distance relation is impossible. Not only are there too many combinations but also we did not have the necessary empirical data.

Lacking empirical evidence, we assume that the range of migration increases for migrant group's in proportion to the income and educational status. We expressed this assumption as a discrete mathematical function (Figure 7.7).

Figure 7.7: Assignment of the Range of Migration



Using the income and educational level of the migrant group, we decide on a distance to be searched as the area of potential destinations for the migrants. For initial runs of the model, we assume that education and income exert an equal influence on the range of migration. Thus we calculate the average of the values of these two variables, using this number as the radius of our range. It should also be noted that any characteristic or combination can be used to produce a likely range. The number selected for the range indicates the farthest potential migration and may be as far as the distance from one end of the country to the other or as close as the adjacent square. We demark an area as large as the number selected. To continue with our example in Figure 7.6, if the number is 2, we choose the cross-hatched area.

This decision means that any migrant from area X must move within the cross-hatched zone. It also means it is possible that migrants will not move to another state, i.e. an interstate move will not occur. The occurance of inter-state migration depends on (1) the migrant's area of origin (2) the range of possible destinations for the migrants. Allowing for such intra-state moves permits us to simulate, in principle, intra-state rural to urban migration, although the current model does not include this capability.

Within this range, we evaluate the attractiveness of all potential destinations (small squares). The evaluation is based on three characteristics. First, we determine the economic health of the labor sector to which the migrants belonged, assuming that migrants will be more likely to move to states with better economic conditions. Second, we increase likelihood of migration to areas where previous migration has occurred. That is, a previous flow of migrants between two states increases the probability of future moves between the migrants' origin and

destination. Finally, we give preferential treatment to urban over rural migration, since the overwhelming weight of migration research points to the predominance of a marked rural to urban and urban to urban movement of migrants.

Once again we were faced with the problem of determining the relative importance of several factors known to influence migration, but for which we lack empirical evidence. That is, we do not know the relative importance or weighting of these three characteristics: economic pull, previous migration listing, and urban attraction. And once more, we employ the same ad hoc method mentioned previously for weighting the attributes of potential out-migrants. We assign arbitrary weights, with the expectation of changing them when we calibrate the model to the 1960-70 migration data.

After the most likely area of origin for the migrant group is selected, the size of the migrant group is calculated based on the expected national gross migration. The actual migration is devoid of emotion, consisting of nothing more than migrants being deleted from their areas of origin by subtracting their characteristics from the state of origin's totals. Likewise, these totals are added to the state of destination's population. A check is made to determine if the year's quota of attempted and completed migrations has been reached. If it has, then a massive up-dating procedure takes place. The age-sex distributions for each state are adjusted to correspond to all the migrations that occur within the year, the distributions for all characteristics are recalculated to include changes due to migration, and a time index and any time varying functions are also updated. Then the model is prepared for another yearly cycle.

Calibration

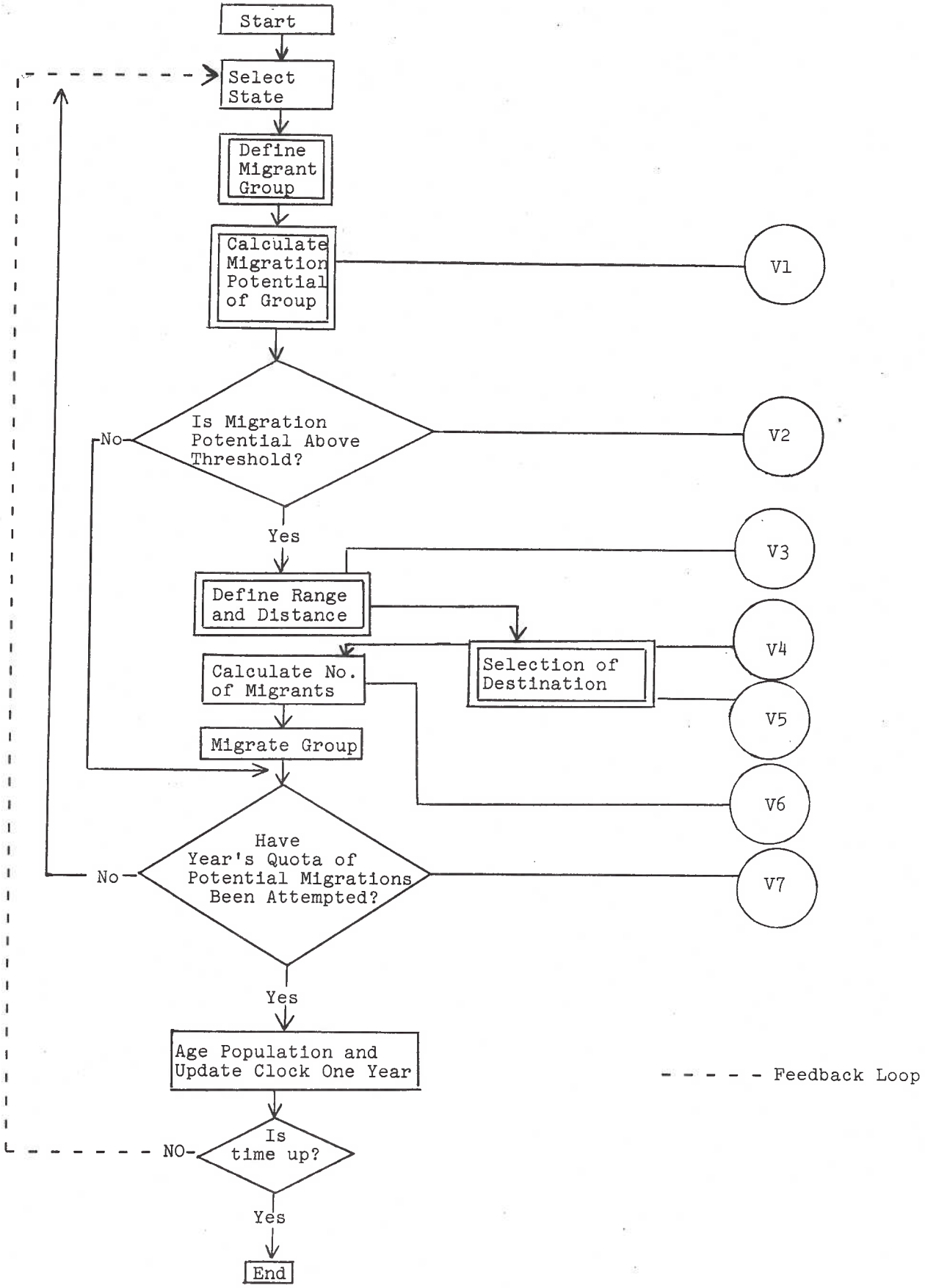
The lack of theoretical formulations specifying the relations of many of the variables used in this model and the absence of empirical data on some of the model's parameters forced us to make several arbitrary decisions during its construction. We had no choice but to set up some weighting for combining of probabilities if the model was to give us any results. In the calibration phase of the model's construction, we are adjusting and modifying these weightings so as to align the output of the model with empirically observed rates of interstate migration.

Calibration is accomplished by building in "control values" at several points in the model's construction. Changing the setting on these control valves instantly alters critical values in the simulation. During calibration, we are adjusting these values to align the model's behavior to a pattern of internal Mexican migration between 1960 and 1970.

Table 7.2 lists the main control valves and Figure 7.8 shows their approximate location in the flow diagram of the model. For example, valve V1 changes the relative weights of age/sex/residence, education, income, and labor sector conditions used in calculating the migration potential of out-migrants. Phrase in theoretical terms, shifting of these weights not only permits us to align the model, but also permits the experimental testing of the relative importance of four factors which enter into a theoretical explanation of internal migration. In a similar manner, valve V4 permits us to alter the relative attractiveness of urban over rural areas, again permitting the experimentation and hypotheses testing. The next phase of the model's development, currently in progress, consists of a careful alteration of the settings of these valves to make the model mimic Mexican migration.

Our first step is to align the vital statistics of the model (births and deaths) to that of the period from 1960-70. The control values on the model area are set so that no migration could occur, i.e. we allow the population of each state to change only in response to births and deaths. The results, as could be expected, only roughly correspond to the state populations observed in 1970 (Table 7.3). We are encouraged, however, by two indications that the simulation is moving in the right direction. First, the model comes within one percent of the national population of Mexico (Table 7.3). A more detailed breakdown

Figure 7.8: Location of Control Valves in the Main Program



of our results by age categories shows that the model tends to underestimate the younger age categories and overestimate the older age categories. Second, the state-by-state population estimates show wider discrepancies between the model and the expected, 1970, distribution. This is expected, since we are not permitting any interstate migration. However, when the direction and magnitude of these discrepancies are compared to the direction and magnitude of internal migration which actually occurs during this period, the model again is making errors in the right direction. That is, if we correct the model's estimates by the amount of net migration known, through the Mexican census, to have taken place between 1960 and 1970, then the magnitude of the model's error is greatly reduced (compare the means and standard deviations on Table 7.4).

Table 7.2: Control Valves Used in Calibrating the Model

V1	Relative weights of four migration potentials
V2	Threshold
V3	Range of migrants group - weighting income vs. education
V4	Attractiveness of urban vs. rural areas
V5	Selection of Destination Weightings: importance of previous migration history vs. economic conditions of states.
V6	National gross rate of internal migration
V7	Number of attempted migrations

Table 7.3: Estimation of Age Distribution

Age	Model	Census	Percent Difference
0 - 4	8,386,114	8,167,510	+2.68
5 - 9	7,085,891	7,722,996	-8.25
10 - 14	6,034,860	6,396,174	-5.65
15 - 19	5,136,109	5,054,391	+1.62
20 - 24	4,304,507	4,032,341	+5.38
25 - 29	3,567,955	3,260,418	+9.43
30 - 34	2,949,383	2,596,263	+10.83
35 - 39	2,454,573	2,511,647	-2.27
40 - 44	2,050,530	1,933,340	+6.06
45 - 64	4,988,566	4,758,773	+4.83
65 +	1,912,908	1,791,385	+6.78
Total	48,871,396	48,225,238	+1.34

Table 7.4: Estimation of State Population Change, Based on Model's Orientation Allowing no Inter-State Migration

	a Model's Estimate	b Census 1970	Percent Difference Between a and b	Percent Difference* Including Observed Net Migration
Aguascalientes	356,601	338,142	+5.46%	-1.74%
Baja California	707,754	870,421	-17.69	-8.83
Baja California T	117,671	128,019	-8.08	-0.76
Campeche	238,856	247,114	-3.34	-3.28
Coahuila	1,288,396	1,114,956	+15.56	-1.79
Colima	232,905	241,153	-3.42	-2.82
Chiapas	1,642,792	1,569,053	+4.70	+2.14
Chihuahua	1,690,259	1,612,525	+4.82	-2.10
Federal District	6,167,584	6,874,165	-10.28	-8.18
Durango	1,143,551	939,208	+21.76	+4.23
Guanajuato	2,437,091	2,270,370	+7.34	+0.33
Guerrero	1,822,939	1,597,360	+14.12	+5.38
Hidalgo	1,452,897	1,193,845	+21.70	+7.02
Jalisco	3,414,065	3,296,586	+3.56	-1.19
México	2,596,424	3,833,185	-32.26	-2.98
Michoacán	2,758,895	2,324,226	+18.70	+2.98
Morelos	555,016	616,119	-9.92	-2.35
Nayarit	587,206	544,031	+7.94	+2.54
Nuevo León	1,505,357	1,694,689	-11.17	-6.30
Oaxaca	2,306,078	2,015,424	+14.42	+0.72
Puebla	2,734,215	2,508,226	+9.01	+0.98
Querétaro	542,550	485,523	+11.75	+4.38
Quintana Roo T	70,650	88,150	-19.85	-0.85
San Luis Potosí	1,572,270	1,281,996	+22.64	+5.76
Sinaloa	1,298,177	1,266,528	+2.50	+1.74
Sonora	1,128,227	1,098,720	+2.69	-1.70
Tabasco	758,891	768,327	-1.23	-1.17
Tamaulipas	1,408,530	1,456,858	-3.32	-2.22
Tlaxcala	513,329	420,638	+22.04	+3.65
Veracruz	3,662,541	3,815,422	-4.01	-0.33
Yucatán	857,823	758,355	+13.12	+0.95
Zacatecas	1,301,856	951,462	+36.83	+10.81
			$\bar{m}$ = 4.25	$\bar{m}$ = 0.16
			$\overline{sd}$ =14.51	$\overline{sd}$ = 4.19

*Difference between a and b, if observed migration is added to model's estimate

Current Status

As of March 1, 1976, a complete, running simulation was operational on the University of Arizona CDC-6400/DEC 10. The model is on-line and interactive, permitting rapid adjustments to many of its parameters, including all the control values, the migration curves, and probability distributions. It is written in Fortran F.4, a common language found at most computer centers.

Calibration had just begun when the National Science Foundation funds for this project were exhausted. The authors felt this is a great tragedy since, to their knowledge, this is the only generalized, flexible model of internal migration capable of allowing operational tests of migration theories on a national level. The University of Arizona has provided a small fund to continue exploration of the model, but the amount is inadequate to begin the next phase. If funds may be obtained, we plan to continue development of this model. Our tentative strategy is to:

1. More closely align the model to mimic the rates of change in vital statistics. This will require computation of mortality tables for each state.

2. Set the threshold value so that the gross national migration of the model matches that of Mexico.

3. Continue the analysis of economic sectors, recalculating the changes in the health of state economic sectors for the calibration period.

4. Complete the calibration of inter-state migration by adjusting the control values, constantly comparing the models' output with the known distribution of the population in 1970, and the intercensal rates of migration.

5. Using economic and vital statistics for the 1970-76 period, project internal migration up to 1976.

6. Develop alternative economic and vital rate projections for the 1976 to 1980 period.

7. Using these projections, project internal migration for 1980. This will be a census year against which we can test the validity of this method.

8. Refine the model to make projections for economic regions in Mexico, rather than states.

9. Test alternative hypotheses concerning the importance of different variables used in the model on estimating and projecting internal migration.

To return to the analogy, we have laid out the game board, written the rules, and moved the first set of migrants. The next step is to play the game and learn about migration.

A P P E N D I X A

Explanation of Tables 1 to 3, Appendix A

These tables give the lifetime migration streams from a state of birth (down the left side) to a state of residence (across the top). Thus, each number in the columns refers to the number of people who were born in a particular state of birth that were living in a specific state of residence, as of the census taking. The first table shows residence as of 1950, the next for 1960 and the last, for 1970. In all cases, the states appear in the same order.

After the list of states, on the left hand side, a description of the abbreviations are as follows:

Total In-Mig.:	Total In-migration. The total number of people that have migrated to a specific state as of the relevant census year.
Int'l. Mig.	International Migration. The total number of people who have migrated from any other country to each state of residence.
Unknown:	Unknown. The number of people who did not specify their state of birth, for each state of residence.
Total State Pop.:	Total State Population. Total state population as of the census taking.
Percent State Pop.:	Percent State Population. The rate of lifetime in-migration, that is the total in-migration as a percentage of total state population.

These abbreviations follow the list of "states of residence" at the top:

Total Native Born Pop.:	Total Native Born Population. All people who were born in a specific state, regardless of their state of residence at a particular census taking.
Total Out-Mig:	The total number of people born in one state who lived in a different state of residence at a census taking.
Out-Mig., Percent of Pop.:	Total out-migration as a percentage of the state's population at the census taking.
Population 10+ Years:	Population of ten years or older in each state of residence (used in survival ratios)
Total Intercensal Net Mig.	Total Intercensal Net migration. The formula for this figure may be found in Table 3.7.
Lifetime Net Mig.:	Lifetime Net Migration. The difference between lifetime in-and lifetime out-migration for each state, as of the particular census.

Table 1 : Aguascalientes - Federal District. State of Residence, 1950

State of Birth	Aguascalientes	Baja Calif.	Baja Calif. T	Campeche	Coahuila	Colima	Chiapas	Chihuahua	Fed. Dist.
Aguascalientes	150,051	1,322	27	74	5,713	72	102	4,691	12,169
Baja California	75	78,389	248	13	535	122	77	530	2,121
Baja California T	34	11,324	57,940	4	72	95	41	92	780
Campeche	29	103	18	110,395	159	53	587	88	4,537
Coahuila	686	1,616	33	48	569,176	111	239	11,145	15,337
Colima	56	1,829	100	7	205	84,904	177	428	4,891
Chiapas	61	251	28	852	307	91	878,636	705	12,281
Chihuahua	393	3,778	24	23	5,766	59	212	723,243	11,272
Federal District	663	3,565	193	179	2,894	375	888	2,622	1,609,218
Durango	706	5,351	54	29	33,241	77	100	31,063	11,152
Guanajuato	2,415	10,996	105	99	6,341	257	495	6,738	190,602
Guerrero	76	527	22	21	184	327	225	411	25,337
Hidalgo	172	415	32	32	556	56	235	518	120,041
Jalisco	16,383	27,138	364	136	9,939	18,594	489	8,876	105,229
México	754	1,435	83	203	2,530	604	1,167	2,792	310,892
Michoacán	396	13,405	130	82	1,720	4,806	594	1,920	136,626
Morelos	46	165	4	13	169	33	98	151	16,941
Nayarit	33	3,619	118	5	172	184	45	233	4,029
Nuevo León	235	515	25	26	14,164	66	87	1,383	106716
Oaxaca	125	607	62	226	361	171	5,390	538	52,674
Puebla	226	432	37	90	558	78	400	523	84,140
Querétaro	179	245	47	23	325	39	140	280	55,323
Quintana Roo T	1	47	4	206	18	1	58	17	570
San Luis Potosí	1,552	673	23	77	18,708	71	133	2,488	25,409
Sinaloa	46	17,382	487	12	332	212	94	1,082	7,189
Sonora	59	19,410	280	29	311	95	61	3,968	6,630
Tabasco	34	129	14	3,956	66	24	6,851	101	8,163
Tamaulipas	174	509	45	50	2,507	101	123	815	15,721
Tlaxcala	31	69	7	12	105	9	33	75	24,726
Veracruz	248	922	77	851	1,040	279	1,801	866	74,928
Yucatán	45	260	10	3,842	166	39	206	137	15,185
Zacatecas	11,187	7,887	38	42	33,729	137	114	16,878	19,426
Total In-Mig.	37,120	135,926	2,739	11,262	142,893	27,238	21,262	102,154	1,385,037
Int'l. Mig.	904	12,650	185	441	8,550	179	7,128	21,017	65,187
Unknown	0	0	0	0	0	0	0	0	0
Total State Pop.	188,075	226,965	60,864	122,098	720,619	112,321	907,026	846,414	3,050,442
Percent State Pop.	20	60	5	9	20	24	2	12	45

Table 1 : Durango - Morelos. State of Residence, 1950

State of Birth	Durango	Guanajuato	Guerrero	Hidalgo	Jalisco	México	Michoacán	Morelos
Aguascalientes	3,171	1,281	94	118	3,536	441	277	152
Baja California	215	160	108	30	721	66	182	68
Baja California T	39	60	20	16	180	54	54	21
Campeche	16	25	44	18	141	61	33	52
Coahuila	13,725	697	121	197	992	553	326	214
Colima	73	139	180	53	4,726	134	721	96
Chiapas	92	151	128	106	234	220	180	194
Chihuahua	6,809	393	140	122	890	428	237	219
Federal District	1,044	3,627	2,325	3,203	6,254	15,597	2,780	4,494
Durango	557,806	803	254	500	1,051	444	316	377
Guanajuato	2,033	1,269,889	795	2,490	8,969	9,305	18,582	3,670
Guerrero	139	336	890,174	677	562	3,143	3,140	18,386
Hidalgo	259	959	830	814,235	772	8,147	1,184	2,055
Jalisco	5,540	19,655	5,320	1,037	1,649,853	3,558	15,035	2,220
México	2,174	4,842	5,153	10,515	5,803	1,320,770	6,695	15,476
Michoacán	1,186	9,347	5,081	1,391	20,892	8,534	1,365,427	4,316
Morelos	78	183	1,196	285	607	2,167	327	207,054
Nayarit	172	111	81	48	7,550	307	178	258
Nuevo León	762	432	118	160	773	372	448	256
Oaxaca	282	413	2,958	393	619	1,478	381	2,129
Puebla	231	626	799	4,782	1,002	3,671	458	6,216
Querétaro	193	3,315	318	2,712	640	5,709	770	615
Quintana Roo T	16	14	20	64	23	12	8	30
San Luis Potosí	1,587	2,811	260	958	1,828	1,001	583	397
Sinaloa	1,508	200	176	63	2,778	329	185	165
Sonora	200	187	198	107	1,555	214	353	168
Tabasco	34	71	51	76	172	95	82	145
Tamaulipas	398	1,129	130	231	952	363	228	323
Tlaxcala	36	93	108	2,554	140	1,148	70	232
Veracruz	353	964	683	1,993	1,455	1,656	600	1,387
Yucatán	58	1,268	119	72	242	191	86	126
Zacatecas	26,403	1,527	725	347	15,947	921	493	368
Total In-Mig.	68,826	55,819	28,533	35,318	92,006	70,319	54,992	64,825
Int'l. Mig.	3,242	3,004	679	841	4,913	1,534	2,298	963
Unknown	0	0	0	0	0	0	0	0
Total State Pop.	629,874	1,328,712	919,386	850,394	1,746,777	1,392,623	1,422,717	272,842
Percent State Pop.	11	4	3	4	5	5	4	24

Table 1 : Nayarit - Sinaloa. State of Residence, 1950

State of Birth	Nayarit	Nuevo León	Oaxaca	Puebla	Querétaro	Quintana Roo T	San Luis Potosí	Sinaloa
Aguascalientes	206	1,991	103	421	112	6	2,649	346
Baja California	238	222	78	91	19	1	43	730
Baja California T	82	50	27	23	5	2	17	216
Campeche	11	85	94	131	48	344	67	28
Coahuila	114	35,075	190	568	164	18	2,213	333
Colima	256	179	85	123	46	9	93	354
Chiapas	77	149	1,299	618	35	175	126	107
Chihuahua	108	1,912	594	405	84	6	433	5,633
Federal District	609	3,871	1,201	5,179	881	111	1,850	962
Durango	855	4,360	215	402	84	11	681	10,805
Guanajuato	734	7,922	760	2,516	7,068	40	10,668	949
Guerrero	142	270	2,043	3,108	87	14	199	198
Hidalgo	280	940	566	6,299	1,005	31	3,961	162
Jalisco	29,752	5,248	979	2,338	636	84	4,950	5,535
México	884	3,611	3,176	9,609	1,612	17	2,611	1,860
Michoacán	1,120	2,734	2,061	1,907	978	38	1,214	1,599
Morelos	118	289	173	2,695	77	6	126	93
Nayarit	243,685	359	64	131	41	5	103	5,699
Nuevo León	139	596,044	138	561	86	13	3,182	234
Oaxaca	180	477	1,376,674	13,816	185	155	384	235
Puebla	120	818	7,730	1,530,435	273	43	1,352	226
Querétaro	114	481	213	726	270,214	22	7,418	314
Quintana Roo T.	2	10	166	165	3	18,068	66	20
San Luis Potosí	166	38,382	918	1,128	782	36	790,536	602
Sinaloa	5,627	301	130	198	53	4	193	592,209
Sonora	470	330	116	266	53	17	123	3,244
Tabasco	24	96	296	305	48	254	134	67
Tamaulipas	143	13,208	169	647	134	34	6,017	364
Tlaxcala	40	321	203	18,149	47	6	109	43
Veracrua	245	1,772	19,849	18,848	268	413	4,449	335
Yucatán	43	272	124	488	674	4,734	106	95
Zacatecas	3,180	10,203	197	605	179	23	8,213	681
Total In-Mig.	46,079	135,938	43,957	92,466	15,765	6,672	63,750	42,069
Int'l Mig.	360	8,209	682	2,929	259	2,227	1,780	1,043
Unknown	0	0	0	0	0	0	0	0
Total State Pop.	290,124	740,191	1,421,313	1,625,830	286,238	26,967	856,066	635,321
Percent State Pop.	16	18	3	6	6	25	7	7

Table 1 : Sonora - Zacatecas. State of Residence, 1950

State of Birth	Sonora	Tabasco	Tamaulipas	Tlaxcala	Veracruz	Yucatán	Zacatecas
Aguascalientes	328	16	2,760	34	503	126	6,570
Baja California	2,958	8	196	10	128	6	120
Baja California T	1,584	1	50	2	63	11	35
Campeche	41	1,242	281	14	1,690	3,711	18
Coahuila	600	28	22,216	55	1,028	24	2,391
Colima	467	13	590	16	316	12	63
Chiapas	200	4,363	511	59	2,492	129	30
Chihuahua	7,638	30	1,917	60	539	22	619
Federal District	1,503	389	5,531	830	7,029	419	626
Durango	2,321	35	5,533	40	607	31	3,744
Guanajuato	2,140	103	19,289	375	4,670	262	1,347
Guerrero	249	39	592	110	1,938	18	91
Hidalgo	289	84	2,531	2,758	10,149	77	159
Jalisco	7,432	205	13,119	263	4,927	220	11,434
México	1,205	534	3,747	2,122	8,201	442	2,579
Michoacán	2,581	135	6,682	239	4,023	134	484
Morelos	111	36	405	95	1,386	14	45
Nayarit	3,466	22	343	37	266	18	106
Nuevo León	287	70	57,148	78	1,045	39	584
Oaxaca	387	329	1,123	360	30,629	119	166
Puebla	361	104	1,576	7,495	48,987	184	165
Querétaro	188	225	2,596	114	1,325	42	144
Quintana Roo T	265	38	87	11	168	451	16
San Luis Potosí	526	381	43,026	148	7,701	127	4,536
Sinaloa	22,347	115	728	19	396	26	65
Sonora	442,671	189	600	331	517	32	65
Tabasco	112	351,425	582	85	10,198	408	70
Tamaulipas	332	82	479,684	116	7,572	98	163
Tlaxcala	192	38	671	267,324	2,663	82	41
Veracruz	686	1,304	18,556	1,061	1,870,520	522	264
Yucatán	144	598	810	41	2,467	507,491	1,014
Zacatecas	1,630	57	8,241	65	920	226	626,049
Total In-Mig.	62,570	10,813	222,037	17,043	164,543	7,992	37,754
Int'l. Mig.	5,366	478	16,446	184	5,168	1,416	1,721
Unknown	0	0	0	0	0	0	0
Total State Pop.	510,607	362,716	718,167	284,551	2,040,231	516,899	665,524
Percent State Pop.	12	3	31	6	8	2	6

Table 1 : Measures of In-, Out-, and Net Migration, 1950

State of Birth	Total Native-born Pop.	Total Out-Mig.	Out-Mig., Percent of Population	Lifetime Net-Mig.*
Aguascalientes	199,462	49,411	25	-12,291
Baja California	88,508	10,119	11	125,807
Baja California T	72,994	15,054	21	-12,315
Campeche	124,164	13,769	11	-2,507
Coahuila	680,233	111,057	16	31,836
Colima	101,341	16,437	16	10,801
Chiapas	904,867	26,231	3	-4,969
Chihuahua	774,008	50,765	7	51,389
Federal District	1,681,912	81,694	5	1,303,343
Durango	673,048	115,242	17	-46,416
Guanajuato	1,592,624	322,735	20	-266,916
Guerrero	952,785	62,611	7	-34,078
Hidalgo	979,789	165,554	17	-130,236
Jalisco	1,976,493	326,635	17	-234,629
México	1,734,098	413,328	24	-343,009
Michoacán	1,601,782	236,355	15	-181,363
Morelos	235,186	28,132	12	36,693
Nayarit	271,488	27,803	10	18,276
Nuevo León	690,186	94,142	14	41,796
Oaxaca	1,494,026	117,352	8	-73,395
Puebla	1,704,138	173,703	10	-81,237
Querétaro	355,009	84,795	24	-69,230
Quintana Roo T	20,645	2,577	12	4,095
San Luis Potosí	947,552	157,016	17	-93,266
Sinaloa	654,651	62,442	10	-20,373
Sonora	482,849	40,178	8	22,392
Tabasco	384,168	32,743	9	-21,930
Tamaulipas	532,562	52,878	10	169,159
Tlaxcala	319,377	52,053	16	-35,010
Veracruz	2,029,175	158,655	8	5,888
Yucatán	541,153	33,662	6	-25,670
Zacatecas	796,638	170,589	21	-132,835

*Total intercensal net-migration figures are not available for 1950 because out-migration figures which would be used in the calculation were not available for 1940. Therefore, the state populations of 10 years or older, a figure used in survival ratios for the intercensal net migration formula, were likewise not calculated.

Table 2 : Aguascalientes - Federal District. State of Residence, 1960

State of Birth	Aguascalientes	Baja Calif.	Baja Calif. T	Campeche	Coahuila	Colima	Chiapas	Chihuahua	Fed. Dist.
Aguascalientes	199,034	3,324	122	374	6,779	224	779	8,669	21,743
Baja California	265	196,426	1,858	137	890	306	592	1,417	6,494
Baja California T	230	1,2747	69,699	203	817	322	1,679	1,007	4,358
Campeche	196	411	33	146,383	816	703	1,695	597	7,709
Coahuila	963	3,651	404	316	743,606	608	872	26,119	24,274
Colima	68	3,988	125	77	572	119,208	322	793	10,479
Chiapas	225	1,718	100	1,639	2,738	224	1,153,840	1,828	35,062
Chihuahua	557	6,278	241	34	6,373	614	1,715	997,654	18,940
Federal District	646	9,438	513	331	3,230	547	1,595	6,931	2,830,267
Durango	895	1,2796	424	41	36,728	216	343	61,005	19,738
Guanajuato	2,452	21,786	827	152	6,386	455	534	9,625	239,224
Guerrero	160	1,365	54	48	396	402	392	966	46,552
Hidalgo	328	1,172	68	60	536	126	265	910	169,850
Jalisco	14,200	66,846	1,290	222	9,033	25,567	525	12,765	124,865
México	976	4,366	208	301	2,350	627	712	2,628	326,455
Michoacán	525	29,769	1,203	167	1,969	9,085	1,038	3,176	204,649
Morelos	55	544	26	23	203	76	235	292	23,031
Nayarit	81	10,907	167	15	225	273	64	821	5,941
Nuevo León	293	1,235	119	27	13,360	181	103	1,956	22,935
Oaxaca	166	1,824	140	234	612	310	6,442	1,050	98,508
Puebla	214	1,375	65	102	632	163	586	1,065	316,507
Querétaro	178	790	121	59	467	87	94	457	63,963
Quintana Roo T	4	161	26	586	41	11	34	50	1,618
San Luis Potosí	1,849	1,813	74	95	14,498	186	165	3,835	37,805
Sinaloa	1,831	36,665	788	18	987	296	131	1,607	10,383
Sonora	132	30,686	661	27	415	142	88	3,593	8,826
Tabasco	58	228	13	5,922	147	46	8,415	167	10,987
Tamaulipas	303	1,427	117	100	3,702	258	265	1,728	22,370
Tlaxcala	22	203	18	13	104	24	116	174	47,229
Veracruz	350	2,118	194	1,240	1,194	505	2,115	1,609	109,581
Yucatán	73	674	46	8,290	338	54	300	403	23,657
Zacatecas	13,646	18,705	209	116	30,700	336	240	34,241	29,985
Total In-Mig.	41,941	289,010	10,254	20,969	147,238	42,974	32,451	191,484	1,913,718
Int'l. Mig.	956	15,417	343	430	8,370	501	7,125	23,117	83,076
Unknown	1,432	19,312	1,298	437	8,520	1,767	17,454	14,538	43,815
Total State Pop.	243,363	520,165	81,594	168,219	907,734	164,450	1,210,870	226,793	4,870,876
Percent State Pop.	17	56	13	12	16	26	3	16	39

Table 2 : Durango - Morelos. State of Residence, 1960

State of Birth	Durango	Guanajuato	Guerrero	Hidalgo	Jalisco	México	Michoacán	Morelos
Aguascalientes	2,940	9,805	389	676	6,154	2,158	771	348
Baja California	350	515	1,480	70	2,214	418	553	152
Baja California T	141	286	39	1,198	273	324	116	24
Campeche	64	371	66	108	6,188	242	106	54
Coahuila	14,981	1,029	167	446	2,400	7,185	612	394
Colima	87	182	261	71	6,263	454	3,165	136
Chiapas	441	604	662	1,207	1,056	8,769	540	1,292
Chihuahua	6,332	738	229	318	1,762	829	272	300
Federal District	1,661	7,482	3,876	7,842	11,655	73,682	4,347	6,929
Durango	679,698	6,762	3,200	2,680	4,319	4,235	2,863	835
Guanajuato	2,777	1,622,899	2,473	4,151	15,147	28,176	15,952	4,349
Guerrero	1,051	2,076	1,142,405	1,570	2,052	4,540	3,537	34,052
Hidalgo	685	3,513	12,85	928,932	2,437	20,173	1,636	2,515
Jalisco	4,988	26,904	1,698	1,791	2,244,341	10,676	19,716	3,054
México	1,547	4,259	5,529	8,259	7,994	1,638,449	7,744	20,528
Michoacán	1,080	13,791	5,393	1,980	37,527	25,106	772,433	6,694
Morelos	169	702	1,598	449	1,460	2,439	666	283,002
Nayarit	379	462	211	114	10,799	906	374	578
Nuevo León	1,080	1,001	404	583	2,277	2,876	1,337	413
Oaxaca	799	604	4,256	884	1,454	6,396	627	3,078
Puebla	349	1,880	1,273	7,128	4,075	13,025	784	8,472
Querétaro	337	3,852	2,577	4,533	1,606	10,883	679	746
Quintana Roo T	36	105	60	652	124	55	31	19
San Luis Potosí	1,549	4,813	432	1,661	5,788	3,645	848	534
Sinaloa	1,548	334	425	260	5,482	1,268	264	205
Sonora	358	354	184	148	2,887	1,007	1,427	235
Tabasco	39	206	88	121	496	358	101	330
Tamaulipas	548	3,660	231	399	2,148	1,226	471	409
Tlaxcala	52	218	126	3,515	434	4,787	128	368
Veracruz	837	1,832	1,246	3,999	3,068	5,609	1,212	2,188
Yucatán	163	1,153	235	491	682	617	437	185
Zacatecas	23,138	2,789	579	560	34,295	3,044	759	499
Total In-Mig.	70,506	102,282	40,672	57,864	184,516	245,108	72,075	99,915
Int'l. Mig.	2,857	5,257	1,543	1,978	6,689	4,189	2,184	1,560
Unknown	7,775	5,052	2,096	5,824	7,715	10,105	5,184	1,787
Total State Pop.	760,836	1,735,490	1,186,716	994,598	2,443,261	1,897,851	851,876	386,264
Percent State Pop.	8	6	3	6	8	13	4	26

Table 2 : Nayarit - Sinaloa. State of Residence, 1960

State of Birth	Nayarit	Nuevo León	Oaxaca	Puebla	Querétaro	Quintana Roo T	San Luis Potosí	Sinaloa
Aguascalientes	323	2,898	156	2,325	175	71	2,091	575
Baja California	579	474	255	596	312	16	227	1,826
Baja California T	55	83	49	75	7	27	36	104
Campeche	101	451	400	159	15	498	985	147
Coahuila	193	61,061	206	722	183	19	2,146	2,246
Colima	298	321	141	184	57	25	92	616
Chiapas	61	289	2,370	845	52	73	167	210
Chihuahua	726	2,926	220	544	129	10	609	6,609
Federal District	671	8,392	1,832	7,374	1,739	309	2,098	2,040
Durango	2,058	11,722	709	1,031	178	25	839	17,278
Guanajuato	1,322	11,514	1,170	4,148	8,138	320	9,895	3,139
Guerrero	233	789	1,812	3,796	291	53	472	491
Hidalgo	432	1,449	631	6,620	1,087	59	5,605	377
Jalisco	35,243	8,259	1,103	2,393	991	123	4,989	8,949
México	759	3,869	2,053	7,537	1,922	119	1,863	2,634
Michoacán	2,421	5,452	1,945	2,574	1,129	119	1,435	3,726
Morelos	210	418	301	2,742	111	82	188	153
Nayarit	326,698	840	74	176	50	10	138	8,196
Nuevo León	504	814,120	486	749	115	90	3,356	670
Oaxaca	207	1,095	1,670,631	17,552	335	172	1,486	1,318
Puebla	289	1,621	5,562	1,851,745	712	149	1,149	545
Querétaro	113	1,389	832	4,218	333,875	79	9,495	717
Quintana Roo T	29	85	1,161	975	157	28,661	290	334
San Luis Potosí	303	67,088	690	1,424	989	110	72,893	1,395
Sinaloa	6,053	1,016	382	723	129	33	466	760,661
Sonora	792	718	356	559	98	42	217	5,912
Tabasco	81	366	520	573	44	216	274	202
Tamaulipas	451	28,322	361	1,140	240	43	7,047	1,303
Tlaxcala	32	1,206	363	16,783	132	54	325	159
Veracruz	307	3,614	22,822	22,957	369	538	5,673	706
Yucatán	48	584	411	1,609	59	15,873	170	146
Zacatecas	5,984	22,959	302	1,540	430	44	8,026	1,956
Total In-Mig.	60,878	251,270	49,675	114,643	20,375	19,401	71,849	74,679
Int'l. Mig.	558	10,207	1,738	5,248	601	1,852	2,159	1,541
Unknown	1,795	3,251	5,222	2,201	194	255	1,396	1,523
Total State Pop.	389,929	1,078,848	1,727,266	1,973,837	355,045	50,169	1,048,297	838,404
Percent State Pop.	16	23	3	6	6	39	7	9

Table 2 : Sonora - Zacatecas. State of Residence, 1960

State of Birth	Sonora	Tabasco	Tamaulipas	Tlaxcala	Veracruz	Yucatán	Zacatecas
Aguascalientes	876	40	3,272	25	841	1,045	4,330
Baja California	8,597	71	779	88	447	22	1,403
Baja California T	916	31	107	8	897	115	332
Campeche	344	1,523	571	43	2,733	2,650	124
Coahuila	2,014	59	28,209	60	1,784	57	2,489
Colima	1,547	37	605	14	641	46	52
Chiapas	355	5,587	637	79	5,976	148	27
Chihuahua	13,504	90	3,453	50	831	43	822
Federal District	3,219	535	7,066	1,718	12,913	613	628
Durango	6,464	75	8,611	71	1,909	257	3,881
Guanajuato	5,352	156	24,530	321	6,201	1,072	1,171
Guerrero	855	217	1,211	219	4,615	78	299
Hidalgo	548	192	3,656	1,976	17,984	127	200
Jalisco	16,422	419	16,141	312	7,992	299	10,429
México	1,726	341	4,099	1,848	10,133	273	525
Michoacán	6,627	260	9,283	214	6,972	198	609
Morelos	302	316	1,228	107	2,161	52	105
Nayarit	7,969	46	895	50	461	32	195
Nuevo León	644	71	67,852	201	1,909	55	641
Oaxaca	2,164	1,284	3,386	955	52,927	325	335
Puebla	1,232	352	1,988	7,461	66,230	485	314
Querétaro	685	300	4,432	658	1,775	226	1,314
Quintana Roo T	487	137	290	137	559	576	103
San Luis Potosí	1,290	612	54,820	326	10,819	127	3,963
Sinaloa	46,454	92	1,346	51	1,211	68	158
Sonora	634,919	139	849	679	951	567	247
Tabasco	223	475,200	977	1,882	19,553	466	54
Tamaulipas	1,199	368	715,814	214	14,387	64	388
Tlaxcala	527	190	869	324,572	3,802	15	44
Veracruz	1,233	3,804	24,537	1,024	2,444,620	1,103	592
Yucatán	1,034	1,298	1,102	39	5,477	600,008	327
Zacatecas	4,908	186	11,514	60	2,278	526	776,879
Total In-Mig.	319,717	18,828	288,315	20,890	267,369	11,730	36,101
Int'l. Mig.	6,147	1,157	16,989	628	6,268	1,026	1,757
Unknown	2,595	1,155	3,064	609	9,642	1,285	3,094
Total State Pop.	783,378	496,340	1,024,182	346,699	2,727,899	614,049	817,831
Percent State Pop.	18	4	28	6	10	2	4

Table 2 : Measures of In-, Out-, and Net Migration, 1960

State of Birth	Total Native-born Pop.	Total Out-Mig.	Out-Mig., Percent of Population	Population 10+ Years	Total Intercensal Net-Mig.	Lifetime Net-Mig.
Aguascalientes	283,332	84,298	30	164,742	-31,591	-42,357
Baja California	229,829	33,403	15	344,505	64,647	255,607
Baja California T	96,305	26,606	28	54,993	-5,225	-16,352
Campeche	176,486	30,103	17	114,594	-6,781	-9,134
Coahuila	929,475	185,869	20	624,300	-66,212	-38,631
Colima	150,927	31,719	21	111,083	573	11,255
Chiapas	1,228,821	74,981	6	808,649	-38,100	-42,530
Chihuahua	1,073,752	76,098	7	835,091	64,684	115,386
Federal District	3,022,119	191,852	6	3,417,831	261,551	1,721,866
Durango	891,886	212,188	24	511,738	-103,972	-141,682
Guanajuato	2,055,814	432,915	21	1,166,156	-96,372	-330,633
Guerrero	1,257,049	114,644	9	803,665	-44,183	-73,972
Hidalgo	1,175,434	246,502	21	675,832	-85,136	-188,368
Jalisco	2,682,545	438,204	16	1,668,520	-29,571	-253,688
México	2,072,633	434,184	21	1,271,868	124,191	-189,076
Michoacán	2,158,549	386,116	18	1,244,412	-155,408	-314,041
Morelos	323,446	40,444	13	263,399	24,048	59,471
Nayarit	378,147	51,449	14	261,943	-7,072	9,429
Nuevo León	941,643	127,523	14	757,182	80,992	123,747
Oaxaca	1,881,556	210,925	11	1,198,777	-99,347	-161,250
Puebla	2,117,529	265,784	13	1,349,862	-83,693	-151,141
Queretaro	451,537	117,662	26	1,239,345	-39,566	-97,287
Quintana Roo T	37,594	8,833	24	32,692	5,504	10,468
San Luis Potosi	1,196,439	223,546	19	706,871	-74,685	-151,141
Sinaloa	881,335	120,674	14	564,559	-27,891	-45,995
Sonora	698,215	63,296	9	529,188	53,214	76,421
Tabasco	528,353	53,153	10	322,694	-14,815	-34,325
Tamaulipas	810,703	94,889	12	706,593	26,993	193,426
Tlaxcala	406,604	82,032	20	234,540	-32,285	-61,142
Veracruz	2,672,796	228,176	9	1,865,953	33,808	39,193
Yucatán	665,983	65,875	10	435,034	-32,641	-54,245
Zacatecas	1,031,433	254,550	25	542,727	-110,128	-218,453

Table 3 : Aguascalientes - Federal District. State of Residence, 1970

State of Birth	Aguascalientes	Baja Calif.	Baja Calif. T	Campeche	Coahuila	Colima	Chiapas	Chihuahua	Fed. Dist.
Aguascalientes	279,478	3,940	175	76	3,642	175	146	5,919	21,241
Baja California	236	511,608	2,090	237	312	580	78	762	6,878
Baja California T	30	9,394	106,128	25	62	47	18	74	828
Campeche	38	266	22	208,861	131	42	556	107	7,597
Coahuila	1,385	5,081	891	528	971,612	260	363	24,952	25,367
Colima	95	4,955	279	52	154	176,068	71	244	5,529
Chiapas	110	745	72	3,161	246	142	1,530,730	341	36,513
Chihuahua	1,176	9,303	820	112	7,894	175	289	1,429,672	20,883
Federal District	1,280	13,314	874	789	3,668	1,034	2,179	4,713	4,538,283
Durango	1,239	17,419	1,774	638	34,926	392	489	57,144	22,805
Guanajuato	2,802	23,432	1,725	1,257	4,998	972	561	7,290	250,520
Guerrero	220	2,094	223	203	445	797	924	786	92,488
Hidalgo	301	1,401	117	116	534	165	329	620	198,469
Jalisco	18,658	81,023	2,389	423	6,774	37,759	638	9,622	129,753
México	1,196	4,777	413	457	1,395	638	982	2,294	313,367
Michoacán	683	38,270	2,603	1,800	2,022	16,242	1,544	2,499	270,409
Morelos	172	1,474	84	117	246	181	174	439	31,746
Nayarit	162	15,580	434	74	263	517	95	402	7,433
Nuevo León	454	1,772	182	104	16,548	287	205	2,237	16,736
Oaxaca	387	2,101	278	996	669	395	9,031	915	158,452
Puebla	384	2,014	185	374	711	233	1,512	876	193,247
Querétaro	236	881	152	77	521	129	146	344	61,372
Quintana Roo T	19	277	16	862	35	24	64	73	1,515
San Luis Potosí	2,850	2,760	172	203	13,270	309	391	2,879	53,599
Sinaloa	215	40,057	2,440	95	768	509	141	2,055	13,935
Sonora	184	32,239	1,508	106	509	263	161	3,452	10,251
Tabasco	74	248	58	12,184	141	59	9,540	148	13,008
Tamaulipas	606	2,437	179	221	5,687	369	283	2,173	27,509
Tlaxcala	67	505	48	23	165	45	144	190	57,572
Veracruz	763	2,923	321	2,577	1,343	669	3,704	1,466	144,935
Yucatán	121	869	74	13,763	314	78	538	400	27,223
Zacatecas	21,540	23,576	961	617	29,025	1,171	245	29,256	47,937
Total In-Mig.	57,683	345,127	21,559	42,267	137,418	64,658	35,541	164,672	2,269,117
Int'l. Mig.	867	13,563	317	330	5,830	291	2,752	18,017	66,413
Unknown	114	123	15	98	96	136	30	164	352
Total State Pop.	338,142	870,421	128,019	251,556	1,114,956	241,153	1,569,053	1,612,525	6,874,165
Percent State Pop.	17	40	17	17	12	27	2	10	33

Table 3 : Durango - Morelos. State of Residence, 1970

State of Birth	Durango	Guanajuato	Guerrero	Hidalgo	Jalisco	México	Michoacán	Morelos
Aguascalientes	1,928	3,242	174	291	13,546	6,772	507	331
Baja California	407	1,233	244	114	7,703	1,598	1,333	229
Baja California T	56	73	40	13	386	398	48	22
Campeche	94	162	207	83	355	1,295	148	115
Coahuila	16,000	2,502	400	411	5,942	5,834	1,073	696
Colima	82	308	390	77	13,192	1,380	1,436	192
Chiapas	115	434	462	258	946	5,534	410	571
Chihuahua	8,215	1,899	506	350	4,793	5,575	606	612
Federal District	1,419	13,302	6,186	9,237	26,110	389,867	7,686	12,323
Durango	874,929	1,868	668	612	6,667	6,249	1,152	683
Guanajuato	1,509	2,140,036	1,144	2,380	23,808	103,324	19,072	5,100
Guerrero	281	1,014	1,543,838	734	2,863	27,292	8,035	66,001
Hidalgo	216	2,346	1,005	1,143,553	2,536	68,970	953	3,342
Jalisco	3,462	32,909	1,710	1,643	2,950,244	36,680	23,136	3,126
México	890	8,260	8,772	9,461	9,114	2,791,244	8,625	28,239
Michoacán	835	19,792	9,267	1,661	66,505	104,358	2,235,043	9,611
Morelos	99	838	3,967	494	1,404	10,163	1,127	450,033
Nayarit	268	511	202	120	23,187	1,301	498	308
Nuevo León	1,025	1,569	382	293	3,888	4,181	522	506
Oaxaca	361	1,087	9,243	969	2,379	51,874	1,019	6,203
Puebla	314	1,943	2,308	6,844	3,884	63,735	1,127	16,789
Querétaro	197	5,931	301	2,806	1,877	26,567	1,572	869
Quintana Roo T	22	38	41	30	174	341	22	44
San Luis Potosí	1,200	7,550	564	1,631	9,020	18,579	1,083	1,091
Sinaloa	2,132	820	402	226	12,407	2,280	644	367
Sonora	428	690	279	140	6,944	2,074	615	295
Tabasco	41	262	161	130	527	1,945	141	250
Tamaulipas	921	6,161	452	553	4,795	5,926	959	685
Tlaxcala	73	344	191	2,926	665	19,039	207	636
Veracruz	560	3,315	2,071	4,439	5,799	32,595	1,830	3,634
Yucatán	152	354	439	190	1,151	4,316	221	345
Zacatecas	19,049	5,389	360	521	72,673	22,525	916	737
Total In-Mig.	62,351	126,146	52,538	49,637	335,240	1,032,567	86,723	163,952
Int'l. Mig.	1,795	3,872	926	580	10,747	8,727	2,379	1,938
Unknown	133	316	58	75	355	647	81	196
Total State Pop.	939,208	2,270,370	1,597,360	1,193,845	3,296,586	3,833,185	2,324,226	616,119
Percent State Pop.	7	6	3	4	10	27	4	27

Table 3 : Nayarit - Sinaloa. State of Residence, 1970

State of Birth	Nayarit	Nuevo León	Oaxaca	Puebla	Queretaro	Quintana Roo T	San Luis Potosí	Sinaloa
Aguascalientes	615	4,515	202	529	307	76	2,381	1,055
Baja California	1,682	675	165	279	115	30	227	5,703
Baja California T	95	116	40	75	28	19	30	497
Campeche	47	282	509	343	50	1,794	83	173
Coahuila	365	92,318	321	1,115	633	64	3,004	2,701
Colima	678	326	185	221	113	22	121	1,482
Chiapas	175	566	4,249	1,995	227	233	222	381
Chihuahua	750	6,530	315	919	593	49	1,066	15,874
Federal District	1,132	9,529	3,329	16,471	5,377	535	3,289	3,180
Durango	2,297	18,491	557	1,101	563	67	1,059	33,585
Guanajuato	2,166	14,768	996	3,343	13,764	222	10,866	7,783
Guerrero	791	686	3,301	5,478	520	211	504	987
Hidalgo	207	1,384	750	9,769	2,450	79	6,353	497
Jalisco	43,853	10,349	1,293	3,274	1,646	219	4,597	14,928
México	686	2,661	2,651	10,452	3,904	124	2,123	1,922
Michoacán	3,892	4,765	2,102	3,411	2,488	333	1,655	9,382
Morelos	583	458	633	4,344	272	79	364	402
Nayarit	461,223	436	152	307	100	36	227	15,409
Nuevo León	192	1,283,242	193	1,023	453	27	5,637	823
Oaxaca	293	1,773	1,959,620	22,006	460	260	819	1,571
Puebla	231	1,938	5,739	2,356,911	898	160	829	739
Querétaro	167	1,143	212	889	444,847	38	8,657	272
Quintana Roo T	30	103	101	135	14	48,875	25	68
San Luis Potosí	561	115,935	463	1,660	2,155	51	1,196,713	1,416
Sinaloa	8,239	1,277	376	507	224	39	438	1,116,016
Sonora	1,597	861	199	520	207	37	250	17,784
Tabasco	175	607	535	742	72	479	110	174
Tamaulipas	273	54,656	438	1,283	700	110	11,543	1,022
Tlaxcala	70	276	287	20,932	161	28	138	208
Veracruz	530	5,190	23,468	33,334	859	854	7,333	1,437
Yucatán	124	761	452	765	146	31,869	159	336
Zacatecas	9,545	46,491	266	844	638	87	9,291	7,006
Total In-Mig.	82,041	399,866	54,479	148,066	40,137	38,231	83,400	148,747
Int'l Mig.	633	11,467	789	3,185	477	1,047	1,736	1,650
Unknown	134	114	536	64	62	47	147	115
Total State Pop.	544,031	1,694,689	2,015,424	2,508,226	485,523	88,200	1,281,996	1,266,528
Percent State Pop.	15	24	3	6	8	43	7	12

Table 3 : Sonora - Zacatecas. State of Residence, 1970

State of Birth	Sonora	Tabasco	Tamaulipas	Tlaxcala	Veracruz	Yucatán	Zacatecas
Aguascalientes	1,046	154	3,286	57	955	98	5,982
Baja California	11,141	137	538	48	571	36	666
Baja California T	1,367	26	129	4	115	18	30
Campeche	199	3,817	582	28	3,595	5,379	116
Coahuila	2,847	218	28,836	69	2,203	111	3,313
Colima	895	66	683	16	659	34	66
Chiapas	476	17,146	973	157	13,323	329	66
Chihuahua	17,469	244	3,774	87	1,313	109	2,233
Federal District	3,893	1,806	8,735	2,563	17,091	1,526	1,186
Durango	9,209	315	9,943	110	1,838	185	6,973
Guanajuato	6,347	441	25,846	454	6,266	259	1,215
Guerrero	1,034	827	1,370	340	7,660	134	255
Hidalgo	551	282	4,033	2,541	23,501	82	178
Jalisco	18,712	821	14,724	324	6,507	305	12,517
México	1,699	1,098	3,499	3,246	11,098	758	798
Michoacán	8,030	1,430	10,122	510	9,807	274	536
Morelos	532	488	725	256	2,607	68	192
Nayarit	9,555	79	622	51	550	44	537
Nuevo León	850	221	64,138	46	2,225	102	849
Oaxaca	1,188	2,625	2,045	736	62,679	717	290
Puebla	855	1,296	2,288	11,240	81,468	296	191
Querétaro	530	70	5,607	159	1,913	69	153
Quintana Roo T	134	257	141	4	557	1,197	13
San Luis Potosí	1,416	344	75,954	143	13,418	212	3,519
Sinaloa	52,073	234	1,364	43	1,186	62	362
Sonora	930,812	125	861	41	875	58	324
Tabasco	202	718,951	973	58	25,234	878	73
Tamaulipas	1,308	715	1,119,520	96	18,138	135	518
Tlaxcala	214	110	915	394,943	3,733	32	40
Veracruz	1,417	10,047	31,894	1,908	3,482,958	1,771	372
Yucatán	387	3,024	1,196	55	5,288	742,111	146
Zacatecas	6,998	187	12,509	103	1,926	92	905,971
Total In-Mig.	162,574	48,650	318,305	25,493	328,299	15,370	43,679
Int'l. Mig.	5,180	508	18,745	183	3,589	869	1,782
Unknown	154	218	288	19	576	5	30
Total State Pop.	1,098,720	768,327	1,456,858	420,638	3,815,422	758,355	951,462
Percent State Pop.	15	6	22	6	9	2	5

Table 3 : Measures of In-, Out-, and Net Migration, 1970

State of Birth	Total Native-born Pop.	Total Out-Mig.	Qut-Mig., Percent of Population	Population 10+ Years	Total Intercensal Net-Mig.	Lifetime Net-Mig.
Aguascalientes	362,791	83,313	23	222,454	13,088	-25,630
Baja California	557,655	46,047	8	582,199	12,990	299,080
Baja California T	120,231	14,103	12	85,034	24,497	7,456
Campeche	237,076	28,215	12	170,838	23,328	14,052
Coahuila	1,201,415	229,803	19	752,083	-60,378	-92,385
Colima	210,071	34,003	16	160,392	19,678	30,655
Chiapas	1,621,308	90,578	6	1,035,871	-18,654	-55,037
Chihuahua	1,544,205	114,533	7	1,077,857	-51,239	50,139
Federal District	5,111,906	573,623	11	4,858,810	-22,107	1,695,494
Durango	1,115,947	241,018	22	610,939	-64,899	-178,667
Guanajuato	2,684,666	544,630	20	1,488,365	-134,931	-418,484
Guerrero	1,772,306	228,468	13	1,047,768	-110,619	-175,930
Hidalgo	1,477,630	334,077	23	794,586	-133,737	-284,440
Jalisco	3,474,018	523,774	15	2,201,969	40,100	-188,534
México	3,236,843	445,599	14	2,474,045	833,448	586,968
Michoacán	2,841,881	606,838	21	1,528,404	-260,928	-520,115
Morelos	514,761	64,728	13	414,049	35,475	99,224
Nayarit	540,683	79,460	15	359,397	-6,110	2,581
Nuevo León	1,410,912	127,670	9	1,150,643	140,214	272,196
Oaxaca	2,303,441	343,821	15	1,363,413	-162,060	-289,342
Puebla	2,761,559	404,648	15	1,695,089	-126,785	-256,582
Querétaro	568,704	123,857	22	316,472	2,997	-83,720
Quintana Roo T	55,251	6,376	12	56,819	19,999	31,855
San Luis Potosí	1,531,111	334,398	22	849,745	-128,033	-250,998
Sinaloa	1,261,933	145,917	12	836,269	48,708	2,830
Sonora	1,014,689	83,877	8	743,893	6,128	78,697
Tabasco	788,180	69,229	9	488,547	13,207	-20,579
Tamaulipas	1,270,371	150,851	12	983,536	-18,296	167,454
Tlaxcala	504,927	109,984	22	279,136	-35,264	-84,491
Veracruz	3,816,316	333,358	9	2,566,726	-41,936	-5,059
Yucatán	837,367	95,256	11	531,085	-32,970	-79,886
Zacatecas	1,278,452	372,481	29	603,379	-167,632	-328,802

A P P E N D I X B

Figure 1: United States of Mexico. Distribution of Labor Force, 1960-70

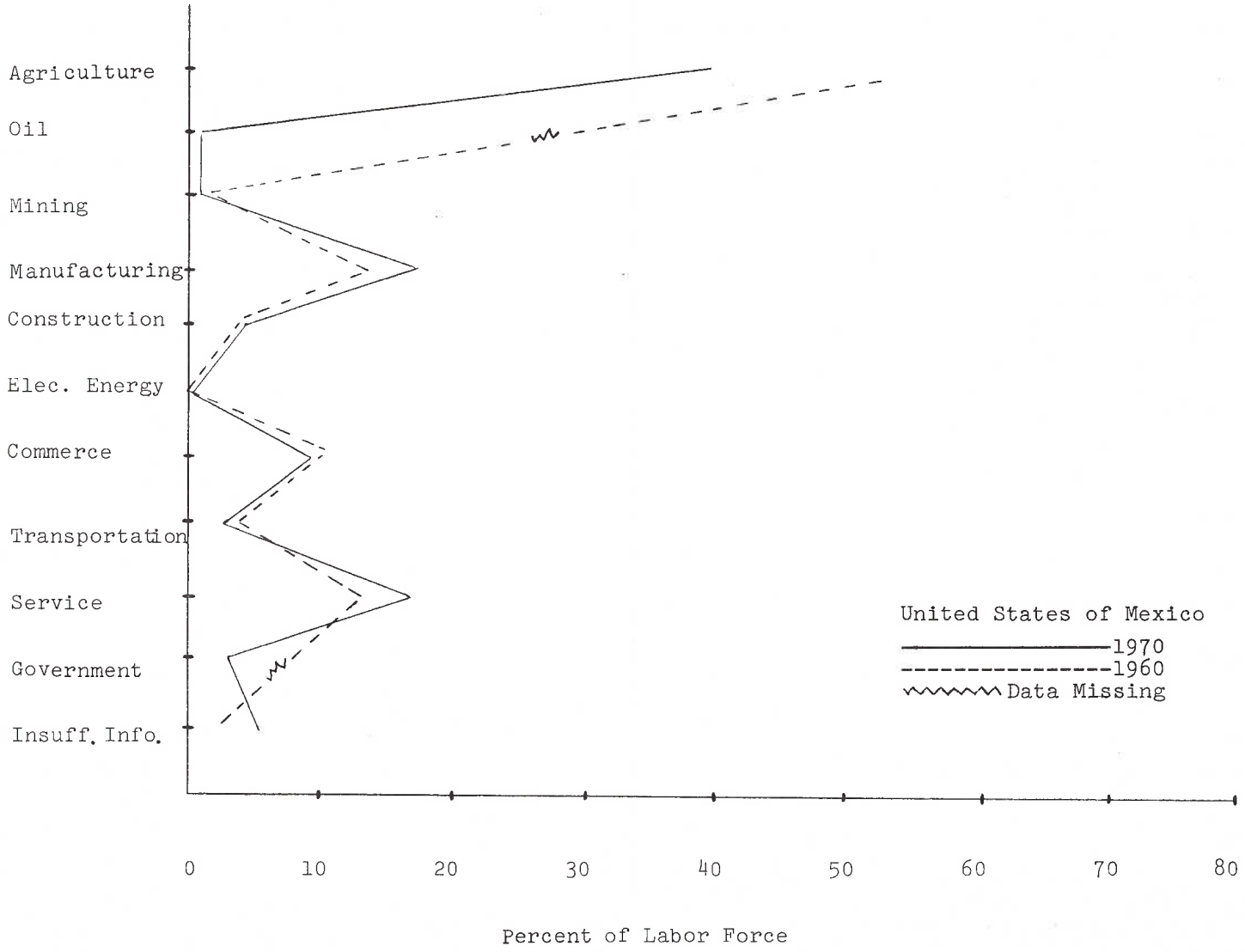


Figure 2: Aguascalientes. Distribution of Labor Force, 1960-70

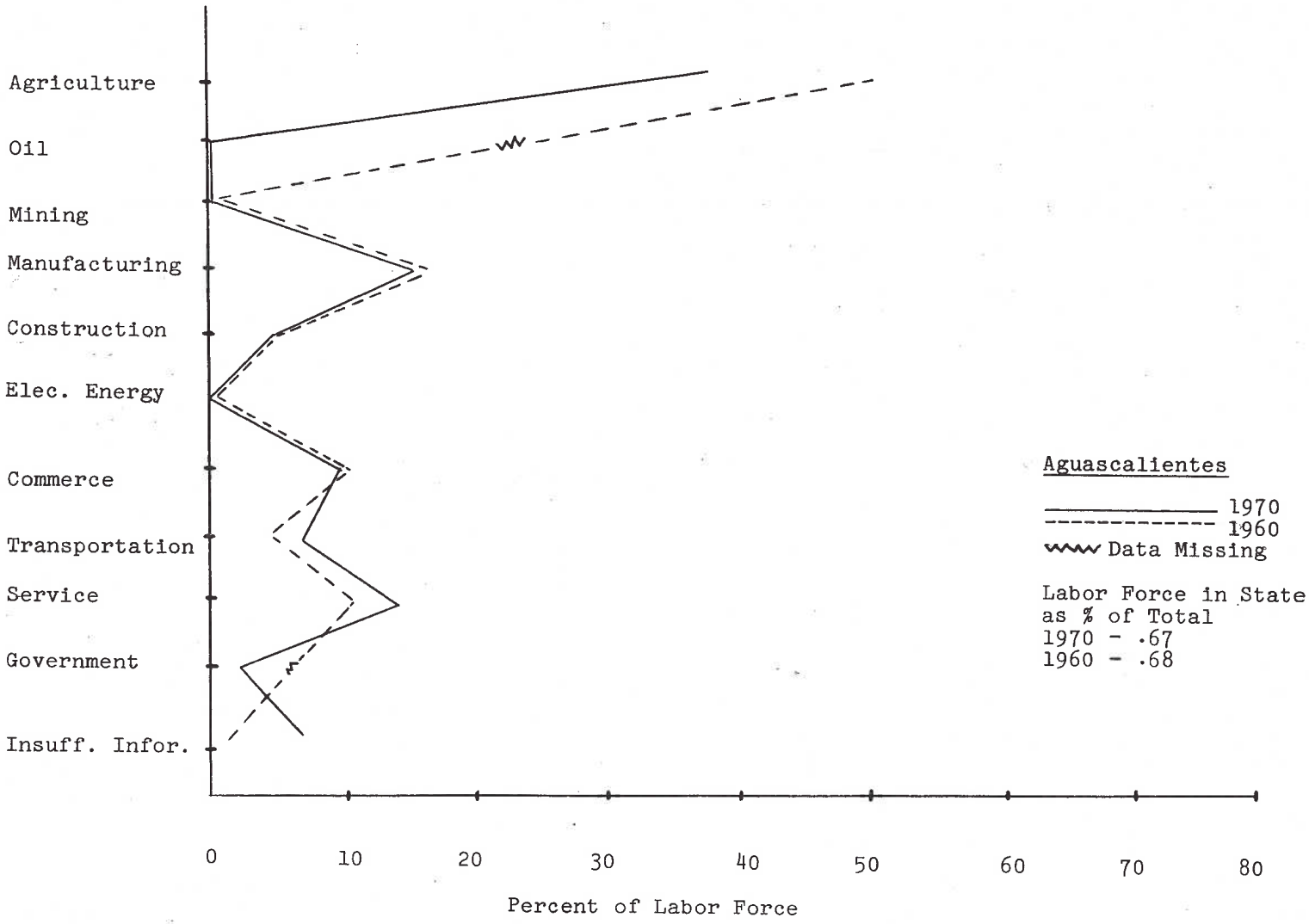


Figure 3: Baja California. Distribution of Labor Force, 1960-70

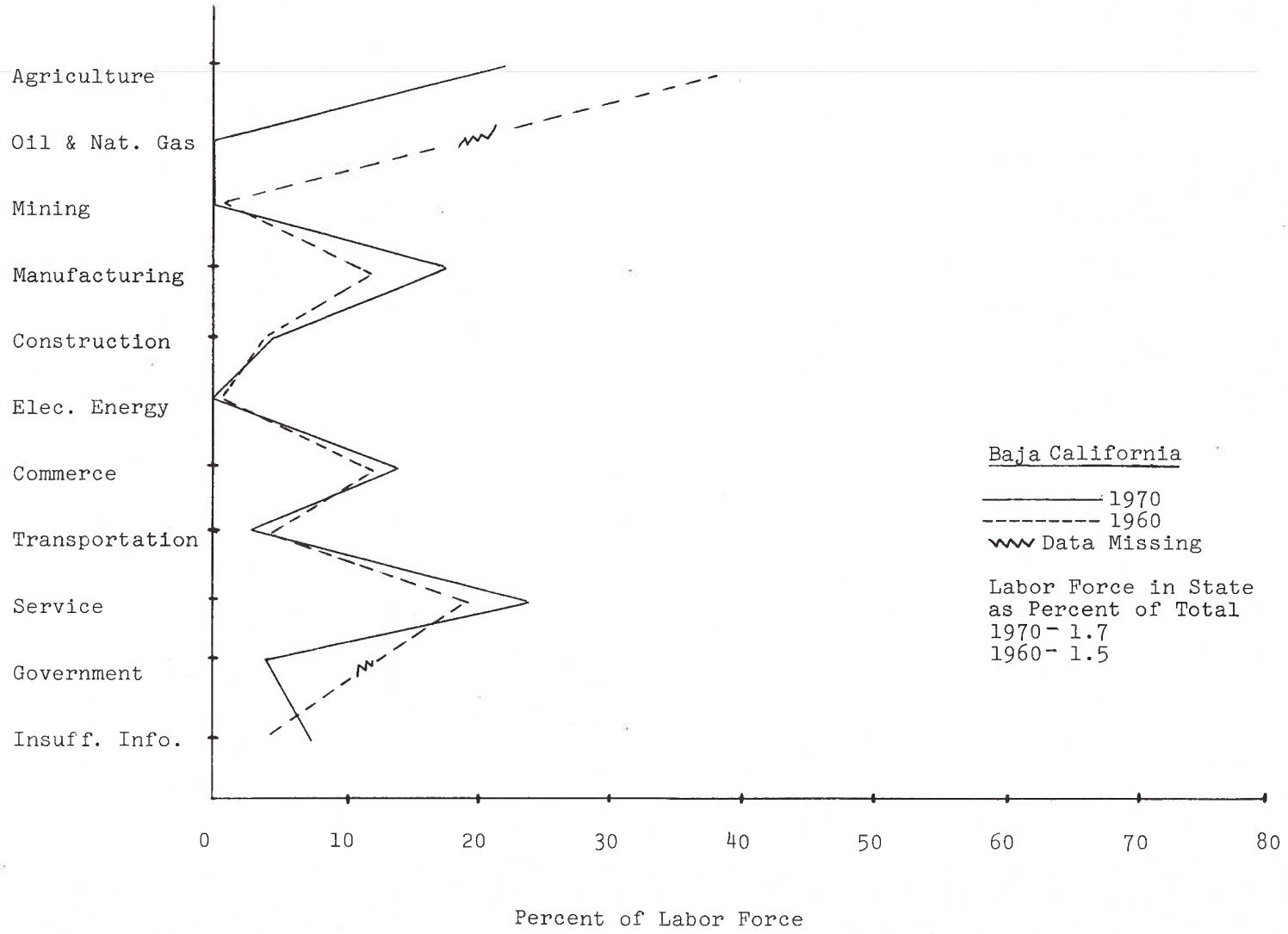


Figure 4: Baja California T. Distribution of Labor Force, 1960-70

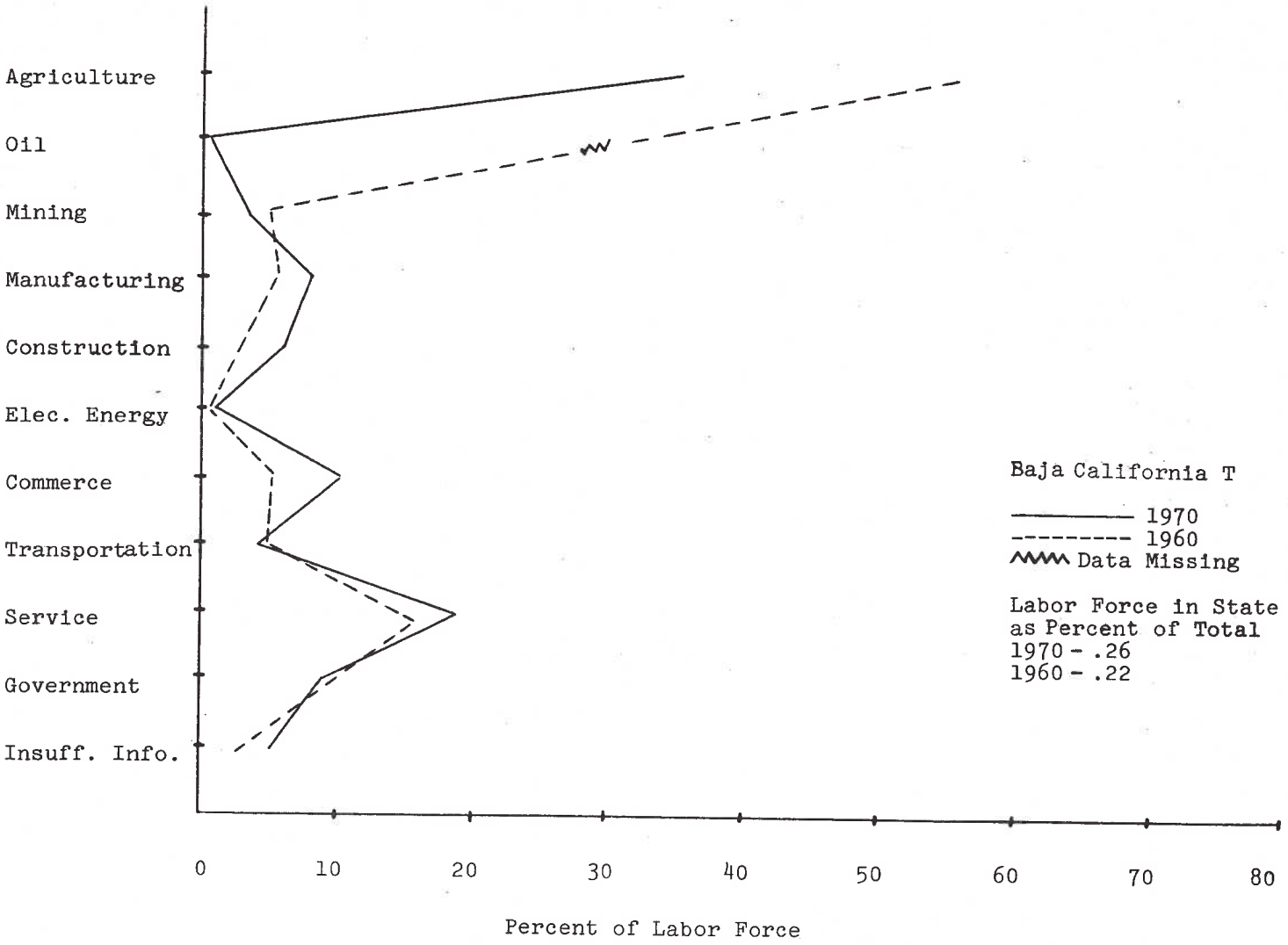


Figure 5: Campeche. Distribution of Labor Force, 1960-70

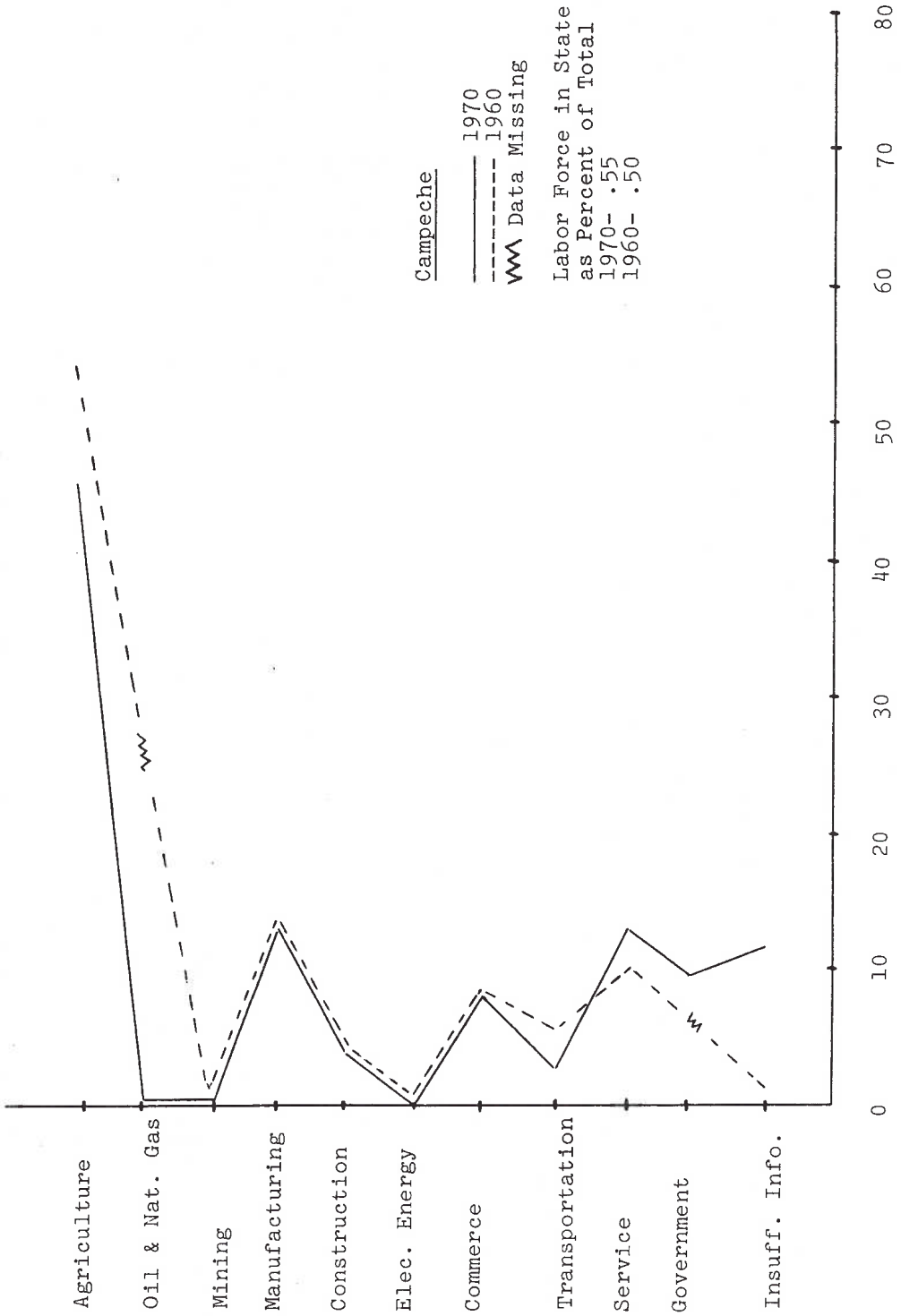


Figure 6: Coahuila. Distribution of Labor Force, 1960-70

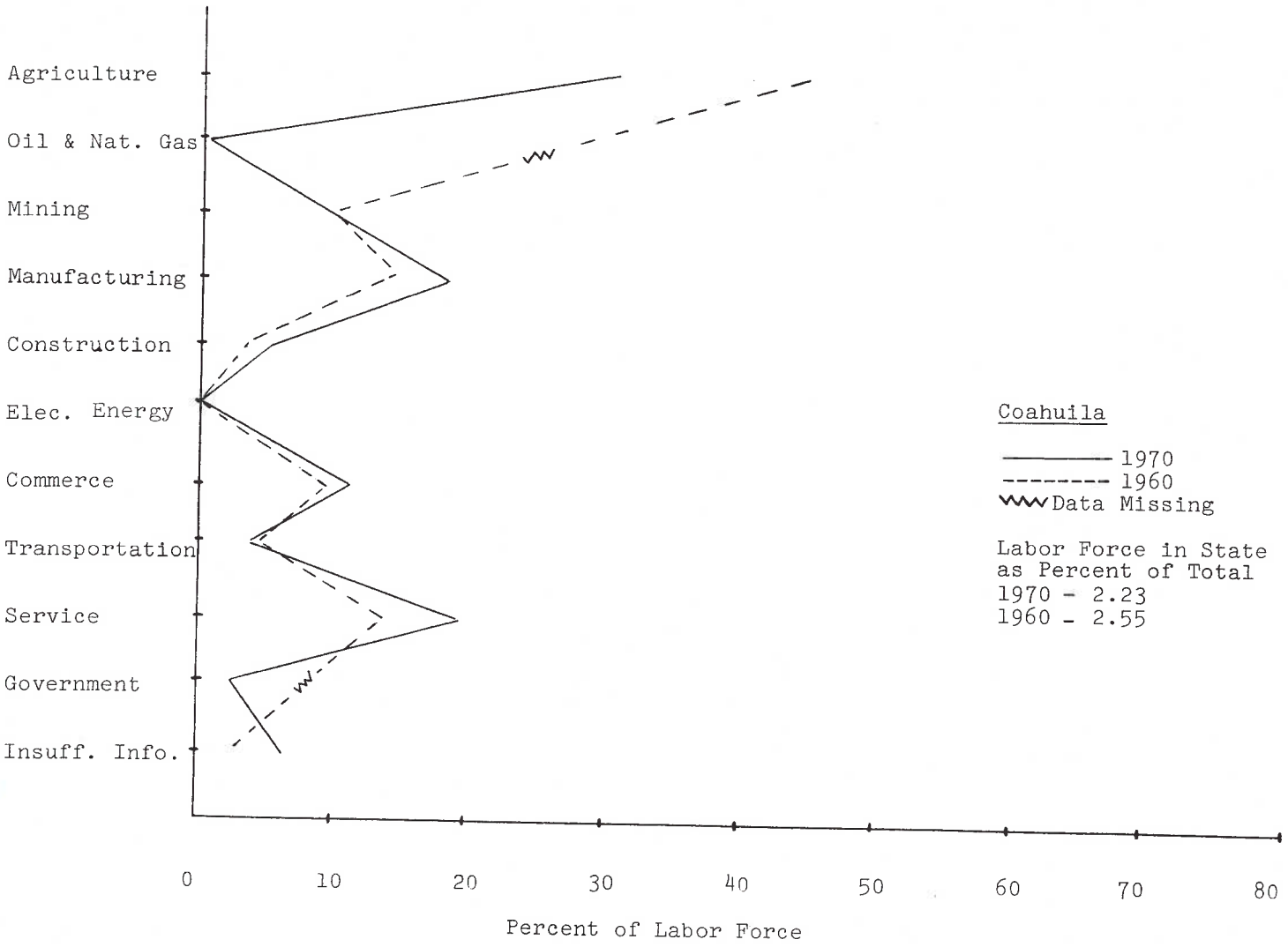


Figure 7: Colima. Distribution of Labor Force, 1960-70

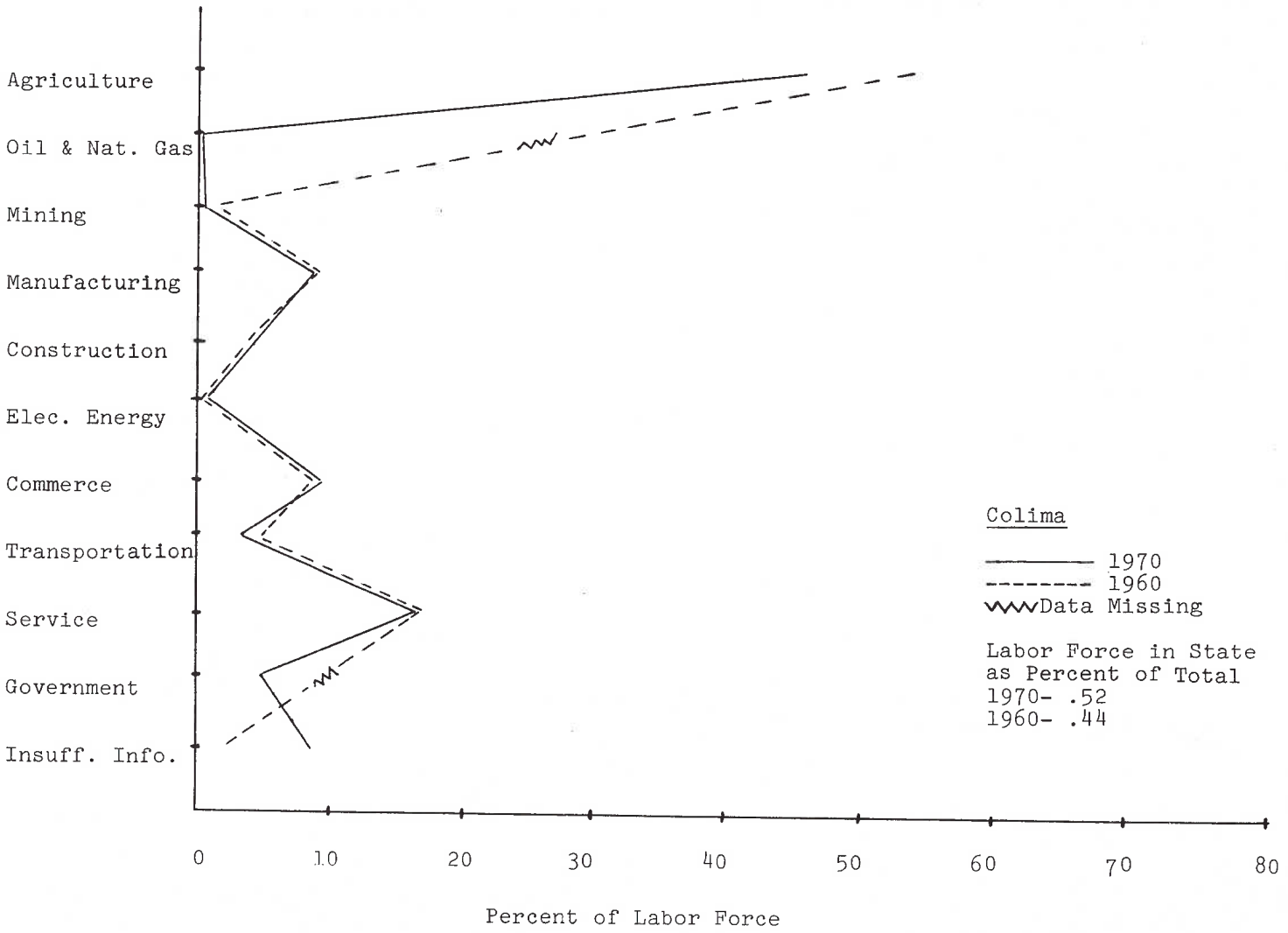


Figure 8: Chiapas. Distribution of Labor Force, 1960-70

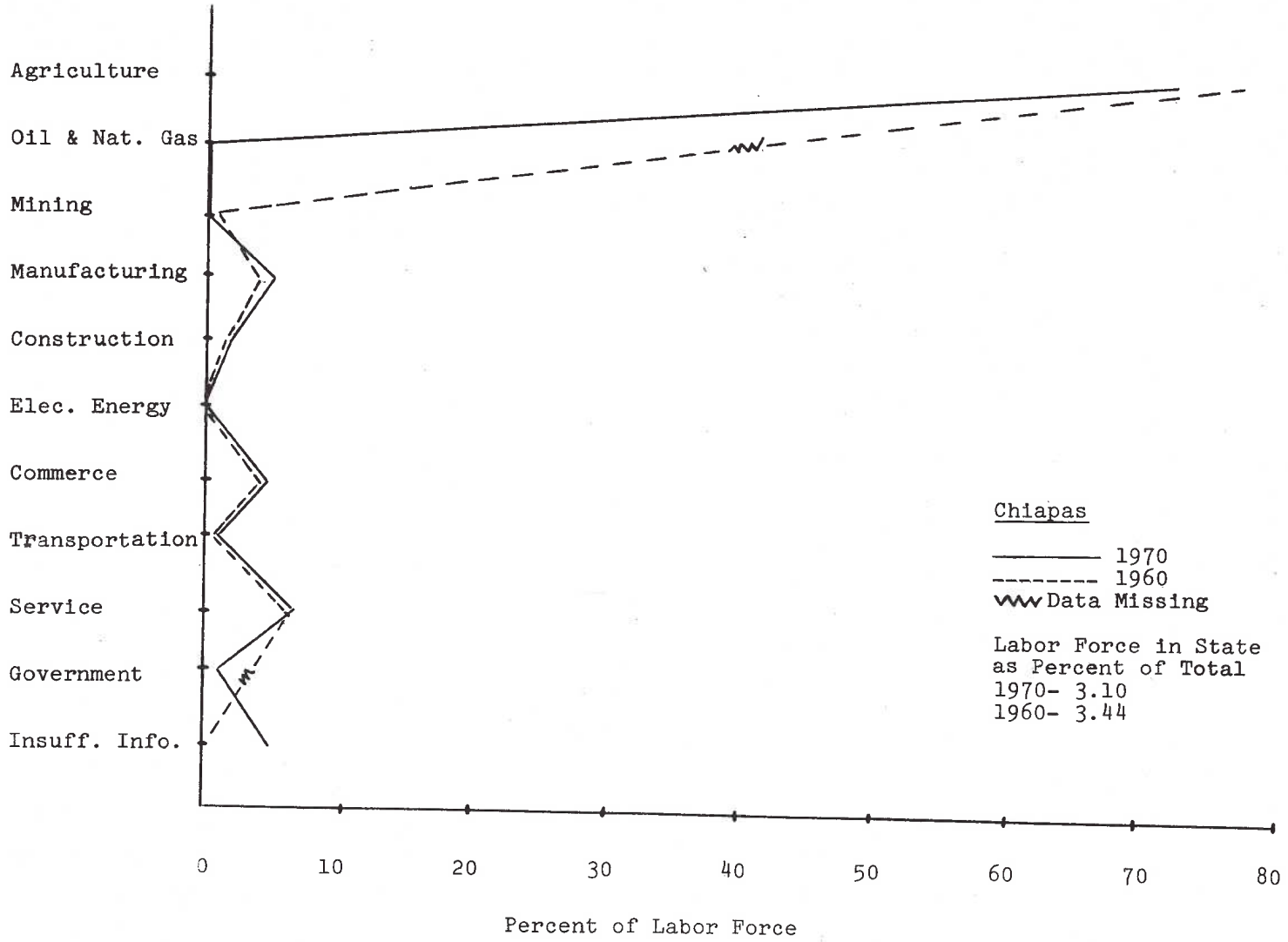


Figure 9: Chihuahua. Distribution of Labor Force, 1960-70

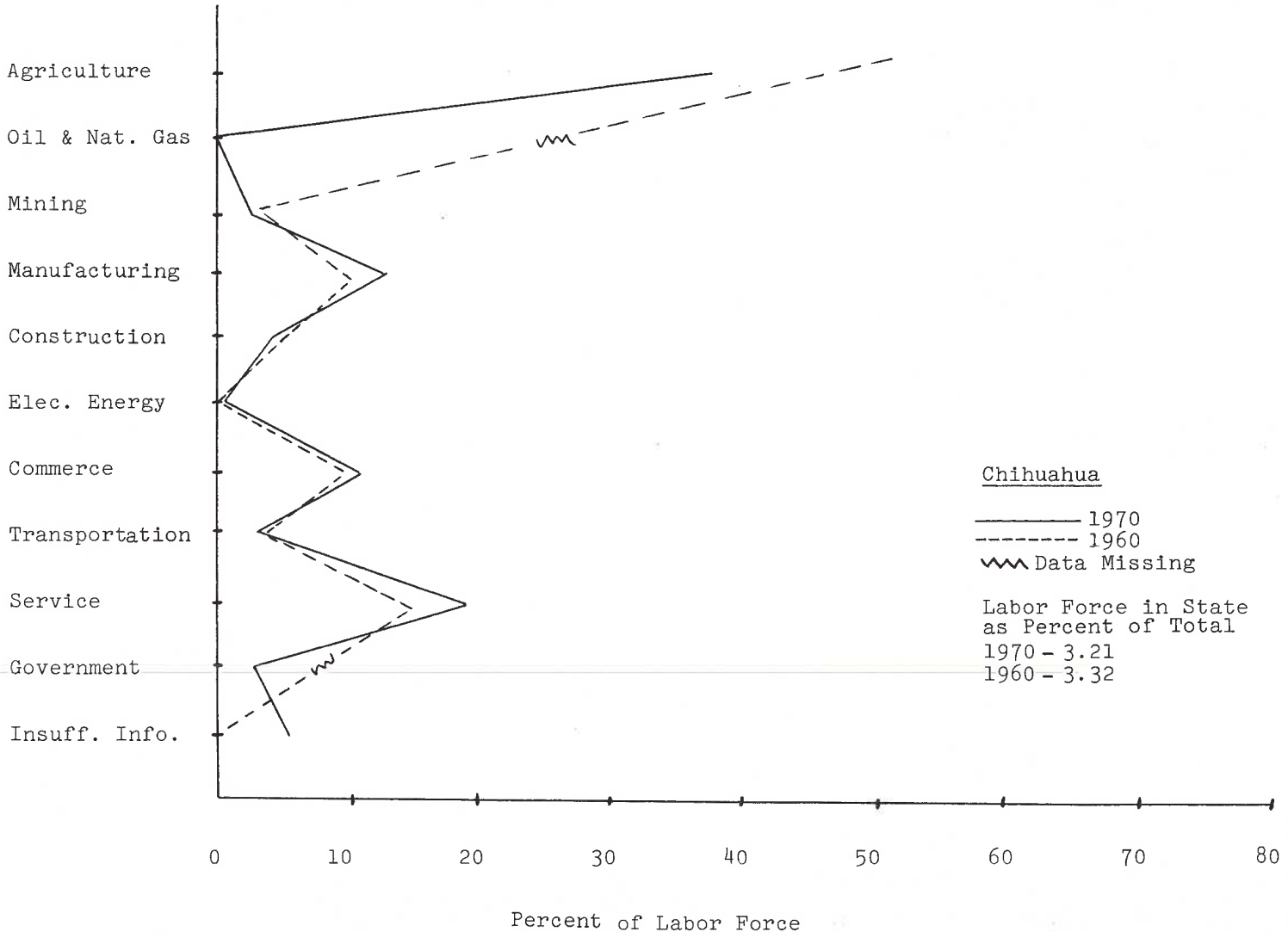


Figure 10: Durango. Distribution of Labor Force, 1960-70

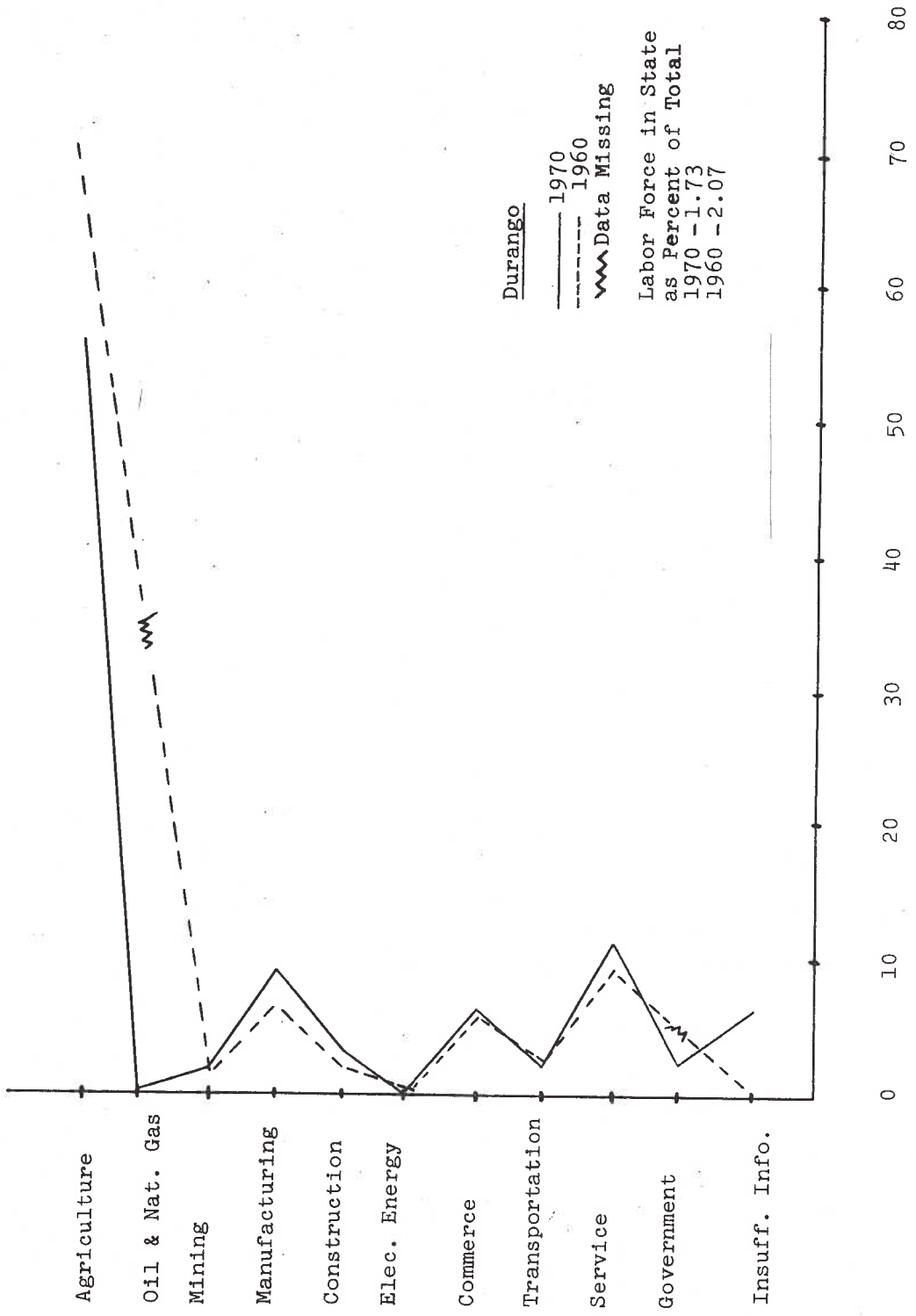


Figure 11: Federal District. Distribution of Labor Force, 1960-70

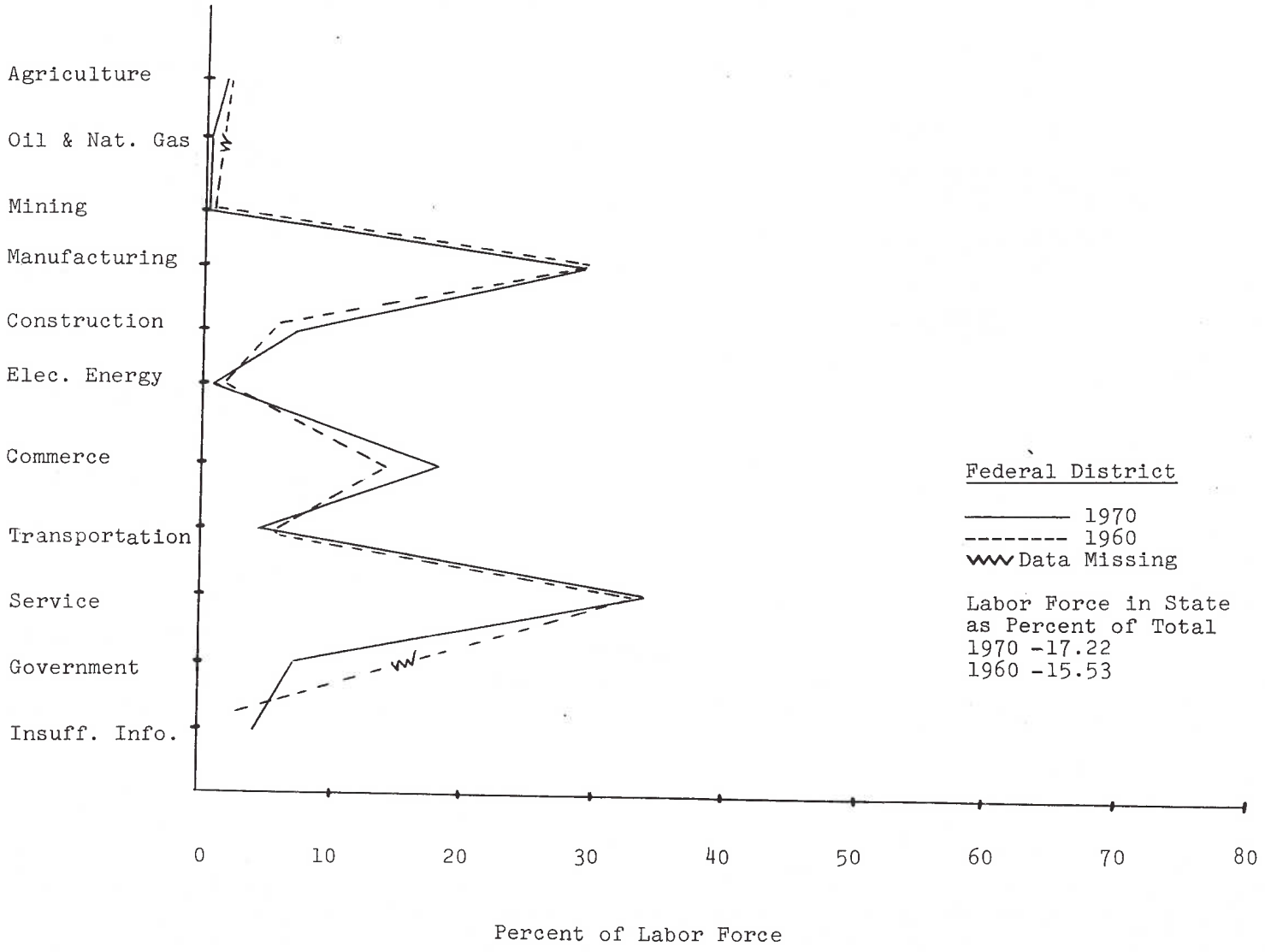


Figure 12: Guanajuato. Distribution of Labor Force, 1960-70

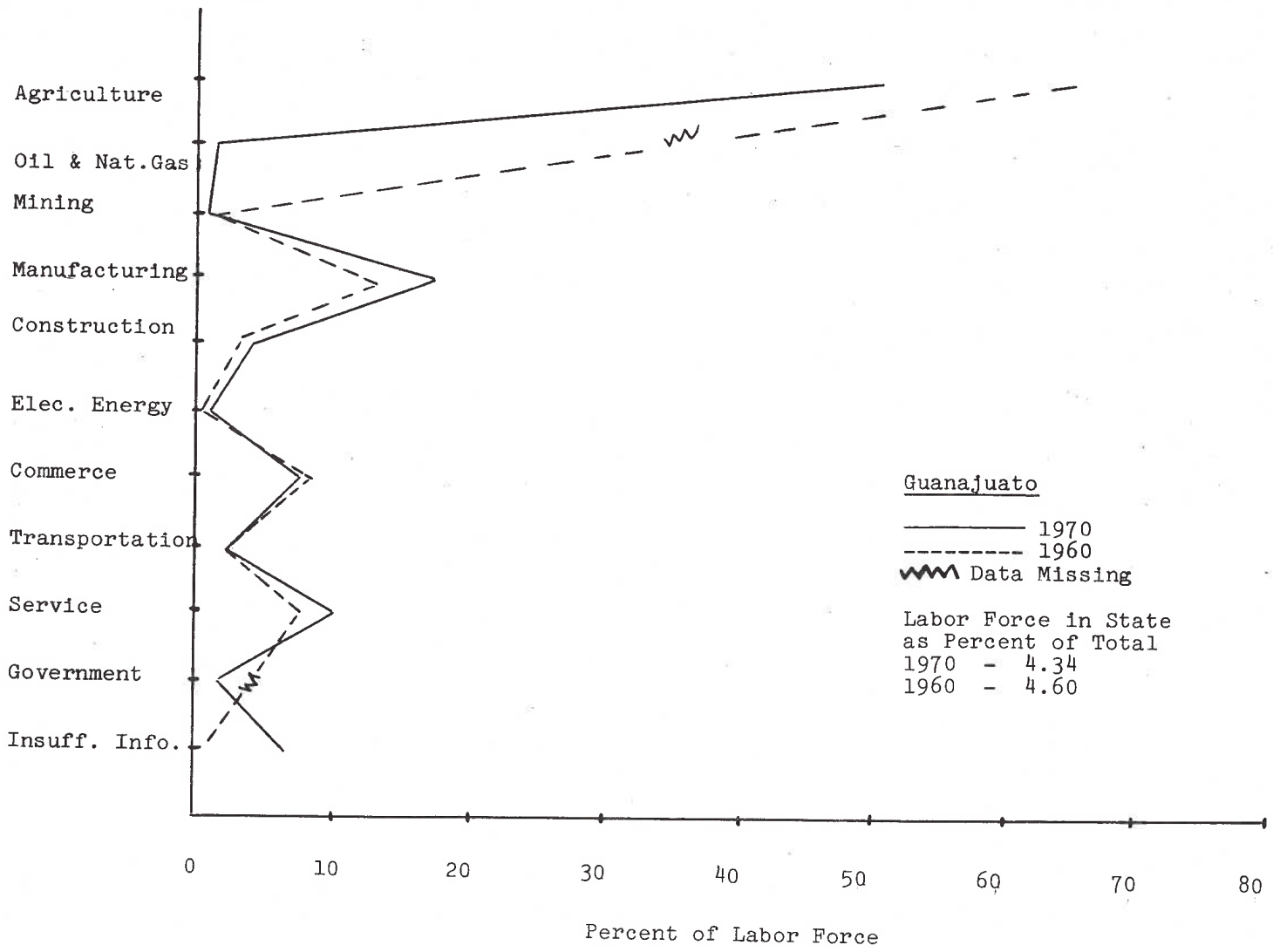


Figure 13: Guerrero. Distribution of Labor Force, 1960-70

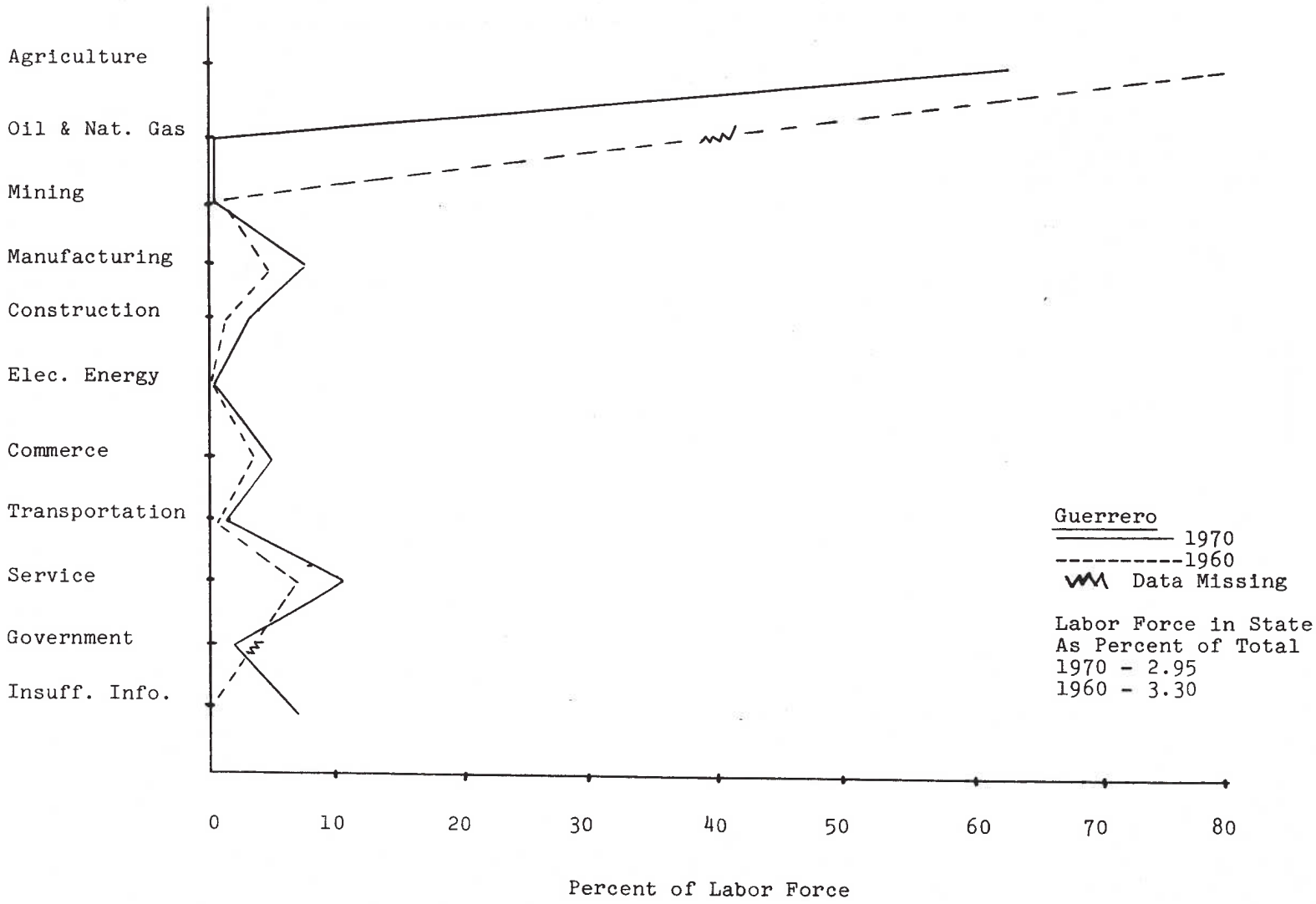


Figure 14: Hidalgo. Distribution of Labor Force, 1960-70

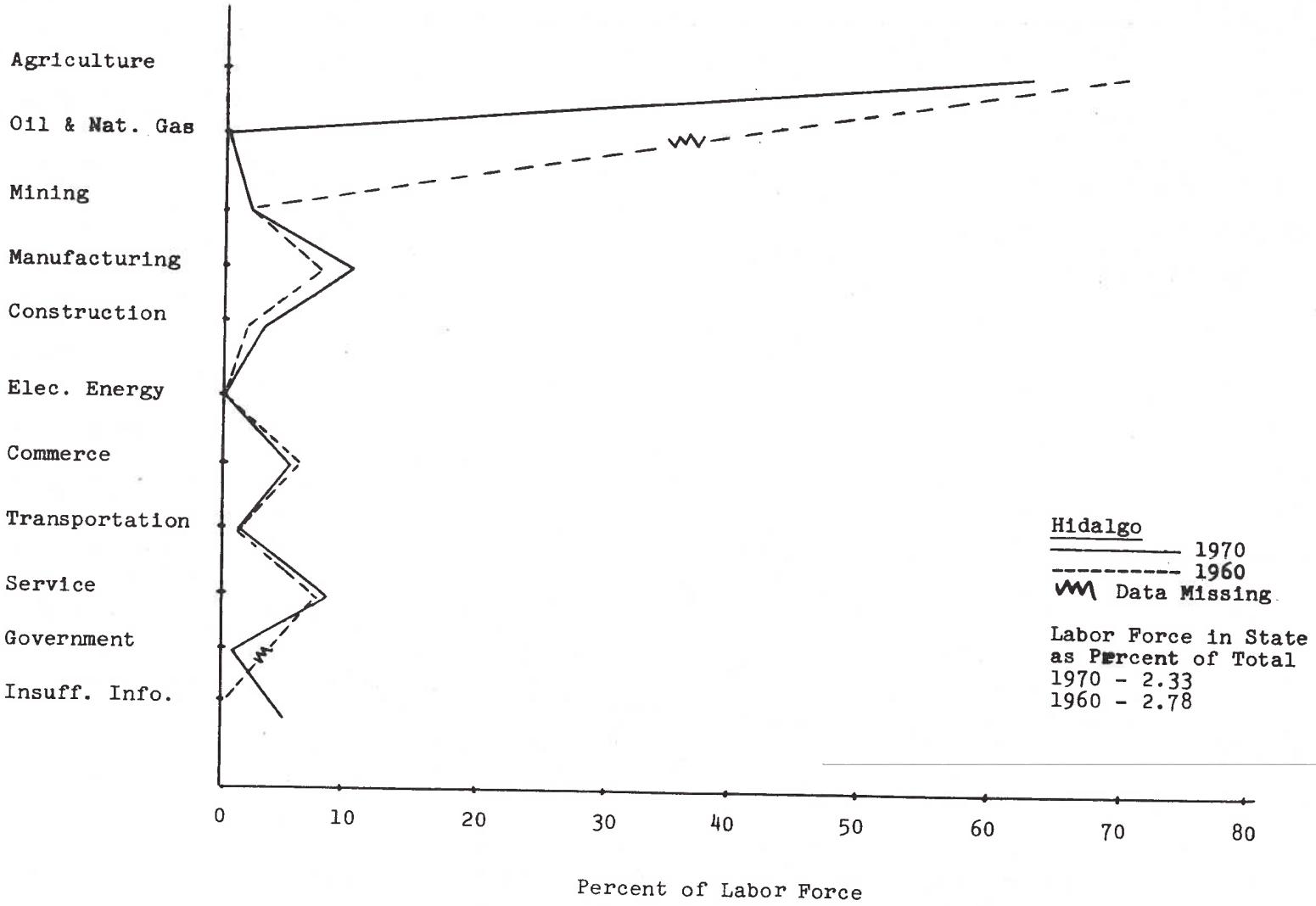


Figure 15: Jalisco. Distribution of Labor Force, 1960-70

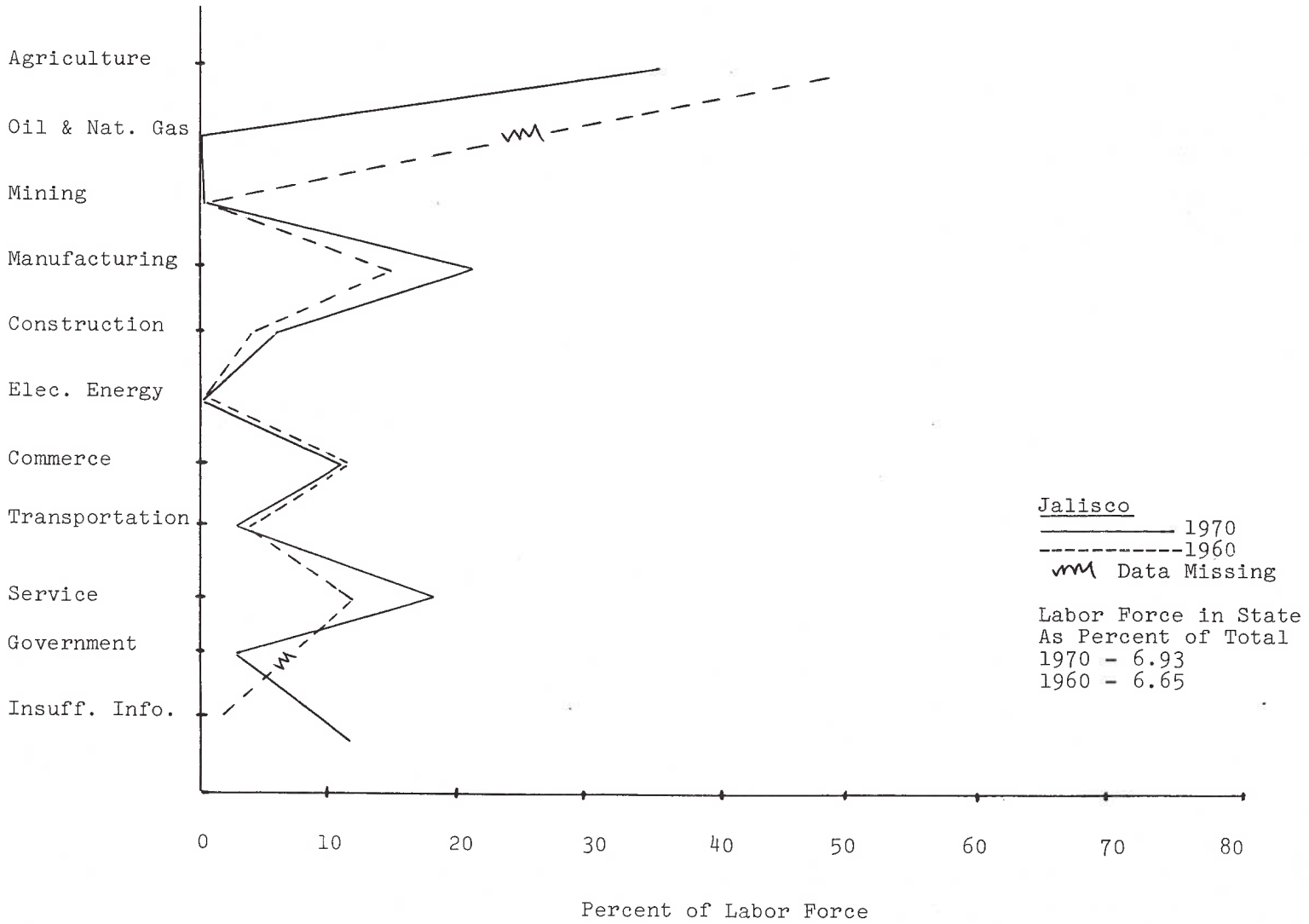


Figure 16: México. Distribution of Labor Force, 1960-70

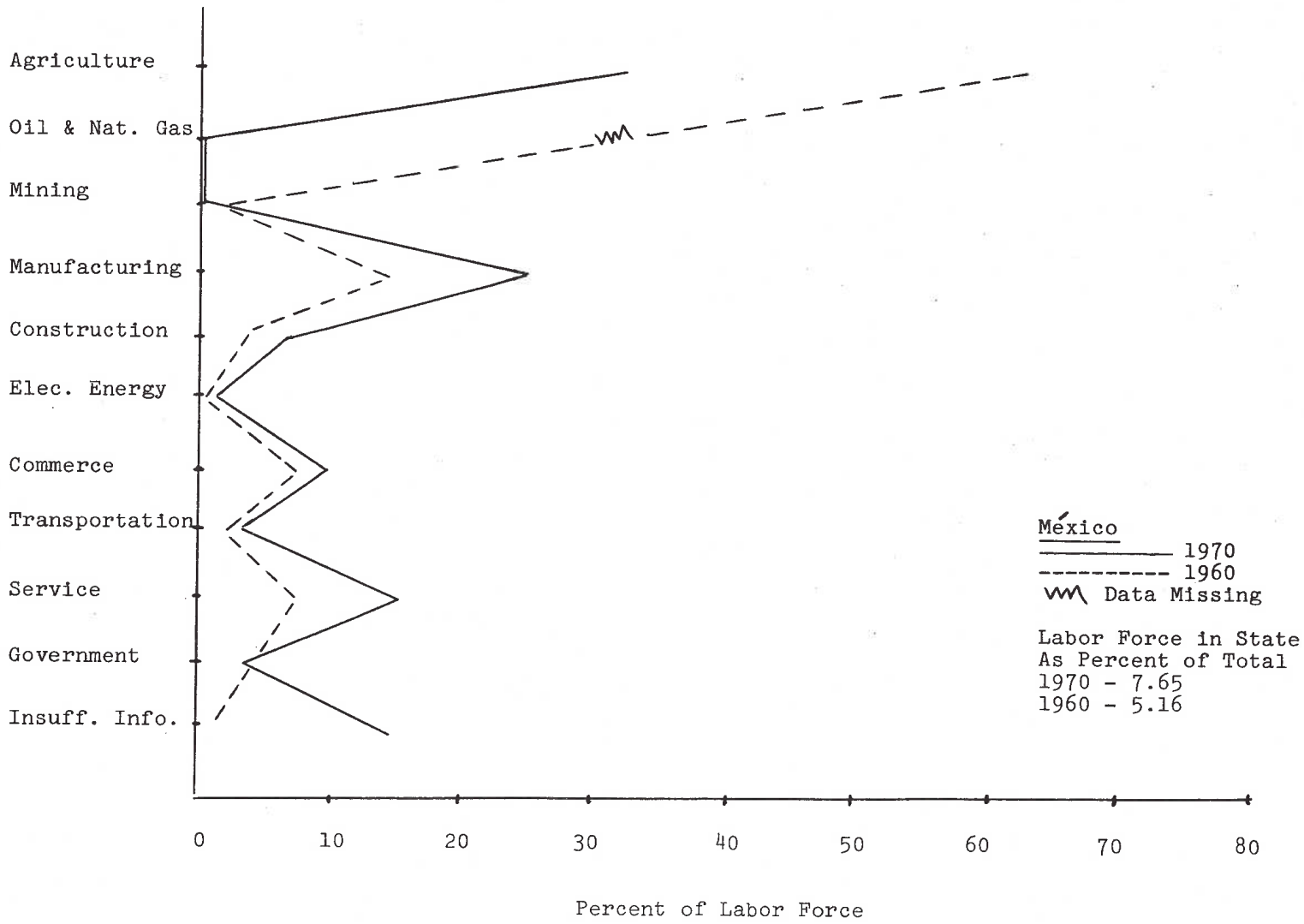


Figure 17: Michoacán. Distribution of Labor Force, 1960-70

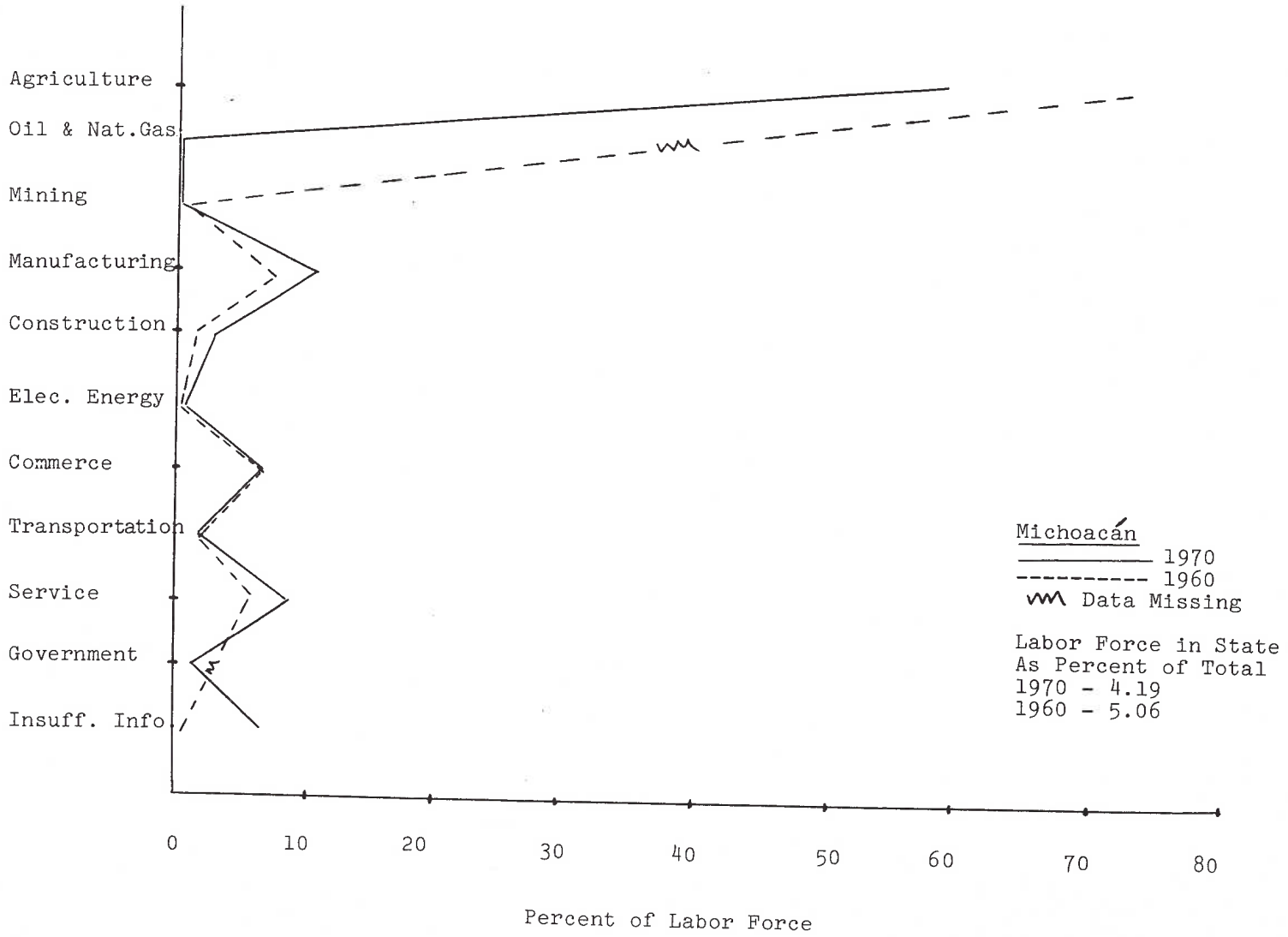


Figure 18: Morelos. Distribution of Labor Force, 1960-70

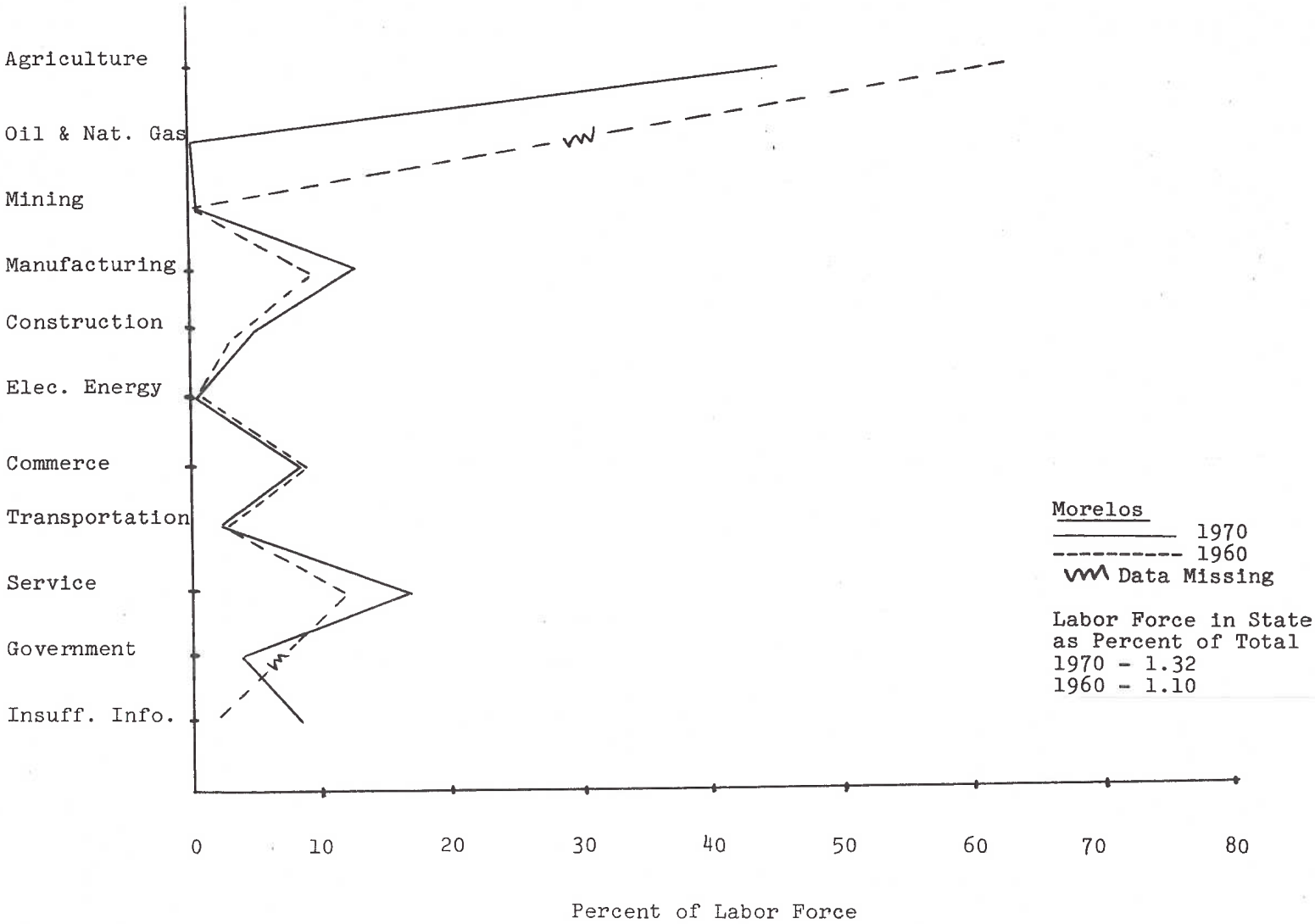


Figure 19: Nayarit. Distribution of Labor Force, 1960-70

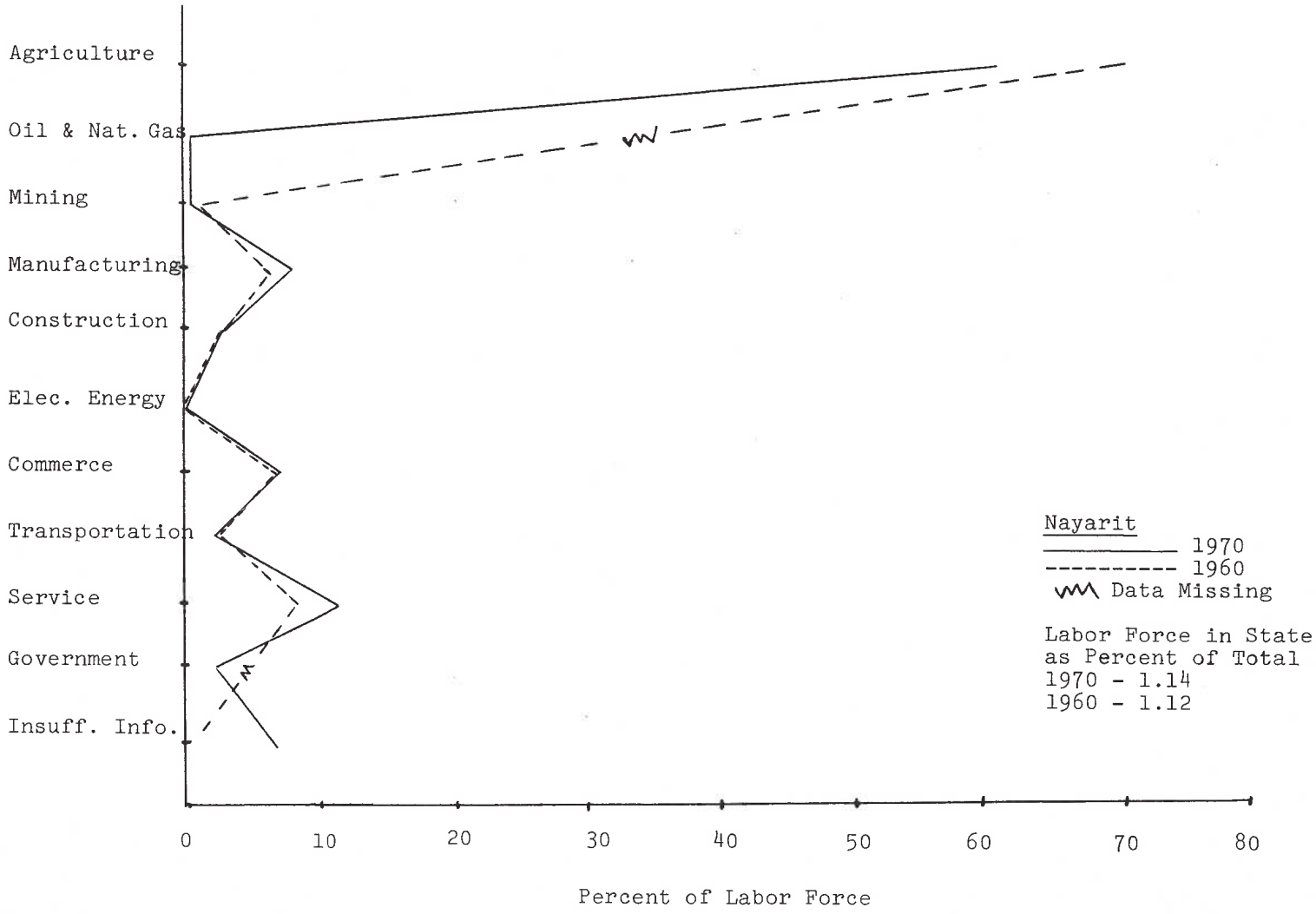


Figure 20: Nuevo León. Distribution of Labor Force, 1960-70

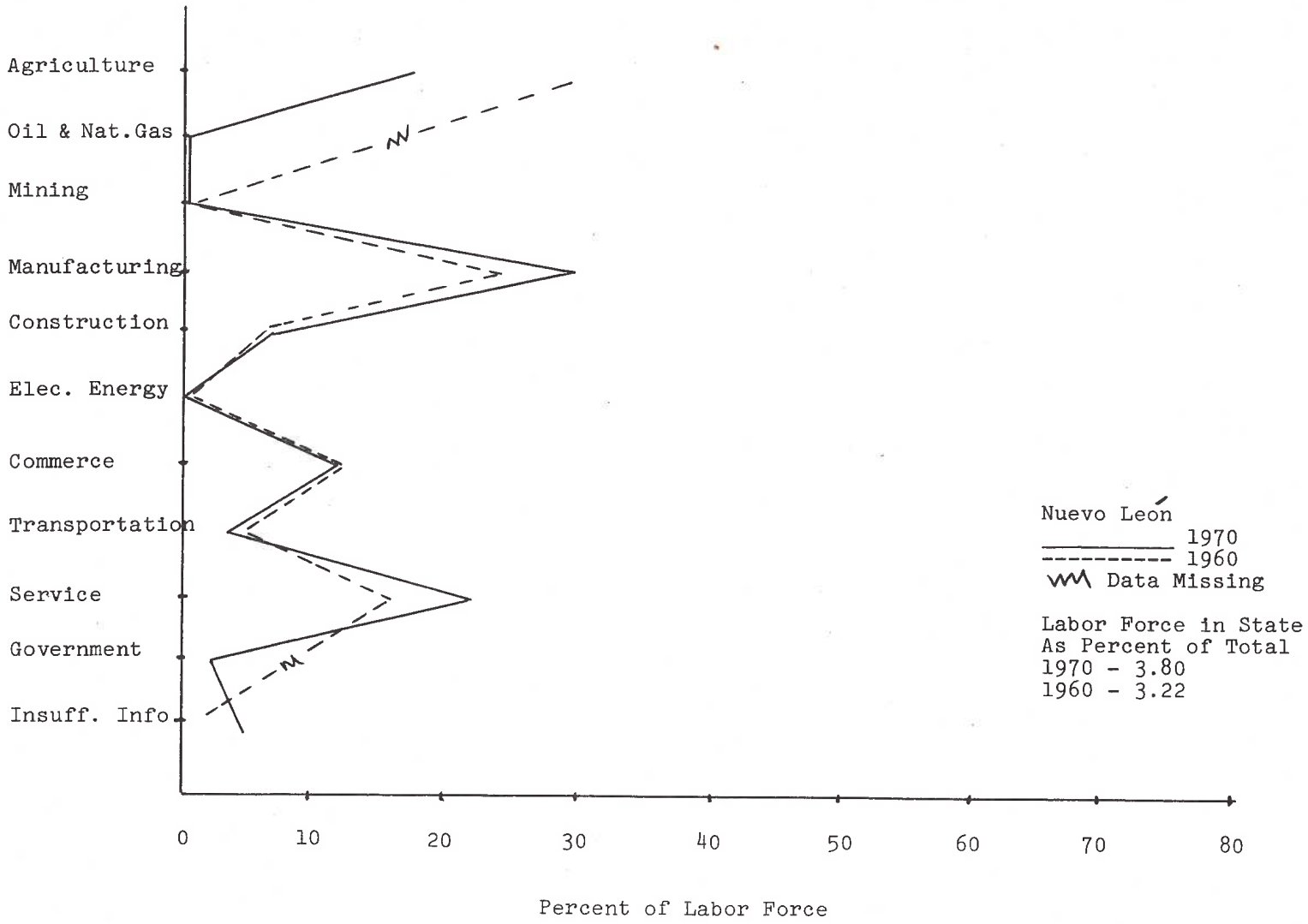


Figure 21: Oaxaca. Distribution of Labor Force, 1960-70

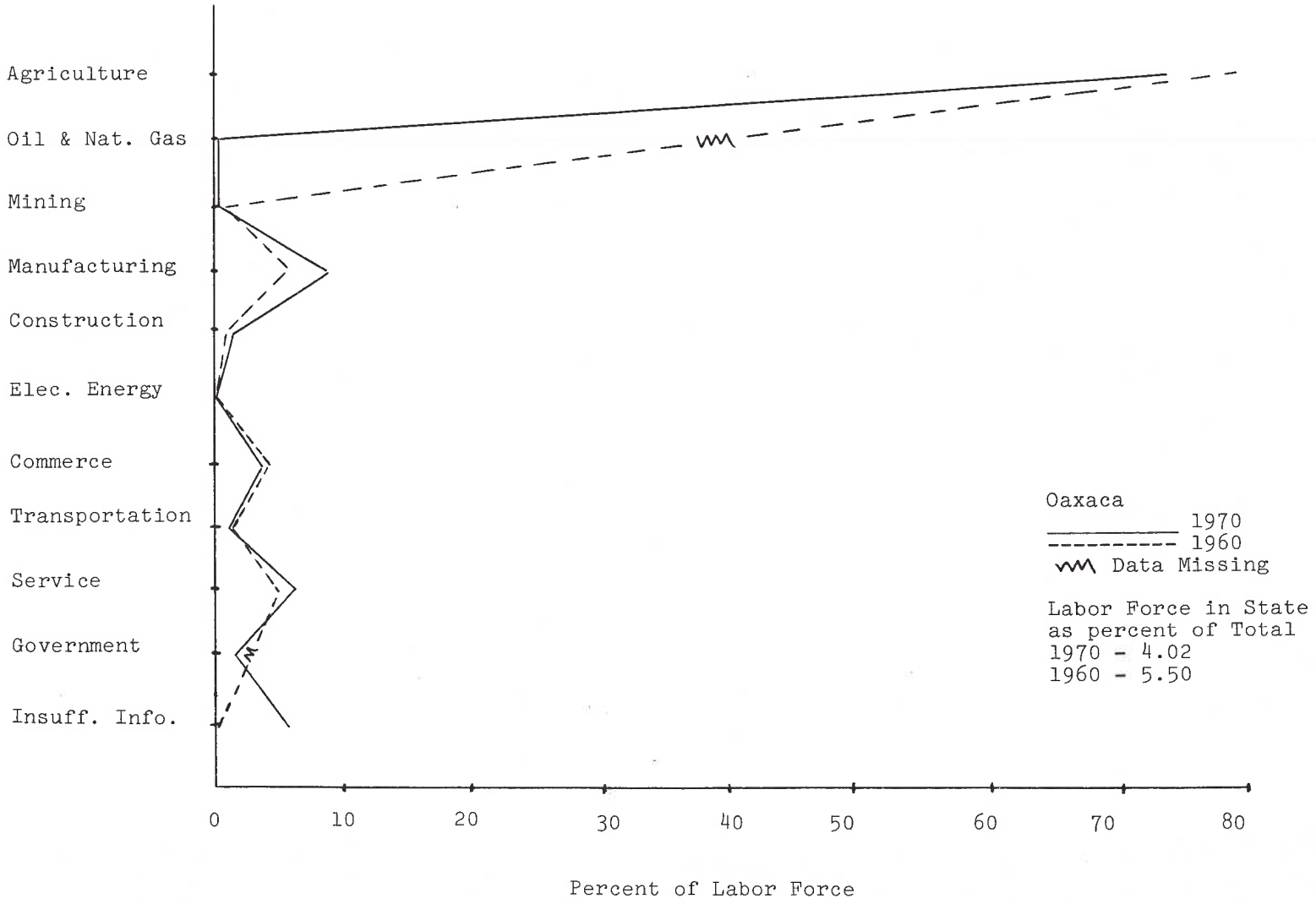


Figure 22: Puebla. Distribution of Labor Force, 1960-70

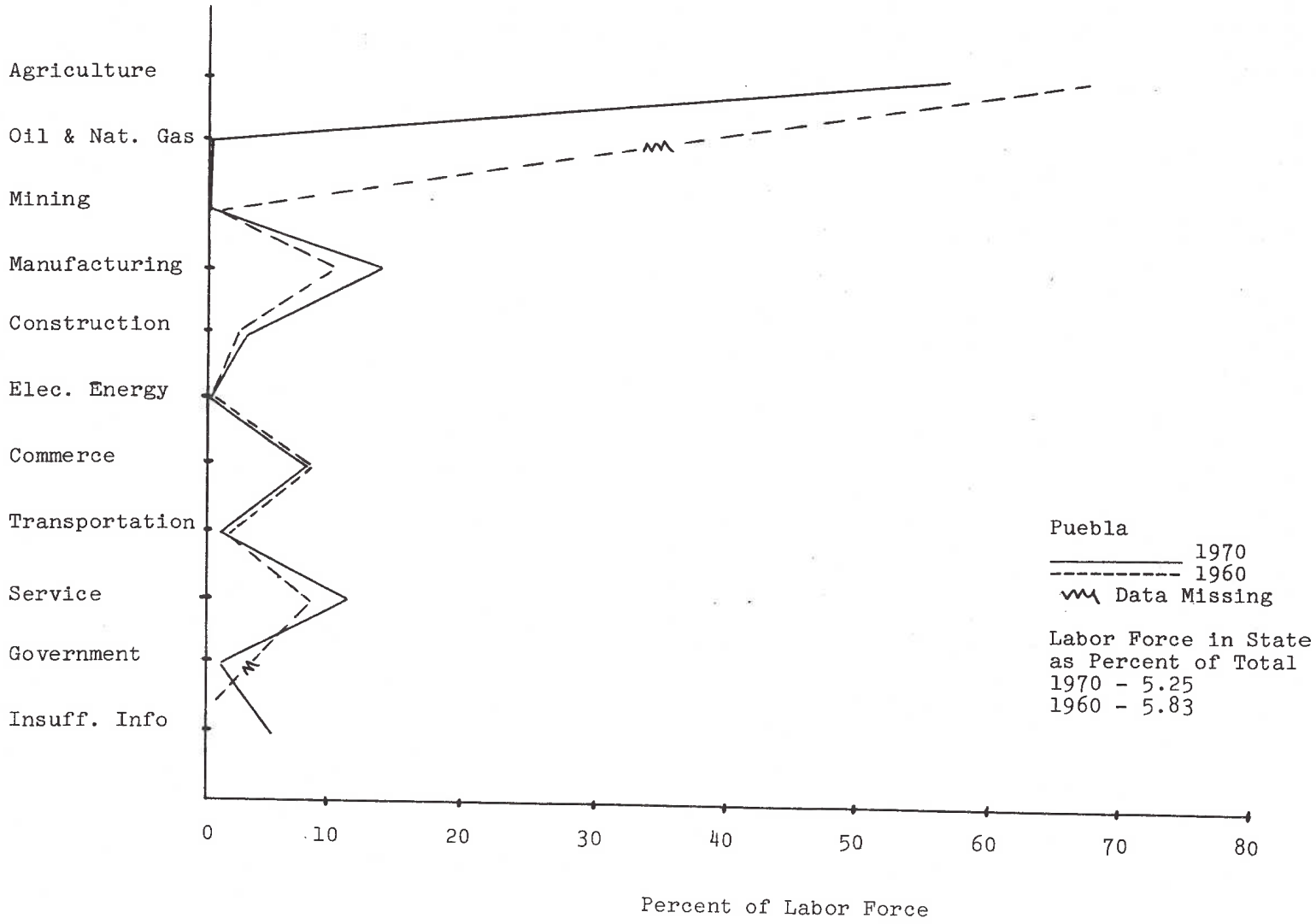


Figure 23: Querétaro. Distribution of Labor Force, 1960-70

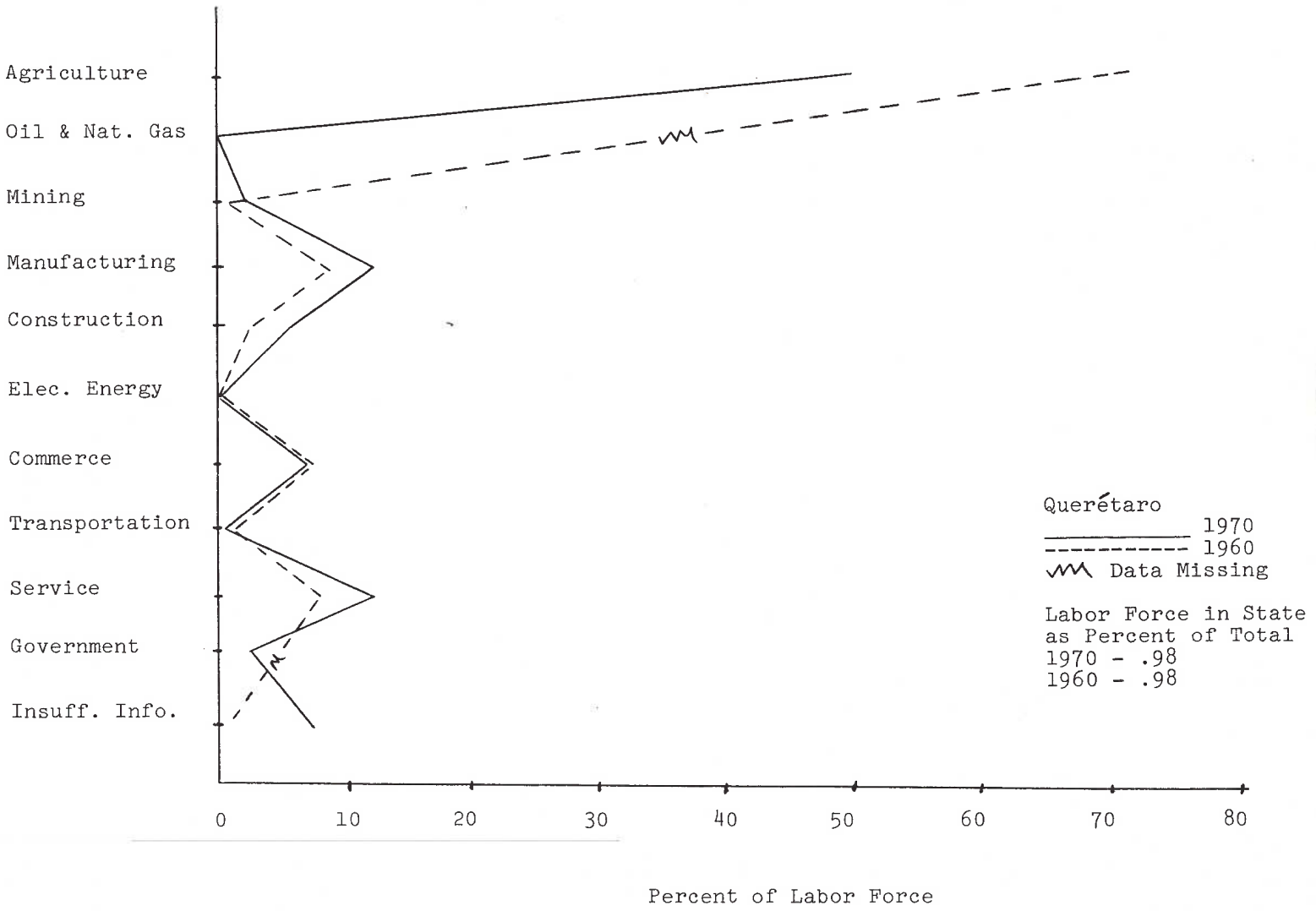


Figure 24: Quintana Roo T. Distribution of Labor Force, 1960-70

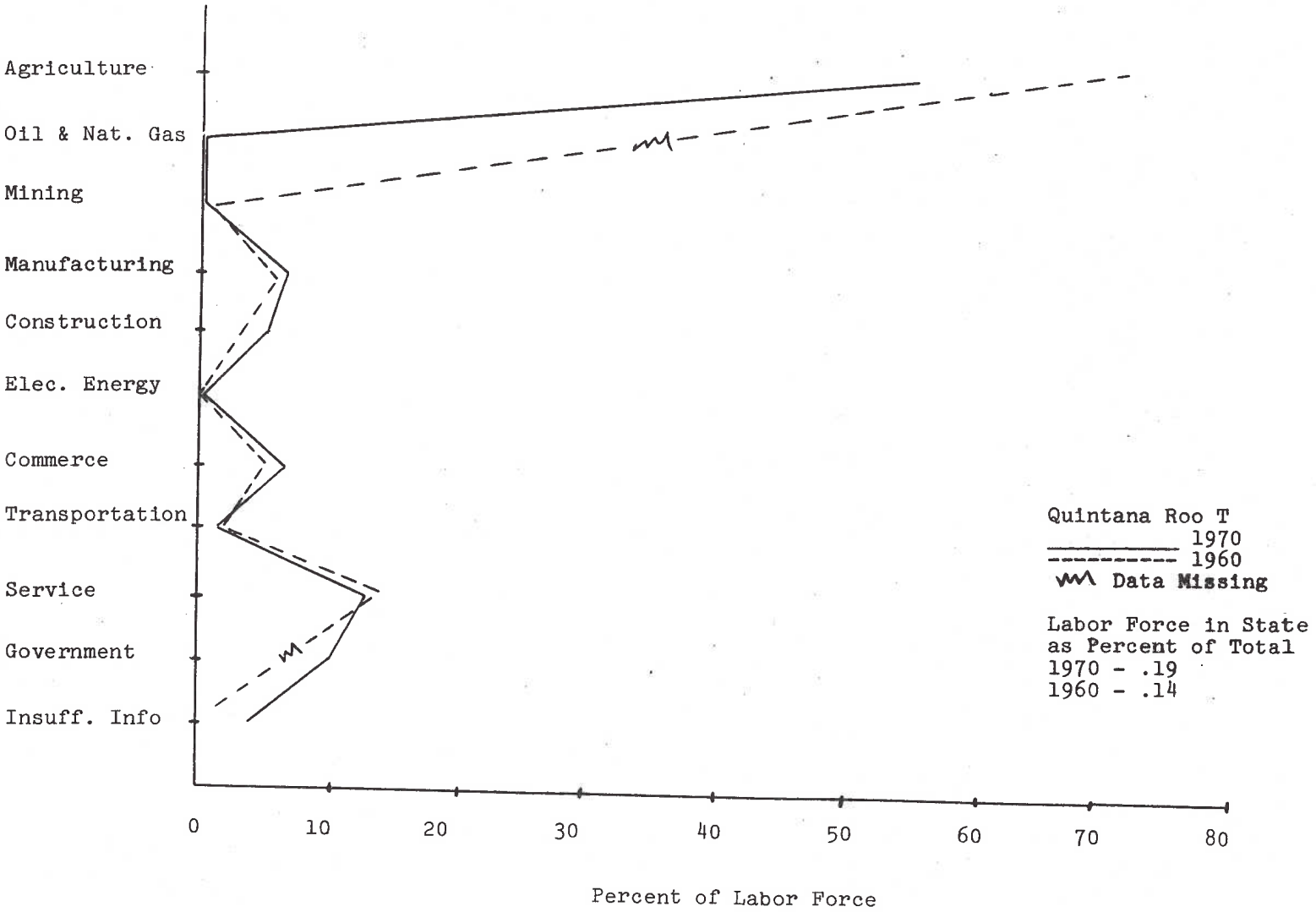


Figure 25: San Luis Potosí. Distribution of Labor Force, 1960-70

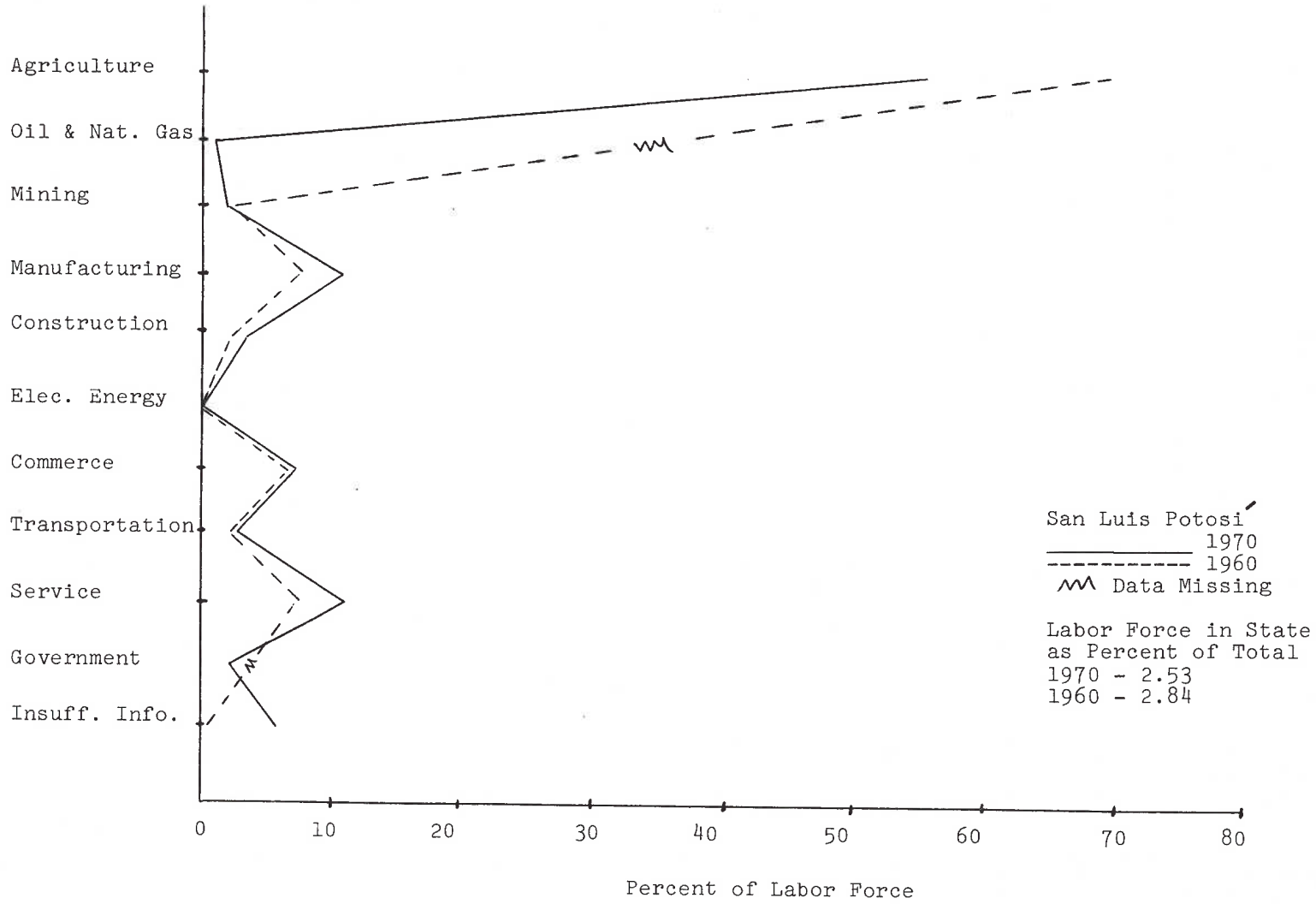


Figure 26: Sinaloa. Distribution of Labor Force, 1960-70

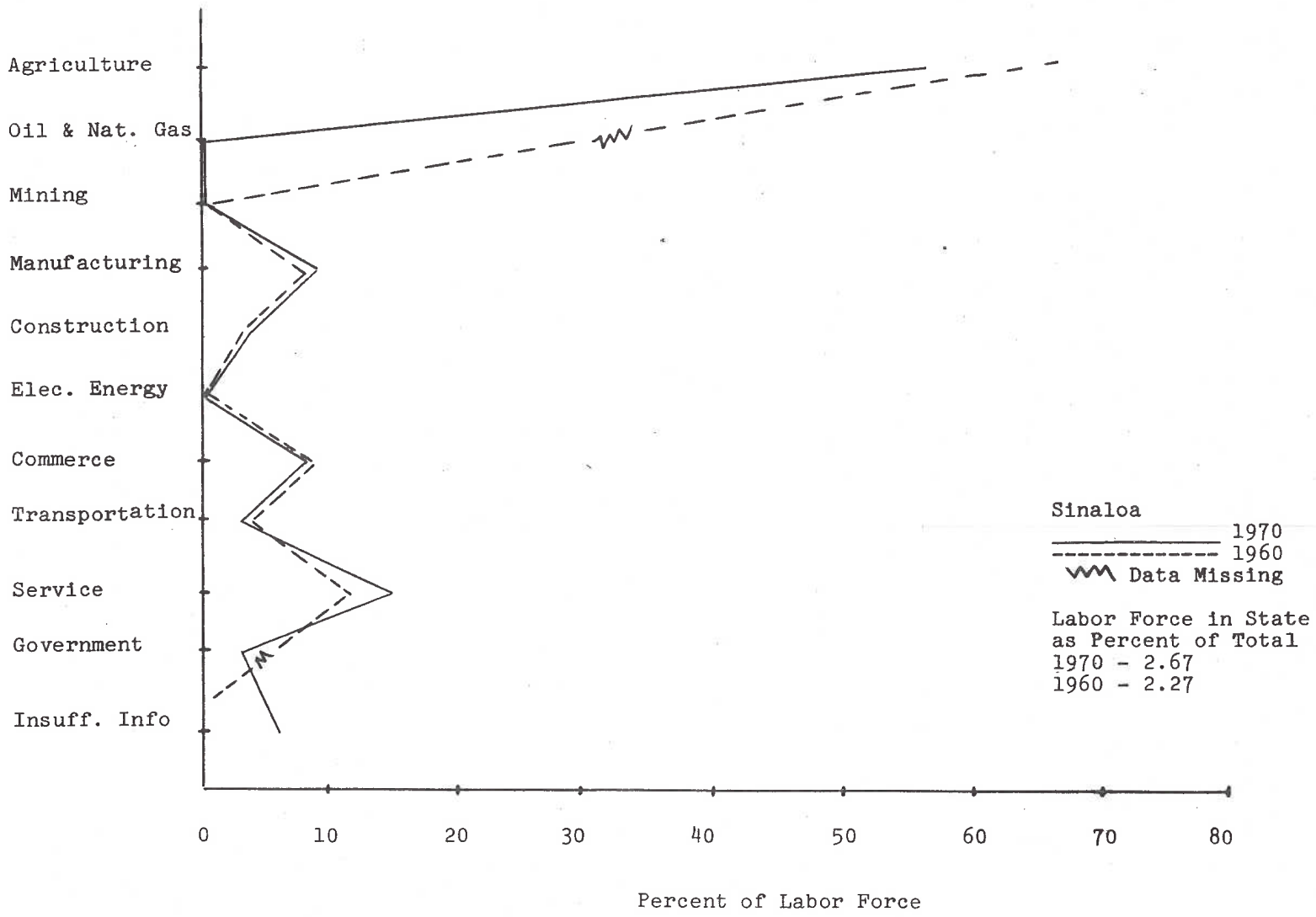


Figure 27: Sonora. Distribution of Labor Force, 1960-70

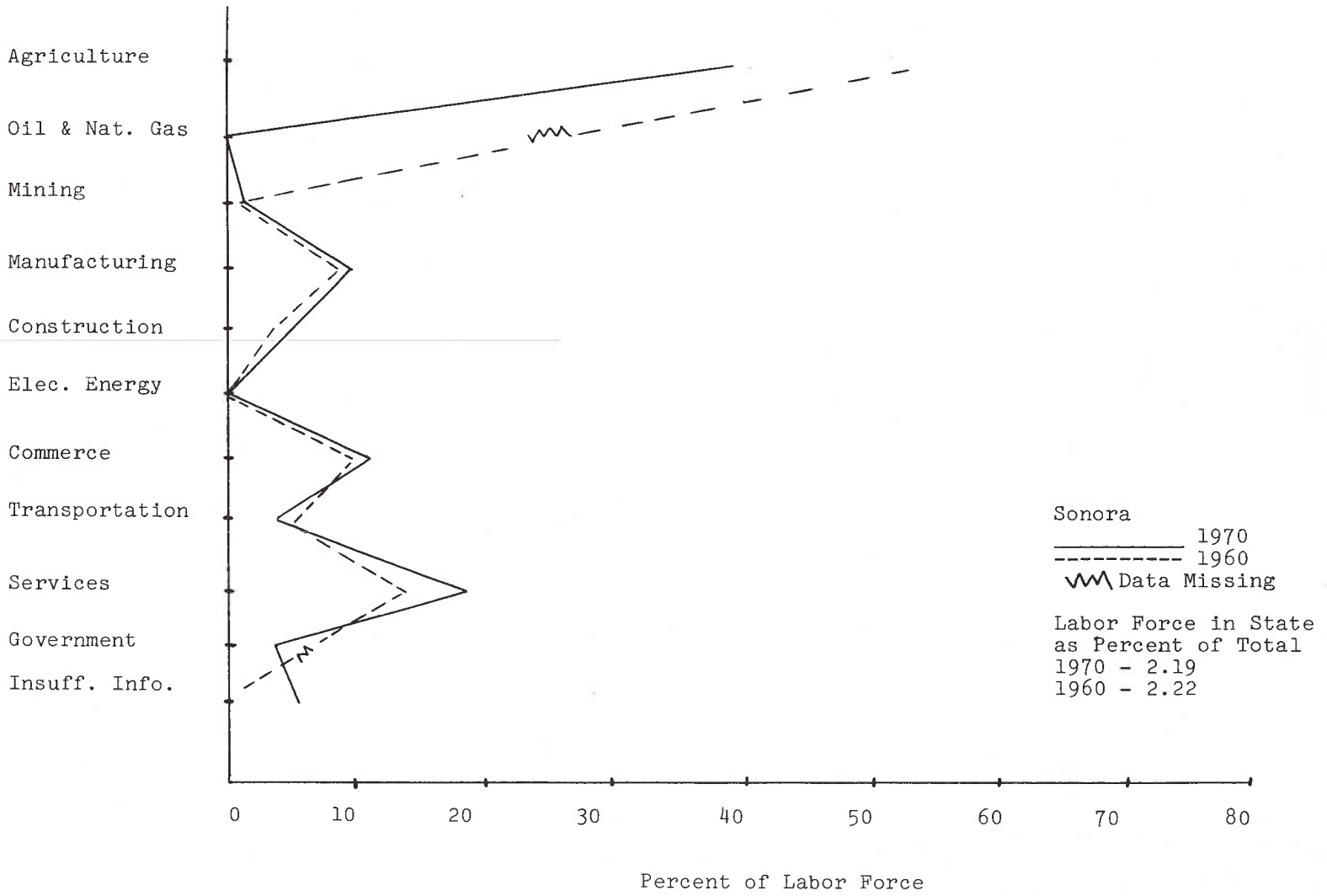


Figure 28: Tabasco. Distribution of Labor Force, 1960-70

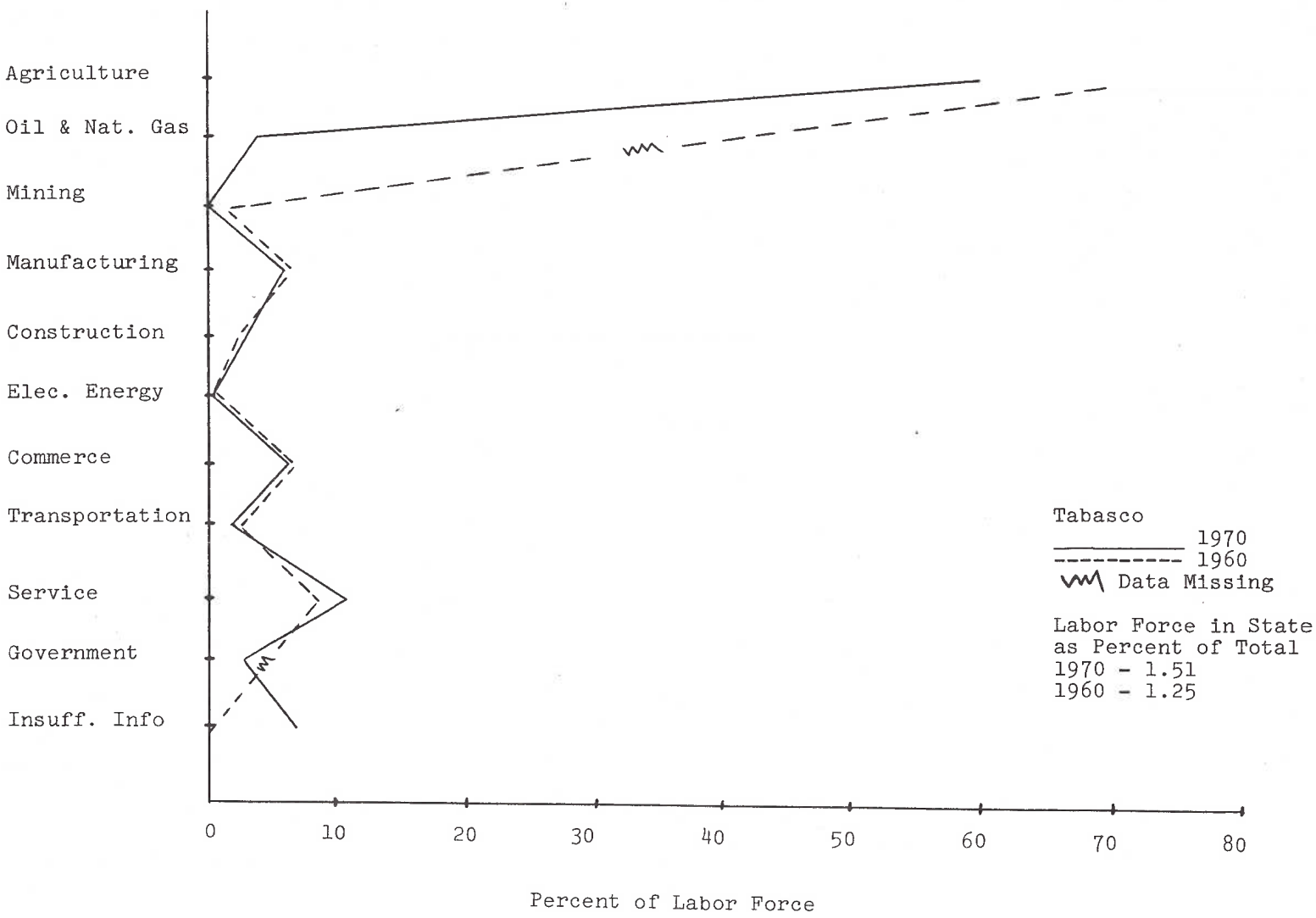


Figure 29: Tamaulipas. Distribution of Labor Force, 1960-70

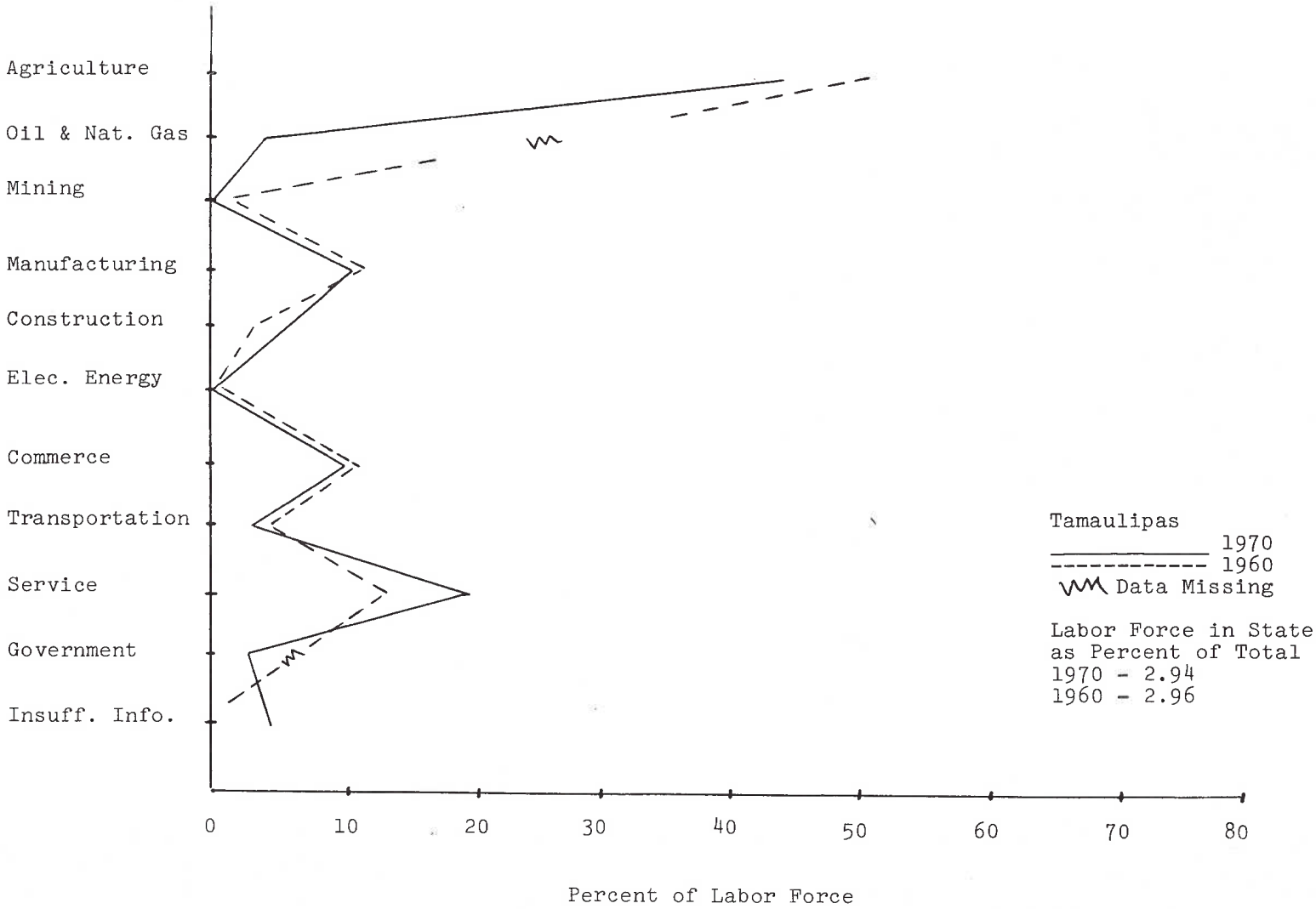


Figure 30: Tlaxcala. Distribution of Labor Force, 1960-70

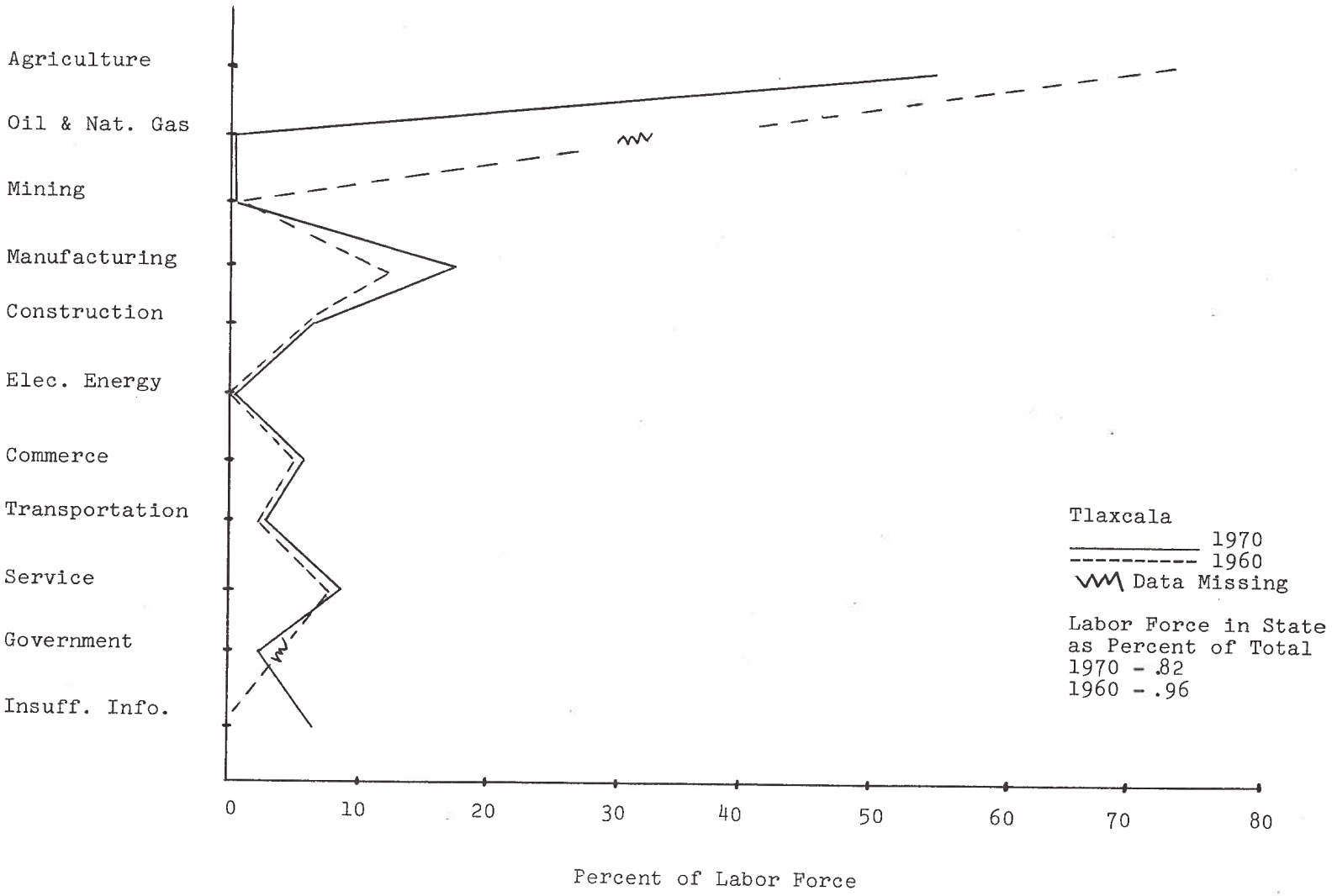


Figure 31: Veracruz. Distribution of Labor Force, 1960-70

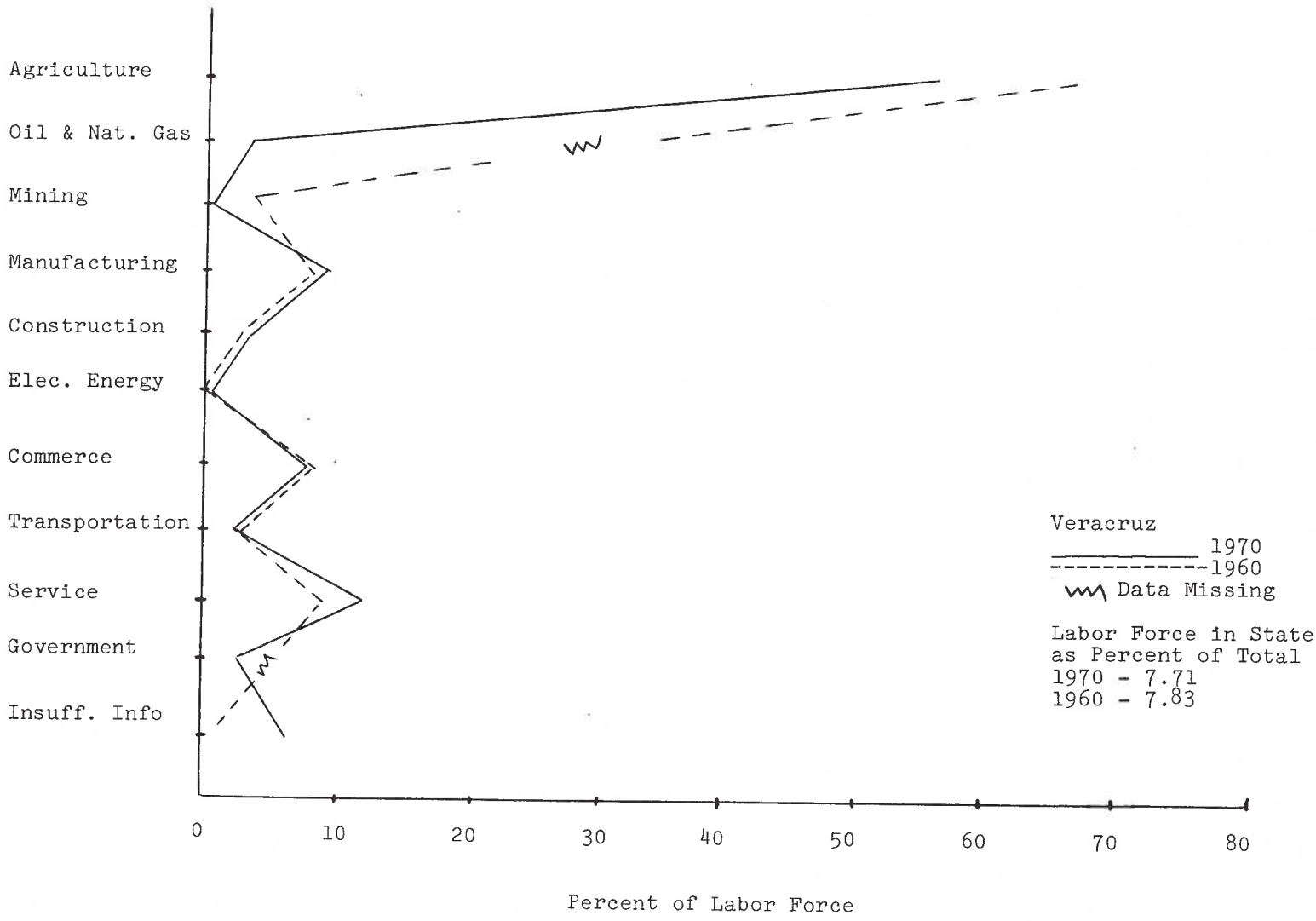


Figure 32: Yucatán. Distribution of Labor Force, 1960-70

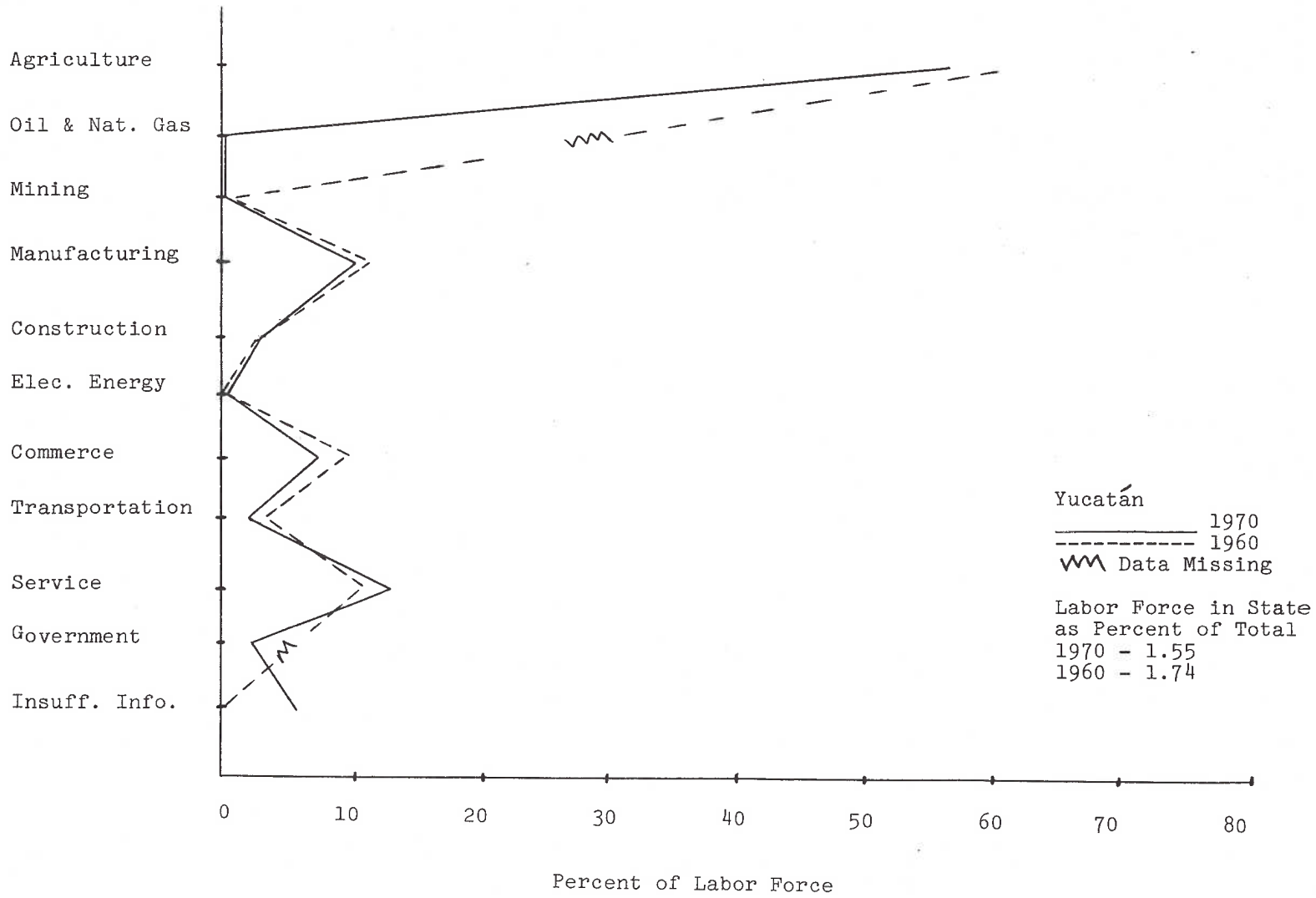
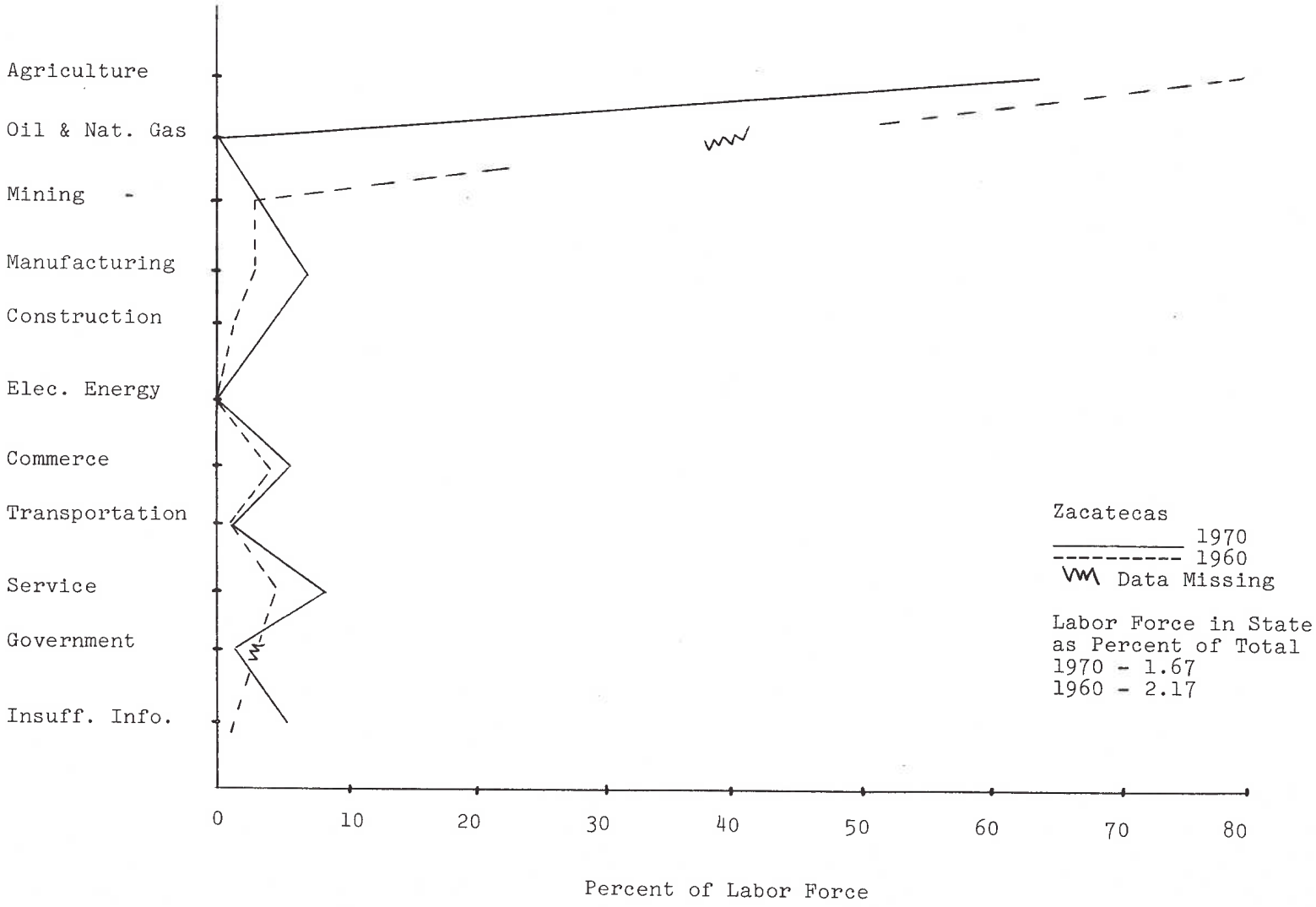


Figure 33: Zacatecas. Distribution of Labor Force, 1960-70



A P P E N D I X C

Table 1 : Urban Population by States. Urban-Rural Breakdown (in thousands), 1970

	Total 1970	1970 Urban	Percent Urban	Percent Increase 1970/1960	1970 Rural	Percent Rural	Percent Increase 1970/1960
United States of Mexico	48,377	21,743	44.9	64.5	26,634	55.1	22.7
Aguascalientes	338	181	53.5	42.5	157	46.5	35.3
Baja California	870	687	78.9	86.2	183	21.1	21.2
Baja California T	128	57	44.5	137.5	71	55.5	22.4
Campeche	252	104	41.3	60.0	148	58.7	43.7
Coahuila	1,115	728	65.3	38.9	387	34.7	1.0
Colima	241	121	50.2	51.3	120	49.8	41.2
Chiapas	1,569	255	16.3	23.8	1,314	83.7	36.7
Chihuahua	1,613	928	57.5	57.0	685	42.5	7.7
Federal District	6,874	6,682	97.2	42.0	192	2.8	15.7
Durango	939	250	26.6	42.0	689	73.4	15.8
Guanajuato	2,270	966	42.6	51.2	1,304	57.4	19.0
Guerrero	1,597	314	19.7	109.7	1,283	80.3	18.9
Hidalgo	1,194	190	15.9	88.1	1,004	84.1	12.3
Jalisco	3,297	1,764	53.5	63.3	1,533	46.5	12.5
México	3,833	1,075	28.0	46.7	2,758	72.0	56.5
Michoacán	2,320	633	27.3	63.6	1,687	72.7	15.2
Morelos	616	204	33.1	172.0	412	66.9	32.5
Nayarit	544	171	31.4	87.9	373	68.6	24.7
Nuevo León	1,695	1,060	62.5	56.8	635	37.5	57.6
Oaxaca	2,172	290	13.4	2.8	1,882	86.6	21.4
Puebla	2,508	616	24.6	45.3	1,892	75.4	22.1
Querétaro	486	128	26.3	62.0	358	73.7	29.7
Quintana Roo T	88	24	27.3	84.6	64	72.7	73.0
San Luis Potosí	1,282	386	30.1	67.1	896	69.9	9.7
Sinaloa	1,267	463	36.5	103.1	804	63.5	31.8
Sonora	1,099	620	56.4	72.2	479	43.6	13.2
Tabasco	768	174	22.7	234.6	594	77.3	33.8
Tamaulipas	1,457	909	62.4	67.7	548	37.6	13.7
Tlaxcala	421	81	19.2	37.3	340	80.8	18.1
Veracruz	3,815	1,230	32.2	96.8	2,585	67.8	22.9
Yucatán	758	301	39.7	36.2	457	60.3	16.3
Zacatecas	951	151	15.9	84.1	800	84.1	8.7

Source: Adapted from Olizar 1973:12. "Only towns of 10,000 inhabitants or more were considered as urban areas since smaller Mexican settlement seldom have truly urban characteristics."

A P P E N D I X D

Table 1: Aguascalientes. Indicators Used to Determine Intercensal Population Estimates

Aguascalientes	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0173	.0250	.4433	.2506	.1927	2
Sugar Consumption	.0036	.0077	1.1758	.2623	.9135	0
Primary School Enrollment	.1563	.2016	.2901	.2133	.0769	4
Secondary School Enrollment	.0064	.0257	2.9995	1.3585	1.6411	0
Soft Drinks Sales	.7399	.4399	-.4055	.0025	.4080	0
Cigarette Sales	.0931	.0971	.0433	.0051	.0382	4
Gasoline Consumption	.1087	.1246	.1463	.2831	.1368	3
Autos and Motorcycles	.0120	.0307	1.5670	.9388	.6282	0
Marriages	.0077	.0075	-.0148	.0941	.1088	3
Amusement Ticket Sales	.0083	.0122	.4831	-.1502	.6333	0
Automobile Registrations	.0115	.0271	1.3527	.8338	.5190	0
Passenger Bus Registrations	.0014	.0006	-.5810	-.0915	.4896	0
Newspaper Circulation	.1242	.1912	.5395	.2815	.2580	0
Cinema Tickets Sold	.0039	.0057	.4597	-.1528	.6125	0
Magazine Circulation	.0180	.0159	-.1188	-.1809	.0621	4
Temporary Housing	.0027	.0030	.1092	.0722	.0370	4

Population Estimates

The 1962 Population Estimate is	254801
The 1964 Population Estimate is	273681
The 1966 Population Estimate is	276342
The 1968 Population Estimate is	308177
The 1972 Population Estimate is	361760

Table 2: Baja California. Indicators Used to Determine Intercensal Population Estimates

Baja California	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0539	.0666	.2359	.2506	.0147	4
Sugar Consumption	.0035	.0038	.1082	.2623	.1541	2
Primary School Enrollment	.1668	.2161	.2958	.2133	.0825	4
Secondary School Enrollment	.0106	.0391	2.6707	1.3585	1.3122	0
Soft Drinks Sales	.3173	.2461	-.2244	.0025	.2269	1
Cigarette Sales	.0649	.0735	.1339	.0051	.1287	3
Gasoline Consumption	.6114	.5937	-.0290	.2831	.3121	0
Autos and Motorcycles	.0759	.0824	.0852	.9388	.8536	0
Marriages	.0092	.0091	-.0152	.0941	.1093	3
Amusement Ticket Sales	.0290	.0207	-.2857	-.1502	.1355	3
Automobile Registrations	.0752	.0808	.0735	.8338	.7602	0
Passenger Bus Registrations	.0010	.0012	.1410	-.0915	.2324	1
Newspaper Circulation	.1592	.1371	-.1386	.2815	.4201	0
Cinema Tickets Sold	.0136	.0096	-.2906	-.1528	.1378	3
Magazine Circulation	.0542	.0434	-.1991	.1809	.0182	4
Temporary Housing	.0040	.0085	1.1627	.0722	1.0905	0

Population Estimates

The 1962 Population Estimate Is	602760
The 1964 Population Estimate Is	610543
The 1966 Population Estimate Is	696303
The 1968 Population Estimate Is	737620
The 1972 Population Estimate Is	824008

Table 3: Baja California T. Indicators Used to Determine Intercensal Population Estimates

Baja California T	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0248	.0036	.3518	.2506	.1012	3
Sugar Consumption	0.0000	0.0000	0.0000	.2623	.2623	0
Primary School Enrollment	.1863	.2103	.1287	.2133	.0846	4
Secondary School Enrollment	.0135	.0233	.7311	1.3585	.6273	0
Soft Drinks Sales	.0920	.1108	.2048	.0025	.2023	1
Cigarette Sales	.0672	.0690	.0274	.0051	.0223	4
Gasoline Consumption	.2573	.4195	.6303	.2831	.3471	0
Autos and Motorcycles	.0226	.0410	.8176	.9388	.1212	3
Marriages	.0055	.0082	.4914	.0941	.3973	0
Amusement Ticket Sales	.0115	.0094	-.1850	-.1502	.0348	4
Automobile Registrations	.0224	.0392	.7489	.8338	.0849	4
Passenger Bus Registrations	.0009	.0001	-.8490	-.0915	.7576	0
Newspaper Circulation	.0306	.0195	-.3626	.2815	.6442	0
Cinema Tickets Sold	.0057	.0045	-.2057	-.1528	.0529	4
Magazine Circulation	.0015	.0016	.0623	-.1809	.2432	1
Temporary Housing	.0036	.0055	.5175	.0722	.4453	0

Population Estimates

The 1962 Population Estimate is	88160
The 1964 Population Estimate is	96250
The 1966 Population Estimate is	118216
The 1968 Population Estimate is	146706
The 1972 Population Estimate is	157409

Table 4: Chiapas. Indicators Used to Determine Intercensal Population Estimates

Chiapas	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0126	.0203	.6115	.2506	.3609	0
Sugar Consumption	.0016	.0020	.2408	.2623	.0215	4
Primary School Enrollment	.0999	.1400	.4009	.2133	.1876	2
Secondary School Enrollment	.0043	.0092	1.1701	1.3585	.1884	2
Soft Drinks Sales	.0496	.0468	-.0567	.0025	.0592	4
Cigarette Sales	.0272	.0268	-.0156	.0051	.0207	4
Gasoline Consumption	.0357	.0670	.8753	.2831	.5922	0
Autos and Motorcycles	.0026	.0059	1.2733	.9388	.3345	0
Marriages	.0054	.0057	.0692	.0941	.0249	4
Amusement Ticket Sales	.0026	.0042	.6560	-.1502	.8062	0
Automobile Registrations	.0026	.0055	1.1485	.8338	.3147	0
Passenger Bus Registrations	.0003	.0003	-.0272	-.0915	.0642	4
Newspaper Circulation	.0178	.0377	1.1213	.2815	.8398	0
Cinema Tickets Sold	.0013	.0021	.6603	-.1528	.8131	0
Magazine Circulation	.0086	.0080	-.0692	-.1809	.1118	3
Temporary Housing	.0009	.0016	.7809	.0722	.7087	0

Population Estimates

The 1962 Population Estimate is	1375243
The 1964 Population Estimate is	1260843
The 1966 Population Estimate is	1424050
The 1968 Population Estimate is	1454177
The 1972 Population Estimate is	1728583

Table 5: Chihuahua. Indicators Used to Determine Intercensal Population Estimates

Chihuahua	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0277	.0324	.1723	.2506	.0783	4
Sugar Consumption	.0029	.0028	-.0489	.2623	.3111	0
Primary School Enrollment	.1693	.2095	.2375	.2133	.0242	4
Secondary School Enrollment	.0100	.0325	2.2571	1.3585	.8986	0
Soft Drinks Sales	.2936	.2642	-.0999	.0025	.1024	3
Cigarette Sales	.0939	.0810	-.1379	.0051	.1430	3
Gasoline Consumption	.2244	.2589	.1538	.2831	.1293	3
Autos and Motorcycles	.0242	.0184	-.2406	.9388	1.1793	0
Marriages	.0082	.0092	.1238	.0941	.0298	4
Amusement Ticket Sales	.0142	.0136	-.0445	-.1502	.1056	3
Automobile Registrations	.0240	.0159	-.3361	.8338	1.1699	0
Passenger Bus Registrations	.0008	.0007	-.1794	-.0915	.0880	4
Newspaper Circulation	.0876	.1268	.4468	.2815	.1653	2
Cinema Tickets Sold	.0059	.0067	.1308	-.1528	.2836	0
Magazine Circulation	.0285	.0228	-.1996	-.1809	.1087	4
Temporary Housing	.0028	.0038	.3390	.0722	.2667	0

Population Estimates

The 1962 Population Estimate is	1115190
The 1964 Population Estimate is	1195049
The 1966 Population Estimate is	1251557
The 1968 Population Estimate is	1505545
The 1972 Population Estimate is	1741762

Table 6: Campeche. Indicators Used to Determine Intercensal Population Estimates

Campeche	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0216	.0301	.3952	.2506	.1446	3
Sugar Consumption	.0030	.0034	.1449	.2623	.1173	3
Primary School Enrollment	.1987	.2017	.0151	.2133	.1982	2
Secondary School Enrollment	.0136	.0347	1.5519	1.3585	.1934	2
Soft Drinks Sales	0.0000	.2093	0.0000	.0025	.0025	5
Cigarette Sales	.0407	.0337	-.1723	.0051	.1775	2
Gasoline Consumption	.1480	.1561	.0542	.2831	.2289	1
Autos and Motorcycles	.0087	.0138	.5960	.9388	.3428	0
Marriages	.0079	.0088	.1085	.0941	.0144	4
Amusement Ticket Sales	.0148	.0130	-.1201	-.1502	.0300	4
Automobile Registrations	.0069	.0083	.1932	.8338	.6406	0
Passenger Bus Registrations	.0006	.0003	-.4510	0.0915	.3596	0
Newspaper Circulation	.0862	.0607	-.2958	.2815	.5773	0
Cinema Tickets Sold	.0072	.0064	-.1091	-.1528	.0437	4
Magazine Circulation	.0196	.0146	-.2527	-.1809	.0717	4
Temporary Housing	.0020	.0020	.0141	.0722	.0582	4

Population Estimates

The 1962 Population Estimate is	189044
The 1964 Population Estimate is	199352
The 1966 Population Estimate is	221230
The 1968 Population Estimate is	235642
The 1972 Population Estimate is	280602

Table 7: Coahuila. Indicators Used to Determine Intercensal Population Estimates

Coahuila	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0266	.0393	.4735	.2506	.2229	1
Sugar Consumption	.0035	.0042	.1792	.2623	.0830	4
Primary School Enrollment	.1661	.2130	.2827	.2133	.0695	4
Secondary School Enrollment	.0177	.0457	1.5861	1.3585	.2277	1
Soft Drinks Sales	.4794	.3347	-.3019	.0025	.3044	0
Cigarette Sales	.0749	.0777	.0379	.0051	.0328	4
Gasoline Consumption	.1627	.2386	.4668	.2831	.1836	2
Autos and Motorcycles	.0192	.0319	.6627	.9388	.2761	0
Marriages	.0092	.0107	.1633	.0941	.0692	4
Amusement Ticket Sales	.0203	.0172	-.1504	-.1502	.0002	5
Automobile Registrations	.0186	.0284	.5238	.8338	.3100	0
Passenger Bus Registrations	.0005	.0006	.2069	-.0915	.2984	0
Newspaper Circulation	.1634	.0642	.0052	.2815	.2764	0
Cinema Tickets Sold	.0100	.0083	-.1641	-.1528	.0113	4
Magazine Circulation	.0300	.0243	-.1893	-.1809	.0083	4
Temporary Housing	.0020	.0023	.1592	.0722	.0870	4

Population Estimates

The 1962 Population Estimate is	909436
The 1964 Population Estimate is	971176
The 1966 Population Estimate is	1009902
The 1968 Population Estimate is	1094860
The 1972 Population Estimate is	1098856

Table 8: Colima. Indicators Used to Determine Intercensal Population Estimates

Colima	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0323	.0369	.1419	.2506	.1087	3
Sugar Consumption	.0026	.0035	.3687	.2623	.1064	3
Primary School Enrollment	.1775	.2081	.1724	.2133	.0408	4
Secondary School Enrollment	.0302	.0420	.3908	1.3585	.9677	0
Soft Drinks Sales	.2281	.4098	.7963	.0025	.7938	0
Cigarette Sales	.0995	.0628	-.3687	.0051	.3738	0
Gasoline Consumption	.1578	.1574	-.0029	.2831	.2860	0
Autos and Motorcycles	.0062	.0170	1.7581	.9388	.8193	0
Marriages	.0054	.0062	.1518	.0941	.0577	4
Amusement Ticket Sales	.0143	.0175	.2245	-.1502	.3747	0
Automobile Registrations	.0059	.0139	1.3734	.8338	.5396	0
Passenger Bus Registrations	.0005	.0004	-.1866	-.0915	.0951	4
Newspaper Circulation	.0535	.0788	.4724	.2815	.1908	2
Cinema Tickets Sold	.0070	.0086	.2308	-.1528	.3836	0
Magazine Circulation	.0235	.0238	.0140	-.1809	.1949	2
Temporary Housing	.0077	.0086	.1151	.0722	.0429	4

Population Estimates

The 1962 Population Estimate is	185621
The 1964 Population Estimate is	186813
The 1966 Population Estimate is	187967
The 1968 Population Estimate is	220918
The 1972 Population Estimate is	240049

Table 9: Durango. Indicators Used to Determine Intercensal Population Estimates

Durango	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0143	.0176	.2263	.2506	.0243	4
Sugar Consumption	.0019	.0022	.1556	.2623	.1067	3
Primary School Enrollment	.1672	.2101	.2566	.2133	.0433	4
Secondary School Enrollment	.0067	.0222	2.3052	1.3585	.9467	0
Soft Drinks Sales	.1874	.2722	.4525	.0025	.4500	0
Cigarette Sales	.0470	.0435	-.0755	.0051	.0807	4
Gasoline Consumption	.0949	.1085	.1441	.2831	.1390	3
Autos and Motorcycles	.0074	.0130	.7447	.9388	.1940	2
Marriages	.0062	.0068	.1075	.0941	.0134	4
Amusement Ticket Sales	.0085	.0075	-.1235	-.1502	.0267	4
Automobile Registrations	.0072	.0113	.5813	.8338	.2525	0
Passenger Bus Registrations	.0003	.0006	.6978	-.0915	.7892	0
Newspaper Circulation	.0223	.0324	.4486	.2815	.1671	2
Cinema Tickets Sold	.0042	.0037	-.1277	-.1528	.0251	4
Magazine Circulation	.0110	.0101	-.0821	-.1809	.0988	4
Temporary Housing	.0014	.0019	.4163	.0722	.3440	0

Population Estimates

The 1962 Population Estimate is	795500
The 1964 Population Estimate is	843390
The 1966 Population Estimate is	824641
The 1968 Population Estimate is	917285
The 1972 Population Estimate is	952195

Table 10: Federal District. Indicators Used to Determine Intercensal Population Estimates

Federal District	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0364	.0391	.0741	.2506	.1766	2
Sugar Consumption	.0045	.0058	.2938	.2623	.0315	4
Primary School Enrollment	.1854	.1942	.0473	.2133	.1660	2
Secondary School Enrollment	.0331	.0664	1.0093	1.3585	.3492	0
Soft Drinks Sales	.3189	.3964	.2432	.0025	.2407	1
Cigarette Sales	.0371	.0556	.5001	.0051	.4950	0
Gasoline Consumption	.2896	.3703	.2787	.2831	.0044	5
Autos and Motorcycles	.0423	.0918	1.1717	.9388	.2329	1
Marriages	.0081	.0089	.1051	.0941	.0110	4
Amusement Ticket Sales	.0367	.0246	-.3298	-.1502	.0796	2
Automobile Registrations	.0395	.0858	1.1696	.8338	.3358	0
Passenger Bus Registrations	.0014	.0014	.0142	-.0915	.1056	3
Newspaper Circulation	.2194	.3232	.4734	.2815	.1918	2
Cinema Tickets Sold	.0161	.0103	-.3592	-.1528	.2064	1
Magazine Circulation	.0480	.0376	-.2158	-.1809	.0348	4
Temporary Housing	.0063	.0031	-.5076	.0722	.5798	0

Population Estimates

The 1962 Population Estimate is	5073178
The 1964 Population Estimate is	5452470
The 1966 Population Estimate is	5774133
The 1968 Population Estimate is	6152212
The 1972 Population Estimate is	6807770

Table 11: Guanajuato. Indicators Used to Determine Intercensal Population Estimates

Guanajuato	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0127	.0197	.5508	.2506	.3002	0
Sugar Consumption	.0016	.0027	.6545	.2623	.3923	0
Primary School Enrollment	.1168	.1539	.3173	.2133	.1041	3
Secondary School Enrollment	.0064	.0163	1.5336	1.3585	.1752	2
Soft Drinks Sales	.1989	.2262	.1372	.0025	.1347	3
Cigarette Sales	.0429	.0401	-.0649	.0051	.0701	4
Gasoline Consumption	.0664	.0966	.4561	.2831	.1730	2
Autos and Motorcycles	.0054	.0121	1.2407	.9388	.3020	0
Marriages	.0063	.0081	.2816	.0941	.1875	2
Amusement Ticket Sales	.0069	.0100	.4516	-.1502	.6017	0
Automobile Registrations	.0050	.0104	1.0532	.8338	.2194	1
Passenger Bus Registrations	.0012	.0004	-.6423	-.0915	.5508	0
Newspaper Circulation	.0453	.0652	.4388	.2815	.1573	2
Cinema Tickets Sold	.0033	.0047	.4340	-.1528	.5868	0
Magazine Circulation	.0109	.0092	-.1536	-.1809	.0274	4
Temporary Housing	.0016	.0022	.3802	.0722	.3080	0

Population Estimates

The 1962 Population Estimate is	1684223
The 1964 Population Estimate is	1649782
The 1966 Population Estimate is	1851491
The 1968 Population Estimate is	2068235
The 1972 Population Estimate is	2321268

Table 12: Guerrero. Indicators Used to Determine Intercensal Population Estimates

Guerrero	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0195	.0270	.3828	.2506	.1322	3
Sugar Consumption	.0018	.0025	.4108	.2623	.1485	3
Primary School Enrollment	.1326	.2028	.5291	.2133	.3159	0
Secondary School Enrollment	.0038	.0192	4.0922	1.3585	2.7337	0
Soft Drinks Sales	.1012	.1704	.6847	.0025	.6822	0
Cigarette Sales	.0307	.0333	.0858	.0051	.0806	4
Gasoline Consumption	.0647	.0812	.2547	.2831	.0284	4
Autos and Motorcycles	.0031	.0073	1.3453	.9388	.4066	0
Marriages	.0090	.0082	-.0992	.0941	.1933	2
Amusement Ticket Sales	.0077	.0073	-.0506	.1502	.0995	4
Automobile Registrations	.0028	.0059	1.1186	.8338	.2848	0
Passenger Bus Registrations	.0005	.0006	.1857	-.0915	.2772	0
Newspaper Circulation	.0291	.0394	.3566	.2815	.0751	4
Cinema Tickets Sold	.0036	.0034	-.0516	-.1528	.1012	3
Magazine Circulation	.0089	.0075	-.1617	-.1809	.0192	4
Temporary Housing	.0054	.0067	.2332	.0722	.1610	2

Population Estimates

The 1962 Population Estimate is	1284944
The 1964 Population Estimate is	1230916
The 1966 Population Estimate is	1335440
The 1968 Population Estimate is	1508386
The 1972 Population Estimate is	1661939

Table 13: Hidalgo. Indicators Used to Determine Intercensal Population Estimates

Hidalgo	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0175	.0257	.4702	.2506	.2196	1
Sugar Consumption	.0009	.0013	.4712	.2623	.2089	1
Primary School Enrollment	.1494	.1854	.2414	.2133	.0281	4
Secondary School Enrollment	.0063	.0176	1.7861	1.3585	.4277	0
Soft Drinks Sales	.0377	.0365	-.0315	.0025	.0340	4
Cigarette Sales	.0124	.0127	.0289	.0051	.0237	4
Gasoline Consumption	.0605	.0896	.4822	.2831	.1991	2
Autos and Motorcycles	.0033	.0116	2.4783	.9388	1.5395	0
Marriages	.0048	.0062	.2987	.0941	.2046	1
Amusement Ticket Sales	.0022	.0041	.8164	-.1502	.9665	0
Automobile Registrations	.0031	.0107	2.3991	.8338	1.5654	0
Passenger Bus Registrations	.0004	.0006	.3047	-.0915	.3961	0
Newspaper Circulation	.0171	.0126	-.2649	.2815	.5464	0
Cinema Tickets Sold	.0010	.0017	.6158	-.1528	.7686	0
Magazine Circulation	.0073	.0068	-.0705	-.1809	.1105	3
Temporary Housing	.0008	.0008	.0012	.0722	.0711	4

Population Estimates

The 1962 Population Estimate is	970720
The 1964 Population Estimate is	936305
The 1966 Population Estimate is	987052
The 1968 Population Estimate is	1082447
The 1972 Population Estimate is	1301599

Table 14: Jalisco. Indicators Used to Determine Intercensal Population Estimates

Jalisco	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0131	.0208	.5914	.2506	.3408	0
Sugar Consumption	.0025	.0036	.4501	.2623	.1878	2
Primary School Enrollment	.1286	.1911	.4860	.2133	.2728	0
Secondary School Enrollment	.0062	.0305	3.9113	1.3585	2.5528	0
Soft Drinks Sales	.2457	.2525	.0280	.0025	.0255	4
Cigarette Sales	.0518	.0547	.0549	.0051	.0497	4
Gasoline Consumption	.0983	.1439	.4636	.2831	.1805	2
Autos and Motorcycles	.0125	.0270	1.1601	.9388	.2213	1
Marriages	.0069	.0079	.1432	.0941	.0491	4
Amusement Ticket Sales	.0106	.0130	.2204	-.1502	.3706	0
Automobile Registrations	.0117	.0215	.8401	.8338	.0063	4
Passenger Bus Registrations	.0008	.0006	-.3126	-.0915	.2211	1
Newspaper Circulation	.0699	.0564	-.1924	.2815	.4739	0
Cinema Tickets Sold	.0049	.0056	.1306	-.1528	.2834	0
Magazine Circulation	.0159	.0145	-.0902	-.1809	.0907	4
Temporary Housing	.0015	.0032	1.1675	.0722	1.0952	0

Population Estimates

The 1962 Population Estimate is	2312279
The 1964 Population Estimate is	2409875
The 1966 Population Estimate is	2667392
The 1968 Population Estimate is	2840970
The 1972 Population Estimate is	3777355

Table 15: México. Indicators Used to Determine Intercensal Population Estimates

México	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0209	.0224	.0711	.2506	.1795	2
Sugar Consumption	.0009	.0015	.6303	.2623	.3680	0
Primary School Enrollment	.1508	.1837	.2182	.2133	.0050	5
Secondary School Enrollment	.0064	.0123	.9234	1.3585	.4350	0
Soft Drinks Sales	.0672	.0868	.2917	.0025	.2892	0
Cigarette Sales	.0122	.0122	.0035	.0051	.0016	5
Gasoline Consumption	.0774	.1267	.6362	.2831	.3531	0
Autos and Motorcycles	.0098	.0162	.6498	.9388	.2889	0
Marriages	.0068	.0070	.0267	.0941	.0674	4
Amusement Ticket Sales	.0040	.0039	-.0154	-.1502	.1348	3
Automobile Registrations	.0093	.0145	.5541	.8338	.2796	0
Passenger Bus Registration	.0008	.0008	.0642	-.0915	.1557	2
Newspaper Circulation	.0119	.0099	-.1638	.2815	.4453	0
Cinema Tickets Sold	.0019	.0019	-.0277	0.1528	.1251	3
Magazine Circulation	.0046	.0027	-.4253	-.1809	.2444	1
Temporary Housing	.0006	.0004	-.4168	.0722	.4890	0

Population Estimates

The 1962 Population Estimate is	2210943
The 1964 Population Estimate is	2484605
The 1966 Population Estimate is	2842570
The 1968 Population Estimate is	3466904
The 1972 Population Estimate is	3987993

Table 16: Michoacán. Indicators Used to Determine Intercensal Population Estimates

Michoacán	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0153	.0232	.5127	.2506	.2621	0
Sugar Consumption	.0017	.0025	.4289	.2623	.1666	2
Primary School Enrollment	.1377	.1852	.3451	.2133	.1318	3
Secondary School Enrollment	.0073	.0187	1.5658	1.3585	.2073	1
Soft Drinks Sales	.1297	.1749	.3487	.0025	.3462	0
Cigarette Sales	.0305	.0453	.4848	.0051	.4797	0
Gasoline Consumption	.0604	.0780	.2921	.2831	.0089	4
Autos and Motorcycles	.0039	.0098	1.5409	.9388	.6021	0
Marriages	.0073	.0082	.1222	.0941	.0281	4
Amusement Ticket Sales	.0081	.0092	.1376	-.1502	.2878	0
Automobile Registrations	.0037	.0086	1.3425	.8338	.5087	0
Passenger Bus Registration	.0006	.0003	-.5726	-.0915	.4811	0
Newspaper Circulation	.0286	.0202	-.2928	.2815	.5743	0
Cinema Tickets Sold	.0039	.0045	.1408	-.1528	.2937	0
Magazine Circulation	.0073	.0064	-.1243	-.1809	.0566	4
Temporary Housing	.0013	.0026	1.0262	.0722	.9539	0

Population Estimates

The 1962 Population Estimate is	1841640
The 1964 Population Estimate is	1975555
The 1966 Population Estimate is	1979151
The 1968 Population Estimate is	2070039
The 1972 Population Estimate is	2399275

Table 17: Morelos. Indicators Used to Determine Intercensal Population Estimates

Morelos	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0362	.0365	.0077	.2506	.2429	1
Sugar Consumption	.0023	.0037	.6204	.2623	.3582	0
Primary School Enrollment	.2029	.1868	-.0792	.2133	.2924	0
Secondary School Enrollment	.0177	.0379	1.1442	1.3585	.2143	1
Soft Drinks Sales	.1554	.2176	.4006	.0025	.3981	0
Cigarette Sales	.0497	.0409	-.1774	.0051	.1825	2
Gasoline Consumption	.1196	.1503	.2566	.2831	.0265	4
Autos and Motorcycles	.0131	.0239	.8250	.9388	.1138	3
Marriages	.0074	.0081	.0935	.0941	.0006	5
Amusement Ticket Sales	.0141	.0096	-.3242	-.1502	.1740	2
Automobile Registrations	.0122	.0202	.6499	.8338	.1839	2
Passenger Bus Registrations	.0006	.0009	.5281	-.0915	.6196	0
Newspaper Circulation	.0285	.0081	-.7150	.2815	.9966	0
Cinema Tickets Sold	.0069	.0044	-.3596	-.1528	.2068	1
Magazine Circulation	.0209	.0132	-.3647	-.1809	.1837	2
Temporary Housing	.0059	.0050	-.1488	.0722	.2210	1

Population Estimates

The 1962 Population Estimate is	376937
The 1964 Population Estimate is	433168
The 1966 Population Estimate is	472865
The 1968 Population Estimate is	520961
The 1972 Population Estimate is	725699

Table 18: Nayarit. Indicators Used to Determine Intercensal Population Estimates

Nayarit	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0181	.0263	.4586	.2506	.2080	1
Sugar Consumption	.0023	.0027	.1980	.2623	.0642	4
Primary School Enrollment	.1771	.2074	.1711	.2133	.0421	4
Secondary School Enrollment	.0171	.0397	1.3280	1.3585	.0305	4
Soft Drinks Sales	.1924	.1647	-.1440	.0025	.1465	3
Cigarette Sales	.0689	.0581	-.1560	.0051	.1612	2
Gasoline Consumption	.1071	.1210	.1296	.2831	.1535	2
Autos and Motorcycles	.0045	.0122	1.6901	.9388	.7513	0
Marriages	.0047	.0053	.1229	.0941	.0288	4
Amusement Ticket Sales	.0131	.0100	-.2370	-.1502	.0868	4
Automobile Registrations	.0044	.0082	.8342	.8338	.0005	5
Passenger Bus Registrations	.0007	.0005	-.3058	-.0915	.2144	1
Newspaper Circulation	.0495	.0478	-.0344	.2815	.3160	0
Cinema Tickets Sold	.0065	.0050	-.2422	-.1528	.0894	4
Magazine Circulation	.0133	.0111	-.1660	-.1809	.0149	4
Temporary Housing	.0020	.0034	.7260	.0722	.6537	0

Population Estimates

The 1962 Population Estimate is	416009
The 1964 Population Estimate is	421279
The 1966 Population Estimate is	454126
The 1968 Population Estimate is	505167
The 1972 Population Estimate is	547715

Table 19: Nuevo León. Indicators Used to Determine Intercensal Population Estimates

Nuevo León	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference Of the Indicator	Score	Weight
Beer Consumption	.0357	.0482	.3493	.2506	.0987	4
Sugar Consumption	.0036	.0040	.0982	.2623	.1641	2
Primary School Enrollment	.1715	.2097	.2228	.2133	.0096	4
Secondary School Enrollment	.0318	.0559	.7603	1.3585	.5981	0
Soft Drinks Sales	.4868	.4009	-.1766	.0025	.1791	2
Cigarette Sales	.0682	.0602	-.1173	.0051	.1224	3
Gasoline Consumption	.1844	.2183	.1840	.2831	.0991	4
Autos and Motorcycles	.0258	.0419	.6245	.9388	.3143	0
Marriages	.0086	.0090	.0503	.0941	.0438	4
Amusement Ticket Sales	.0226	.0172	-.2389	-.1502	.0887	4
Automobile Registrations	.0252	.0377	.4970	.8338	.3368	0
Passenger Bus Registrations	.0006	.0008	.3163	-.0915	.4078	0
Newspaper Circulation	.1553	.1829	.1782	.2815	.1033	3
Cinema Tickets Sold	.0104	.0078	-.2478	-.1528	.0950	4
Magazine Circulation	.0276	.0217	-.2116	-.1809	.0307	4
Temporary Housing	.0023	.0020	-.1447	.0722	.2169	1

Population Estimates

The 1962 Population Estimate is	1125416
The 1964 Population Estimate is	1180771
The 1966 Population Estimate is	1285158
The 1968 Population Estimate is	1500658
The 1972 Population Estimate is	1675293

Table 20: Oaxaca. Indicators Used to Determine Intercensal Population Estimates

Oaxaca	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0121	.0191	.5723	.2506	.3217	0
Sugar Consumption	.0010	.0015	.4285	.2623	.1663	2
Primary School Enrollment	.1144	.1777	.5527	.2133	.3394	0
Secondary School Enrollment	.0033	.0116	2.5388	1.3585	1.1803	0
Soft Drinks Sales	.0434	.0578	.3316	.0025	.3291	0
Cigarette Sales	.0243	.0188	-.2255	.0051	.2306	1
Gasoline Consumption	.0349	.0550	.5760	.2831	.2929	0
Autos and Motorcycles	.0016	.0049	2.1644	.9388	1.2256	0
Marriages	.0038	.0044	.1366	.0941	.0425	4
Amusement Ticket Sales	.0018	.0023	.3251	-.1502	.4753	0
Automobile Registrations	.0015	.0043	1.8421	.8338	1.0084	0
Passenger Bus Registrations	.0004	.0002	-.6093	-.0915	.5179	0
Newspaper Circulation	.0082	.0119	.4485	.2815	.1670	2
Cinema Tickets Sold	.0009	.0012	.3268	-.1528	.4796	0
Magazine Circulation	.0057	.0054	-.0498	-.1809	.1311	3
Temporary Housing	.0007	.0015	.9986	.0722	.9264	0

Population Estimates

The 1962 Population Estimate is	1622987
The 1964 Population Estimate is	1746189
The 1966 Population Estimate is	1764174
The 1968 Population Estimate is	1861660
The 1972 Population Estimate is	2697079

Table 21: Puebla. Indicators Used to Determine Intercensal Population Estimates

Puebla	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0157	.0191	.2140	.2506	.0366	4
Sugar Consumption	.0017	.0025	.4205	.2623	.1582	2
Primary School Enrollment	.1371	.1685	.2290	.2133	.0157	4
Secondary School Enrollment	.0150	.0291	.9332	1.3585	.4253	0
Soft Drinks Sales	.2509	.1354	-.4604	.0025	.4629	0
Cigarette Sales	.0241	.0234	-.0307	.0051	.0358	4
Gasoline Consumption	.0705	.0936	.3292	.2831	.0460	4
Autos and Motorcycles	.0062	.0142	1.2921	.9388	.3533	0
Marriages	.0057	.0065	.1460	.0941	.0519	4
Amusement Ticket Sales	.0043	.0063	.4671	-.1502	.6172	0
Automobile Registrations	.0060	.0130	1.1688	.8338	.3351	0
Passenger Bus Registrations	.0006	.0004	-.3358	-.0915	.2443	1
Newspaper Circulation	.0337	.0460	.3648	.2815	.0833	4
Cinema Tickets Sold	.0038	.0028	-.2612	-.1528	.1083	3
Magazine Circulation	.0124	.0103	-.1675	-.1809	.0134	4
Temporary Housing	.0011	.0015	.3433	.0722	.2711	0

Population Estimates

The 1962 Population Estimate is	1921973
The 1964 Population Estimate is	2101301
The 1966 Population Estimate is	2191635
The 1968 Population Estimate is	2340375
The 1972 Population Estimate is	2584926

Table 22: Querétaro. Indicators Used to Determine Intercensal Population Estimates

Querétaro	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0149	.0243	.6317	.2506	.3810	0
Sugar Consumption	.0020	.0029	.4373	.2623	.1751	2
Primary School Enrollment	.1202	.1746	.4523	.2133	.2391	1
Secondary School Enrollment	.0072	.0240	2.3545	1.3585	.9960	0
Soft Drinks Sales	.1902	.2856	.5016	.0025	.4991	0
Cigarette Sales	.0374	.0389	.0382	.0051	.0331	4
Gasoline Consumption	.1198	.1692	.4121	.2831	.1289	3
Autos and Motorcycles	.0054	.0153	1.8157	.9388	.8769	0
Marriages	.0067	.0072	.0666	.0941	.0275	4
Amusement Ticket Sales	.0036	.0058	.5925	-.1502	.7427	0
Automobile Registrations	.0052	.0131	1.5022	.8338	.6684	0
Passenger Bus Registrations	.0002	.0004	.6564	-.0915	.7478	0
Newspaper Circulation	.0282	.0230	-.1852	.2815	.4667	0
Cinema Tickets Sold	.0018	.0028	.5785	-.1528	.7313	0
Magazine Circulation	.0103	.0090	-.1272	-.1809	.0537	4
Temporary Housing	.0019	.0026	.3898	.0722	.3176	0

Population Estimates

The 1962 Population Estimate is	322914
The 1964 Population Estimate is	372207
The 1966 Population Estimate is	399742
The 1968 Population Estimate is	426054
The 1972 Population Estimate is	499379

Table 23: Quintana Roo T. Indicators Used to Determine Intercensal Population Estimates

Quintana Roo T	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0185	.0386	1.0846	.2506	.8339	0
Sugar Consumption	.0012	.0009	-.2186	.2623	.4809	0
Primary School Enrollment	.1850	.1921	.0385	.2133	.1747	2
Secondary School Enrollment	.0059	.0126	1.1434	1.3585	.2151	1
Soft Drinks Sales	0.0000	0.0000	0.0000	.0025	.0025	5
Cigarette Sales	.0250	.0315	.2575	.0051	.2524	0
Gasoline Consumption	.0111	.1526	12.7687	.2831	12.4856	0
Autos and Motorcycles	.0057	.0190	2.3196	.9388	1.3808	0
Marriages	.0044	.0121	1.7781	.0941	1.6840	0
Amusement Ticket Sales	.0018	.0216	11.0277	-.1502	11.1778	0
Automobile Registrations	.0049	.0113	1.3135	.8338	.4798	0
Passenger Bus Registrations	.0002	.0005	1.5295	-.0915	1.6209	0
Newspaper Circulation	0.0000	0.0000	0.0000	.2815	.2815	0
Cinema Tickets Sold	.0009	.0108	11.0277	-.1528	11.1805	0
Magazine Circulation	.0146	.0094	-.3564	-.1809	.1755	2
Temporary Housing	.0013	.0096	6.1948	.0722	6.1226	0

Population Estimates

The 1962 Population Estimate is	62369
The 1964 Population Estimate is	65536
The 1966 Population Estimate is	68245
The 1968 Population Estimate is	87231
The 1972 Population Estimate is	95226

Table 24: San Luis Potosí. Indicators Used to Determine Intercensal Population Estimates

San Luis Potosí	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0175	.0218	.2489	.2506	.0017	5
Sugar Consumption	.0020	.0025	.2614	.2623	.0008	5
Primary School Enrollment	.1515	.1848	.2194	.2133	.0061	4
Secondary School Enrollment	.0100	.0244	1.4427	1.3585	.0843	4
Soft Drinks Sales	.1145	.1878	.6396	.0025	.6371	0
Cigarette Sales	.0414	.0412	-.0052	.0051	.0103	4
Gasoline Consumption	.0808	.0921	.1389	.2831	.1442	3
Autos and Motorcycles	.0055	.0136	1.4482	.9388	.5094	0
Marriages	.0075	.0065	-.1372	.0941	.2313	1
Amusement Ticket Sales	.0075	.0072	-.0499	-.1502	.1002	3
Automobile Registrations	.0053	.0104	.9771	.8338	.1433	3
Passenger Bus Registrations	.0003	.0005	.6185	-.0915	.7100	0
Newspaper Circulation	.0383	.0741	.9319	.2815	.6504	0
Cinema Tickets Sold	.0037	.0034	-.0879	-.1528	.0649	4
Magazine Circulation	.0113	.0096	-.1464	-.1809	.0345	4
Temporary Housing	.0019	.0021	.0820	.0722	.0098	4

Population Estimates

The 1962 Population Estimate is	1114230
The 1964 Population Estimate is	1053675
The 1966 Population Estimate is	1132886
The 1968 Population Estimate is	1203750
The 1972 Population Estimate is	1290949

Table 25: Sinaloa. Indicators Used to Determine Intercensal Population Estimates

Sinaloa	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0274	.0344	.2566	.2506	.0060	4
Sugar Consumption	.0032	.0033	.0278	.2623	.2345	1
Primary School Enrollment	.1891	.2170	.1477	.2133	.0655	4
Secondary School Enrollment	.0081	.0313	2.8569	1.3585	1.4984	0
Soft Drinks Sales	.3580	.2323	-.3511	.0025	.3536	0
Cigarette Sales	.0876	.0749	-.1458	.0051	.1509	2
Gasoline Consumption	.1700	.1777	.0453	.2831	.2378	1
Autos and Motorcycles	.0095	.0187	.9628	.9388	.0241	4
Marriages	.0062	.0074	.1876	.0941	.0935	4
Amusement Ticket Sales	.0148	.0094	-.3647	-.1502	.2146	1
Automobile Registrations	.0092	.0157	.7001	.8338	.1336	3
Passenger Bus Registrations	.0009	.0009	.0610	-.1915	.1524	2
Newspaper Circulation	.0779	.0849	.0901	.2815	.1914	2
Cinema Tickets Sold	.0014	.0047	2.3009	-.1528	2.4537	0
Magazine Circulation	.0195	.0170	-.1267	-.1809	.0542	4
Temporary Housing	.0017	.0030	.7588	.0722	.6866	0

Population Estimates

The 1962 Population Estimate is	978032
The 1964 Population Estimate is	973709
The 1966 Population Estimate is	1094726
The 1968 Population Estimate is	1099959
The 1972 Population Estimate is	1407365

Table 26: Sonora. Indicators Used to Determine Intercensal Population Estimates

Sonora	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0363	.0495	.3623	.2506	.1117	3
Sugar Consumption	.0033	.0034	.0121	.2623	.2502	0
Primary School Enrollment	.1877	.2103	.1204	.2133	.0928	4
Secondary School Enrollment	.0132	.0255	.9310	1.3585	.4274	0
Soft Drinks Sales	.2586	.1878	-.2737	.0025	.2762	0
Cigarette Sales	.0930	.0848	-.0879	.0051	.0930	4
Gasoline Consumption	.2571	.3247	.2626	.2831	.0205	4
Autos and Motorcycles	.0245	.0411	.6788	.9388	.2600	0
Marriages	.0079	.0090	.1478	.0941	.0537	4
Amusement Ticket Sales	.0185	.0117	-.3679	-.1502	.2177	1
Automobile Registrations	.0242	.0348	.4390	.8338	.3948	0
Passenger Bus Registrations	.0011	.0005	-.4939	-.0915	.4025	0
Newspaper Circulation	.1315	.1151	-.1243	.2815	.4059	0
Cinema Tickets Sold	.0090	.0055	-.3911	-.1528	.2383	1
Magazine Circulation	.0330	.0280	-.1517	-.1809	.0292	4
Temporary Housing	.0030	.0031	.0298	.0722	.0424	4

Population Estimates

The 1962 Population Estimate is	794911
The 1964 Population Estimate is	851346
The 1966 Population Estimate is	884311
The 1968 Population Estimate is	1008966
The 1972 Population Estimate is	1150564

Table 27: Tabasco. Indicators Used to Determine Intercensal Population Estimates

Tabasco	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0172	.0304	.7643	.2506	.5136	0
Sugar Consumption	.0044	.0026	-.4141	.2623	.6764	0
Primary School Enrollment	.2066	.1829	-.1147	.2133	.3279	0
Secondary School Enrollment	.0017	.0119	6.1427	1.3585	4.7843	0
Soft Drinks Sales	.0907	.0884	-.0249	.0025	.0274	4
Cigarette Sales	.0389	.0300	-.2281	.0051	.2332	1
Gasoline Consumption	.0705	.0969	.3760	.2831	.0928	4
Autos and Motorcycles	.0039	.0078	.9994	.9388	.0607	4
Marriages	.0063	.0069	.1029	.0941	.0088	4
Amusement Ticket Sales	.0060	.0063	.0453	-.1502	.1954	2
Automobile Registrations	.0038	.0067	.7740	.8338	.0598	4
Passenger Bus Registrations	.0010	.0004	-.5560	-.0915	.4645	0
Newspaper Circulation	.0363	.0286	-.2104	.2815	.4920	0
Cinema Tickets Sold	.0030	.0031	.0217	-.1528	.1746	2
Magazine Circulation	.0093	.0079	-.1519	-.1809	.0290	4
Temporary Housing	.0007	.0017	1.5821	.0722	1.5098	0

Population Estimates

The 1962 Population Estimate is	505036
The 1964 Population Estimate is	549952
The 1966 Population Estimate is	630621
The 1968 Population Estimate is	696405
The 1972 Population Estimate is	835020

Table 28: Tamaulipas. Indicators Used to Determine Intercensal Population Estimates

Tamaulipas	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0395	.0405	.0261	.2506	.2246	1
Sugar Consumption	.0033	.0035	.0825	.2623	.1798	2
Primary School Enrollment	.1775	.2028	.1429	.2133	.0704	4
Secondary School Enrollment	.0142	.0378	1.6551	1.3585	.2966	0
Soft Drinks Sales	.4469	.3595	-.1955	.0025	.1980	2
Cigarette Sales	.0744	.0622	-.1644	.0051	.1696	2
Gasoline Consumption	.1935	.1954	.0100	.2831	.2731	0
Autos and Motorcycles	.0152	.0177	.1640	.9388	.7747	0
Marriages	.0077	.0077	.0013	.0941	.0928	4
Amusement Ticket Sales	.0204	.0195	-.0406	-.1502	.1096	3
Automobile Registrations	.0151	.0166	.0972	.8338	.7365	0
Passenger Bus Registrations	.0006	.0009	.4756	-.0915	.5671	0
Newspaper Circulation	.1522	.2423	.5921	.2815	.3106	0
Cinema Tickets Sold	.0094	.0094	-.0053	-.1528	.1475	3
Magazine Circulation	.0333	.0270	-.1895	-.1809	.0086	4
Temporary Housing	.0040	.0040	.0005	.0722	.0717	4

Population Estimation

The 1962 Population Estimate is	1106209
The 1964 Population Estimate is	1175176
The 1966 Population Estimate is	1233257
The 1968 Population Estimate is	1343559
The 1972 Population Estimate is	1506182

Table 29: Tlaxcala. Indicators Used to Determine Intercensal Population Estimates

Tlaxcala	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0110	.0169	.5317	.2506	.2811	0
Sugar Consumption	.0010	.0017	.5915	.2623	.3293	0
Primary School Enrollment	.1818	.2099	.1548	.2133	.0585	4
Secondary School Enrollment	.0102	.0219	1.1599	1.3585	.1986	2
Soft Drinks Sales	0.0000	0.0000	0.0000	.0025	.0025	5
Cigarette Sales	.0091	.0104	.1399	.0051	.1347	3
Gasoline Consumption	.0639	.1043	.6317	.2831	.3485	0
Autos and Motorcycles	.0046	.0136	1.9373	.9388	.9985	0
Marriages	.0089	.0092	.0351	.0941	.0589	4
Amusement Ticket Sales	.0025	.0036	.4386	-.1502	.5888	0
Automobile Registrations	.0046	.0128	1.7972	.8338	.9634	0
Passenger Bus Registrations	.0004	.0005	.3408	-.0915	.4323	0
Newspaper Circulation	.0173	.0288	.6615	.2815	.3800	0
Cinema Tickets Sold	.0012	.0018	.4458	-.1528	.5986	0
Magazine Circulation	.0056	.0066	.1850	-.1809	.3659	0
Temporary Housing	.0005	.0007	.3650	.0722	.2927	0

Population Estimates

The 1962 Population Estimate is	355833
The 1964 Population Estimate is	373887
The 1966 Population Estimate is	378485
The 1968 Population Estimate is	410098
The 1972 Population Estimate is	432856

Table 30: Veracruz. Indicators Used to Determine Intercensal Population Estimates

Veracruz	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0332	.0352	.0601	.2506	.1906	2
Sugar Consumption	.0024	.0030	.2467	.2623	.0155	4
Primary School Enrollment	.1637	.1776	.0847	.2133	.1285	3
Secondary School Enrollment	.0117	.0215	.8433	1.3585	.5151	0
Soft Drinks Sales	.1733	.1278	-.2624	.0025	.2649	0
Cigarette Sales	.0346	.0313	-.0943	.0051	.0995	4
Gasoline Consumption	.0923	.0978	.0590	.2831	.2241	1
Autos and Motorcycles	.0050	.0100	1.0060	.9388	.0672	4
Marriages	.0046	.0054	.1710	.0941	.0769	4
Amusement Ticket Sales	.0086	.0071	-.1768	-.1502	.0267	4
Automobile Registrations	.0048	.0089	.8633	.8338	.0295	4
Passenger Bus Registrations	.0004	.0004	.0731	-.0915	.1645	2
Newspaper Circulation	.0456	.0442	-.0308	.2815	.3123	0
Cinema Tickets Sold	.0041	.0034	-.1735	-.1528	.0207	4
Magazine Circulation	.0172	.0141	-.1801	-.1809	.0008	5
Temporary Housing	.0022	.0030	.3851	.0722	.3128	0

Population Estimates

The 1962 Population Estimate is	2761862
The 1964 Population Estimate is	3453881
The 1966 Population Estimate is	3531462
The 1968 Population Estimate is	3661641
The 1972 Population Estimate is	3778450

Table 31: Yucatán. Indicators Used to Determine Intercensal Population Estimates

Yucatán	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0306	.0336	.0965	.2506	.1541	2
Sugar Consumption	.0033	.0039	.1727	.2623	.0896	4
Primary School Enrollment	.1764	.1981	.1229	.2133	.0903	4
Secondary School Enrollment	.0099	.0303	2.0701	1.3585	.7116	0
Soft Drinks Sales	.2810	.3509	.2485	.0025	.2460	1
Cigarette Sales	.0442	.0311	-.2949	.0051	.3000	0
Gasoline Consumption	.0926	.1462	.5790	.2831	.2959	0
Autos and Motorcycles	.0121	.0245	1.0177	.9388	.0789	4
Marriages	.0076	.0094	.2433	.0941	.1492	3
Amusement Ticket Sales	.0188	.0130	-.3082	-.1502	.1581	2
Automobile Registrations	.0095	.0169	.7725	.8338	.0612	4
Passenger Bus Registrations	.0008	.0006	-.2261	-.0915	.1346	3
Newspaper Circulation	.1084	.1374	.2682	.2815	.0133	4
Cinema Tickets Sold	.0085	.0065	-.2456	-.1528	.0928	4
Magazine Circulation	.0189	.0177	-.0651	-.1809	.1158	3
Temporary Housing	.0008	.0024	2.0858	.0722	2.0136	0

Population Estimates

The 1962 Population Estimate is	661810
The 1964 Population Estimate is	680750
The 1966 Population Estimate is	686293
The 1968 Population Estimate is	700908
The 1972 Population Estimate is	819119

Table 32: Zacatecas. Indicators Used to Determine Intercensal Population Estimates

Zacatecas	1960 Per Capita Rate	1970 Per Capita Rate	Relative Difference	Average Relative Difference of the Indicator	Score	Weight
Beer Consumption	.0074	.0121	.6394	.2506	.3887	0
Sugar Consumption	.0011	.0014	.2874	.2623	.0252	4
Primary School Enrollment	.1296	.2075	.6008	.2133	.3875	0
Secondary School Enrollment	.0027	.0140	4.2448	1.3585	2.8864	0
Soft Drinks Sales	.0092	.0931	9.1460	.0025	9.1435	0
Cigarette Sales	.0346	.0314	-.0931	.0051	.0982	4
Gasoline Consumption	.0405	.0729	.7979	.2831	.5147	0
Autos and Motorcycles	.0016	.0036	1.2075	.9388	.2687	0
Marriages	.0080	.0074	-.0672	.0941	.1613	2
Amusement Ticket Sales	.0038	.0055	.4603	-.1502	.6105	0
Automobile Registrations	.0016	.0035	1.1991	.8338	.3654	0
Passenger Bus Registrations	.0002	.0005	1.0515	-.0915	1.1430	0
Newspaper Circulation	.0163	.0290	.7848	.2815	.5032	0
Cinema Tickets Sold	.0019	.0027	.4585	-.1528	.6113	0
Magazine Circulation	.0054	.0053	-.0187	-.1809	.1622	2
Temporary Housing	.0008	.0016	.9171	.0722	.8448	0

Population Estimates

The 1962 Population Estimate is	754684
The 1964 Population Estimate is	777718
The 1966 Population Estimate is	812889
The 1968 Population Estimate is	885175
The 1972 Population Estimate is	962228

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