THE LOCATION PATTERN OF THE LARGEST MANUFACTURING CORPORATIONS AND ITS IMPACT ON RURAL AREAS ECONOMIC GROWTH: A CASE ANALYSIS FOR THE STATES OF MICHIGAN AND CALIFORNIA

By

Yvon Proulx

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Agricultural Economics

1974

ABSTRACT

THE LOCATION PATTERN OF THE LARGEST MANUFACTURING CORPORATIONS AND ITS IMPACT ON RURAL AREAS ECONOMIC GROWTH: A CASE ANALYSIS FOR THE STATES OF MICHIGAN AND CALIFORNIA

By

Yvon Proulx

Between 1950 and 1970, the population and economic activities of this country have been predominantly settling into the suburban ring of the large metropolitan areas and moving away from the nonmetropolitan areas and the central cities of the largest metropolitan areas. This settlement trend does not appear to be socially accepted. Public statements accompanying the signing into law of a new legislation on nonmetro development indicate that there is an increased determination to promote a more balanced demographic growth and to strengthen economic opportunities in rural areas. There are good reasons to believe this is a justified objective.

The new legislation, however, seems to be of an incremental nature. It strengthens nonmetropolitan program planning and coordination, broadens the definition of rural areas and program coverage and expands the funds available.

It does not change the basic approach which has been followed thus far in this country and others but failed to bring about the desired population settlement and economic activities distribution patterns.

In this research, it is argued that this approach, which attempts to increase the attractiveness of rural and depressed areas through the financing of infrastructural and production facilities and provides inducement for enterprises to locate in these areas, is a weak one. We argue that it rests on an inadequate theoretical understanding of the way the current settlement and distribution patterns are generated. A number of theoretical arguments, mostly derived from a review of location and area growth theories, are developed to support the hypothesis that the most important determinant of area growth differentials is the choice of locations of the largest manufacturing corporations. Specifically we argue that this choice is relatively free with respect both to the traditional location factors and the type of public programs desired from them. It is also suggested that the largest manufacturing firms are in a privileged position to act as location leaders or to set the pattern of the spatial distribution of population and economic activities.

The empirical part of the research starts with a descriptive analysis of the geographic distribution of the employment of the largest manufacturing corporations and its

relation to area growth in Michigan and California between 1960 and 1970.

The two states are divided into multi-county areas defined as Basic Trading Areas (BTAs) and already used in an ERS study of the regional variations in economic growth. The firms included in the analysis are the Fortune Magazine's 200 largest industrial corporations plus the 30 of the next 300 largest which had their headquarters in either Michigan or California in 1970. Their employment figures are taken from the Sales Management Directory of Key Plants.

The description shows that the firms included have a very high proportion of their employment in BTAs including an SMSA, that they increase their employment mostly in these areas and that the population and total employment of an area follow quite closely the change in the employment of these firms.

We proceed then to a regression analysis in which we attempt to explain the variability of a dependent variable defined as the comparative gain in employment of an area between 1960 and 1970 by the change in employment of the firms included during the period and a number of other variables believed to influence the growth of an area. The results strongly support our hypothesis since more than 90 percent of the variability of the dependent variable is explained by the model and the variable measuring the change in the activities of the largest firms has, by far, the largest beta weight.

Although some weaknesses of the analysis and the nature of the methodology used prevent us from concluding categorically that the hypothesis is valid, it is believed that the weight of the evidence supports this conclusion.

The major implication of the analysis is that, if we really want to enhance rural areas economic growth, public policy will have to deal with the choice of the location of expansion for the largest manufacturing corporations. This, in turn, will require more than incentives supplied through the market. Public policy will have to leave to the largest firms no alternatives other than to align their location patterns with the public interest.

PREFACE

In the process of preparing a term paper on the question of rural community development, I came across an article by Professor Charles Tiebout which gave rise to the idea investigated in this thesis. The article reports one result of research conducted by Delano at the University of Washington indicating that, in the redevelopment county of Yakima during the period under study, no new branch plant of manufacturing firms located in the area, while over 30 new businesses started up locally [Tiebout, 1965]. Tiebout indicates that some of them have since failed and others may remain small. Nevertheless he expresses the view that "here is, perhaps, that area's real hope for the future." In other words, the development potential of an area lies within the community, in the hands of local people willing and encouraged to start a new business.

At this time, I had just taken a course on industrial organization and read Adam's book on the Structure of American Industry which discusses the problems of global and market concentration in the American economy, monopoly and competition, barriers to entry, etc. [Adams, 1961]. It was not difficult for me to understand that some of Yakima's new businesses had failed and others would remain

small. It was more difficult to imagine a very bright future for redevelopment areas, all competing for more economic activities, if, to generate this activity, they had to rely only on that share of new capital investment not controlled by the largest firms.

This led me further to wonder why the largest firms might not be attracted to rural and depressed areas, might not respond to public incentive to do so. Turning the coin upside down, I wondered if the location pattern of these firms might not be an important determinant of the existence of depressed areas on one hand and extremely large metropolitan areas on the other. I wondered if the problems of both rural and urban areas, generally discussed in two separate segments of the literature, might not be two aspects of the same global settlement problem.

This thesis attempts to contribute elements of an answer to some of these questions. It especially investigates the significance of the contribution of the largest manufacturing corporations to area differentials in economic growth, in an attempt to identify a stronger policy tool to alter in favor of rural areas the current growth and settlement trends.

The first chapter discusses the nature of the settlement problem which motivated this work; it suggests a need for further research on the question and elaborates the hypothesis and objectives of the research. The second

chapter attempts to support the hypothesis formulated with a theoretical base. The third presents the methodology designed to test this hypothesis. The fourth chapter reports and discusses the findings of the research and the fifth and final chapter draws some policy implications from the findings.

The author wishes to express his appreciation to the members of his Guidance Committee: Dr. J. T. Bonnen, Dr. D. E. Chappelle, Dr. L. V. Manderscheid, Dr. J. D. Shaffer and Dr. A. Y. C. Koo for their assistance during his graduate program at Michigan State University.

Special thanks are given to the first four of these persons who also served on the Thesis Committee. Dr. Bonnen's encouragement, assistance, advice and the many hours spent brushing-up the author's English and Dr. Manderscheid's comments and suggestions on the statistical part of the research were especially helpful.

Appreciation is extended to the Conseil des Recherches Agricoles du Québec, the Conseil des Arts du Canada and Laval University for their financial assistance during the author's graduate studies.

The author is also indebted to his wife, Lise, for her assistance and comprehension throughout his undergraduate and graduate studies.

Any error or omissions found in this manuscript are solely the responsibility of the author.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

THE PROBLEM, JUSTIFICATION, HYPOTHESIS AND OBJECTIVES OF THE RESEARCH

The Problem

In his presidential address at the 1973 annual meeting of the American Agricultural Economics Association, Kenneth Tefertiller invites us to examine the problem of rural development in a broad perspective. He suggests that "a rural development policy has to address itself to the basic questions of where people are going to live and work in the future and under what conditions" [Tefertiller, 1973].

This, we believe, is correct. Thus, before proceeding to indicate what this research attempts to contribute to rural development policy, we will first examine where people have lived in the past, where the current trends are leading them and what problems seem to be involved in these trends.

Population Settlement and Economic Activities Distribution Patterns

Between 1950 and 1970, the population of the United States increased by 51.8 million people. Approximately 86 percent of this increase occurred in areas designated as

Standard Metropolitan Statistical Areas, while the remaining 14 percent of the population increase was added to non-metropolitan areas, (see Table 1).

The population of this country is expected to grow further. If one takes the average of the two extreme population projections made by the Census Bureau as an accurate expectation, the U.S. population by 1990 would be 253 million inhabitants or 50 million more than in 1970 [U.S. Bureau of Census, 1972]. Assuming that the SMSAs will capture 80 percent[1] (or a slightly smaller share than in the past) of this increase, they will have to accomodate 40 million more people. Their share of the total population in 1990 would be 71 percent as compared to 62.5 in 1950 (Table 1).

A closer look at the last two decades' growth of population in metropolitan areas reveals that the SMSAs having between 1 and 3 million inhabitants grew at the fastest rate. In fact, these 27 SMSAs plus the 6 having 3 million inhabitants or more captured 58.4 percent of the growth of the SMSAs (Table 2). At this rate, which was about the same for the two decades, they would have to locate 23 million more people by 1990 while the other 210 SMSAs would greet 17

---

[1]This is the percentage used by Anthony Downs in making a similar projection based on a somewhat smaller expected growth for the total U.S. population [Downs, 1970]. It seems justified since the gain has been smaller in the 1960s than in the 1950s.

Table 1. Population and Population Change in the United States, Metropolitan (SMSA) and Nonmetropolitan Areas, 1950-1970*

Location	Population			Population Change					
	1970	1960	1950	1960-70		1950-60		1950-70	
	(in 000's)								
United States	203,212	179,323	151,326	23,889		27,997		51,886	
SMSA	139,419	119,595	94,579	19,824		25,016		44,840	
Central City	63,797	59,947	53,696	3,850		6,251		10,101	
Outside Central City	75,622	59,648	40,883	15,974		18,765		34,739	
Nonmetropolitan	63,793	59,728	56,747	4,065		2,981		7,046	
	(Percentage Distribution)			Percent Change	Percent of U.S. Change	Percent Change	Percent of U.S. Change	Percent Change	Percent of U.S. Change
United States	100.0	100.0	100.0	13.3	100.0	18.5	100.0	34.3	100.0
SMSA	68.6	66.7	62.5	16.6	83.0	26.4	89.4	47.4	86.4
Central City	31.4	33.4	35.5	6.4	16.1	11.6	22.3	18.8	19.5
Outside Central City	37.2	33.3	27.0	26.8	66.9	45.9	67.1	85.0	66.9
Nonmetropolitan	31.4	33.3	37.5	6.8	17.0	5.3	10.6	12.4	13.6

*Figures relate to areas as defined for 1970 (243 SMSAs).

Source: U.S. Bureau of the Census, U.S. Census of Population: 1970, Number of Inhabitants, Final Report, PC(1)-A1, United States Summary, Washington, D.C., 1971.

Table 2. Population and Population Change by Size Class of SMSAs in the United States, 1950-1970.*

Size of SMSA	# of Areas	Population			Population Change					
		1970	1960	1950	1960-70		1950-60		1950-70	
		(in 000's)								
3,000 or more	6	37,710	33,708	27,709	4,002		5,999		10,001	
1,000 to 3,000	27	42,946	35,362	26,755	7,584		8,607		16,191	
500 to 1,000	32	21,936	18,588	14,424	3,348		4,164		7,512	
250 to 500	60	19,761	16,992	13,364	2,769		3,628		6,397	
100 to 250	92	14,973	13,081	10,736	1,892		2,345		4,237	
Less than 100	26	2,091	1,862	1,531	229		331		560	
		(Percent Distribution)			Percent Change	Percent of SMSAs Change	Percent Change	Percent of SMSAs Change	Percent Change	Percent of SMSAs Change
3,000,000 or more		27.0	28.2	29.3	11.9	20.2	21.7	23.9	36.1	22.3
1,000,000 to 3,000,000		30.8	29.6	28.3	21.4	38.3	32.2	34.3	60.5	36.1
500,000 to 1,000,000		15.7	15.5	15.3	18.0	16.9	28.9	16.6	52.1	16.7
250,000 to 500,000		14.2	14.2	14.1	16.3	14.0	27.1	14.5	47.9	14.2
100,000 to 250,000		10.7	10.9	11.4	14.5	9.5	21.8	9.4	39.5	9.4
Less than 100,000		1.5	1.6	1.6	12.3	1.2	21.6	1.3	36.6	1.2

*Figures relate to areas as defined for 1970 (243 SMSAs).

Source: U.S. Bureau of the Census, U.S. Census of Population: 1970, Number of Inhabitants, Final Report, PC(1)-A1, United States Summary, Washington, D.C., 1971.

million people and the 14,557 small towns and villages and the countryside of the nonmetropolitan areas would add only about 10 million to their population. This would bring the proportion of the total population in these 33 largest SMSAs to 41 percent from 36 percent that was in 1950.[2]

The trends examined thus far do not however reveal the whole picture. It could have been noted from the data presented above that the population of the nonmetropolitan areas and of the central cities of the metropolitan areas has been growing at a much smaller rate than the average for the nation as a whole. It suggests that these areas have suffered a negative net migration. This trend is documented in Table 3 which shows the composition of the population change in the various types of areas of the country. It can be observed that the net migration is negative for both the nonmetropolitan areas and the central cities of the metropolitan areas, that the most important net out-migration is from the central cities of the largest SMSAs while the largest net in-migration is into the suburban ring of the largest SMSAs.

---

[2]Using the assumptions made here to project the 1990 population, we have the following picture:

	Population in 1990, millions	Percentage Distribution 1990	1970	1960	1950
United States	253	100.0	100.0	100.0	100.0
SMSAs	179	70.8	68.6	66.7	62.5
33 largest SMSAs	104	41.1	39.7	38.5	36.1
Other SMSAs	75	29.6	28.9	28.2	26.4
Nonmetropolitan areas	74	29.2	31.4	33.3	37.5

Table 3. Components of Population Change in Nonmetropolitan Areas, Inside and Outside the Central City of Metropolitan Areas, By Size Classes of Metropolitan Areas, United States, 1960-1970.

Location	Total Change	Natural Increase	Net Migration	Rate of Change[2]	
				Natural	Net Migration
	--------(in 000's)---------			-----(Percent)-----	
Nonmetropolitan Areas	3,684	5,990	-2,306	10.1	-3.9
SMSAs[1]	19,997	14,767	5,230	12.2	+4.3
Central City	3,904	7,319	-3,415[3]	12.2	-5.7[3]
Outside Central City	16,093	7,448	8,645[3]	12.3	14.3[3]
Size Classes of SMSA[1]					
3,000,000 or more	4,268	3,892	376	10.6	1.0
Central City	-20	1,649	-1,669	8.3	-8.4
Outside Central City	4,288	2,243	2,045	13.2	12.0
1,000,000 to 3,000,000	7,437	4,179	3,258	12.8	10.0
Central City	848	1,766	-916	12.3	-6.4
Outside Central City	6,589	2,413	4,176	13.1	22.7
500,000 to 1,000,000	3,606	2,620	986	12.7	4.8
Central City	1,300	1,825	-522	17.2	-4.9
Outside Central City	2,306	795	1,511	8.0	15.1
250,000 to 500,000	2,802	2,226	576	13.4	3.5
Central City	811	1,034	-226	13.3	-2.9
Outside Central City	1,991	1,192	799	13.4	9.0
100,000 to 250,000	1,722	1,630	92	13.6	0.8
Central City	840	881	-40	14.0	-0.6
Outside Central City	882	749	133	13.2	2.3
100,000 or Less	162	220	-58	14.6	-3.8
Central City	125	166	-42	15.1	-3.8
Outside Central City	37	54	-17	13.3	-4.2

[1]SEAs are used in New England in place of SMSAs.

[2]Percent of 1960 population.

[3]These figures include a substantial amount of change due to annexations by central cities. Thus the net out-migration from the central cities as well as the net in-migration into the suburban ring of SMSAs are understated.

Source: U.S. Bureau of the Census, 1970 Census of Population and Housing, PHC(2)-1, General Demographic Trends for Metropolitan Areas, 1960 to 1970, Washington, D.C., Tables 6, 11 and 11A and calculations.

Turning briefly now to the distribution of economic activities, one does not expect very different trends since most people have to work close to where they live. This expectation is certainly consistent with the observed trends. Measuring the level and growth pattern of economic activities in various areas by the personal income of the population generated in these areas, we observe that the trends are very similar to those of the population (Table 4). The distribution of the total personal income is even more concentrated in SMSAs than the population is and this concentration is increasing but at a somewhat smaller rate than population, especially during the last decade. The largest SMSAs are capturing an even larger share of the personal income increase than they do for the population, though the share of the increase was slightly smaller in the 1960s than in the 1950s. It suggests a very mild relative improvement of the income situation of nonmetropolitan areas during the last decade.

If the level and growth pattern of economic activities in these areas were measured with employment data (which could not be reported here because of the absence of published employment data for consistently defined metropolitan areas throughout the period) it is believed that the trends exhibited would be similar.[3] This is, however, in opposition

---

[3]Perloff, et al. [1963] examined the shifts in population, employment and total personal income between States for the period 1939-54. A look at their figures 10, 41 and 45 suggests that both measures (employment and income) of

Table 4. Total Personal Income, Where Earned, in the United States, Metropolitan and Nonmetropolitan Areas and for the Largest Metropolitan Areas, 1950-1970.

Location	Personal Income, Where Earned			Change in Personal Income					
	1970	1959	1950	1959-70		1950-59		1950-70	
	(Millions of Dollars)								
United States	798,949	382,840	226,197	416,109		156,643		572,752	
SMSAs	622,480	297,569	168,985	324,911		128,584		453,495	
3,000,000 or more	190,967	95,647	56,297	95,320		39,350		134,670	
1 to 3,000,000	190,063	88,040	48,442	102,023		39,598		141,621	
Nonmetropolitan Areas	176,469	85,271	57,212	91,198		28,059		119,257	
	(Percent Distribution)			Percent Change	Percent of Total Change	Percent Change	Percent of Total Change	Percent Change	Percent of Total Change
United States	100.0	100.0	100.0	108.7	100.0	69.3	100.0	253.2	100.0
SMSAs	77.9	77.7	74.7	109.2	78.1	76.1	82.1	268.4	79.2
3,000,000 or more[1]	30.7	32.1	33.3	99.7	29.3	69.9	30.6	239.2	29.7
1 to 3,000,000[1]	30.5	29.6	28.7	115.9	31.4	81.7	30.8	292.4	31.2
Nonmetropolitan Areas	22.1	22.3	25.3	107.0	21.9	49.0	17.9	208.4	20.8

[1]Percentage of total metropolitan income or change.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, Vol. 52, No. 5, May 1972, Part 1, page 30 and calculations.

with Edwards, Coltrane and Daberkow's observations for the period 1959-68 [Edwards, Coltrane, Daberkow, 1971, pp 52-55]. They found that employment during the period they covered has increased by a slightly greater percentage in rural oriented counties while population was increasing more in urban oriented counties. This needs some explanation.

Edwards, et al., supplied several explanations for their findings and came close to suggesting that there would be "real job gains in rural areas" despite the decrease in population. Unfortunately, it is very likely that they missed the most important explanation for their finding. Their measure of employment is total nonagricultural employment, thus excluding agricultural employment which decreased substantially over the period.[4] This type of employment is obviously much more important, in absolute terms and even more in percentage, in rural oriented counties. Its omission has therefore certainly contributed importantly to an overstatement in their analysis of the percentage increase in

---

the shift in economic activities approximate closely the shift in population. Similarly, Fuchs has found a high correlation between these two measures of the shift in economic activities for the period 1929-54 [Fuchs, 1962, p. 45].

[4]This author has verified from the data of the Bureau of Labor Statistics that during the period 1959-68, the total nonagricultural employment has increased by 22.1 percent, while the total employment was increasing by only 17.5 percent [U.S. Department of Labor, 1970-71]. We can easily imagine the importance of such a decrease in agricultural employment on the percentage change in total employment in rural areas.

employment in rural oriented counties as compared to urban oriented counties.

We conclude that the population and economic activities of this country have been predominantly settling into the large metropolitan areas and moving away from the nonmetropolitan areas and the central cities of the largest metropolitan areas. This settlement pattern is not necessarily a problem in itself, it may be a symptom of problems or contribute to aggravate problems.[5] This is what we must now look at.

An Unbalanced Settlement Pattern: The Problems of Urban and Rural Areas

Let us assume, for the purpose of this section, that the distinction between metropolitan and nonmetropolitan areas supplies a reasonable approximation of the distinction urban versus rural areas. This is at least consistent with the proportion of the population classified as urban and rural by the Census Bureau and the population density in these areas (Table 5). These are the criteria generally used to distinguish an urban from a rural area, as we will see in Chapter III. It is also suggested as conceptually appropriate or used as such by certain authors [Downs, 1970, p. 9 and 37, p. 125]. We can now infer, from the observed

---

[5]Unless otherwise specified the term settlement pattern will now be used as a proxy for the distribution of population and economic growth.

composition of the population change, that people are moving away from the most rural parts of the country and away from the most urban parts of the country. This suggests the existence of severe problems in both areas.

Table 5. Percentage Urban and Rural Population, Land Area and Population Density in the United States, Metropolitan and Nonmetropolitan Areas, 1970.

Location	Urban	Rural	Land Area: 1,000 sq. Miles	Density in Persons Per Sq. Mile
	---Percent----			
United States	73.5	26.5	3,537	57.5
SMSAs	88.2	11.8	387	360.0
Central City	100.0	0.0	14	4,462.0
Outside Central City	78.3	21.7	373	203.0
Nonmetropolitan Areas	41.3	58.7	3,150	20.0

Source: U.S. Bureau of the Census, U.S. Census of Population; 1970, Number of Inhabitants, Final Report, PC(1)-A1, U.S. Summary, Washington, D.C., Tables 2, 35, 41 and calculations.

The fact that there are problems motivating people to move away from rural areas is relatively well documented. No comprehensive treatment of these problems is attempted here. We simply refer to a few publications to suggest with their authors that on very many aspects of well-being rural people are in a disadvantaged position as compared to urban people.

Such is the case, to name a few of these aspects, of rural health, nutritional level, housing, education, employment

and income and even Public Welfare Assistance. Each of these aspects is documented in a distinct chapter of the "Proceedings of a Workshop of the National Academy of Science" on the quality of rural living [National Academy of Sciences, 1971]. If one wants further documentation on several of them, he can refer to the work of the President's National Commission on Rural Poverty [President's National Commission on Rural Poverty, 1968]. One member of this commission, in an article related to it, did not hesitate to conclude that: "By any reasonable standard, the institutions of rural life are inferior to those of urban life" [Bonnen, 1968]. It should be emphasized here that the term institutions is not restricted to public institutions delivering services like education, social assistance, etc., but includes private institutions delivering the variety of commercial goods and services that modern rural people expect. It is not difficult to observe that rural people are not receiving the same diversity in many of these services--cultural activities, health specialists being probably among the best examples.

If the institutions of urban life are superior to those of rural life, this should not suggest that urban areas are exempt from problems. It suggests that the problems are different. And in fact, when one looks at the content of a part of the literature dealing with urban problems he realizes that the problems most frequently mentioned are those of congestion, traffic jams, crowded

living conditions with their suggested undesirable social and mental effects, pollution, noise, high crime rates and urban poverty [Congress of the United States, 1967; Everett and Leach, 1965; Wilson, 1967].

This, along with the data reported in Tables 6, 7 and 8 should be sufficient evidence that there are problems in both urban and rural areas. It will be emphasized now that, except for rural and urban poverty which are causally interrelated [Bonnen, 1968], these problems are not only different but appear to have a very different origin: an excessively high or low concentration of population and economic activities.

It seems obvious that congestion, traffic jams and crowded living conditions cannot occur if there is no excessive concentration of population in a given territory. Similarly pollution, air, water (and maybe even noise), are certainly not severe problems unless the concentration of pollutant sources exceeds the assimilative capacity of the environment. The problem of high crime rates is somewhat distinct. Unlike the preceeding cases which are almost by definition associated with excessive concentration, crime rates should not necessarily be higher in concentrated areas. Factual evidence supplements here a priori reasoning (see Table 7).

On the other hand, it seems that many and perhaps most rural problems have their origin in an insufficient

Table 6. Selected Social and Economic Characteristics of Population Groups in the United States, 1970.

Characteristics	United States	Urban	Rural Nonfarm	Rural Farm	SMSAs	Center City of SMSAs	Nonmetro Areas
Education of Persons 25 Years and Over:							
Median School Year Completed	12.1	12.2	11.2	10.7	12.2	12.0	11.4
Percent with Less than 1 Year of High School	28.3	25.6	35.0	39.4	25.3	28.8	34.9
Unemployment of Persons 16 Years and Over:							
Male, Percent of Labor Force	3.9	3.9	4.3	2.4	3.8	4.4	4.0
Female, Percent of Labor Force	5.2	5.0	5.8	4.7	5.0	5.2	5.6
Income of Persons and Families, 1969:							
Per Capita Income of Persons	3,139	3,365	2,530	2,448	3,434	3,281	2,495
Median Income of Families	9,590	10,196	8,248	7,296	10,474	9,507	7,832
Percent of Families on Public Assistance	5.3	5.4	5.5	3.7	5.2	7.2	5.6
Percent of Families in Poverty	10.7	9.0	15.0	15.8	8.5	11.0	15.4

Source: U.S. Bureau of the Census, U.S. Census of Population: 1970, General, Social and Economic Characteristics, Final Report, PC(1)-C1.

Table 7. Crime Rates by Population Group in the United States, 1970.

Places	Offenses per 100,000 Population	
	Violent	Property
250,000 Population and Over	980	6,167
100,000 - 249,999	450	5,782
50,000 - 99,999	274	4,416
25,000 - 49,999	214	3,814
10,000 - 24,999	159	3,194
Less than 10,000	141	2,539
Suburbs	177	2,970
Rural Areas	102	1,163

Source: U.S. Bureau of the Census, Statistical Abstract of the United States: 1972, Washington, D.C., 1972, Table 226.

Table 8. Number of Cities with a Suspended Particulate Matter Level Higher than 76 Micrograms per Cubic Meter by Population Groups, United States, 1970.[1]

Places	Number of Cities	
	Sampled	With Above
1,000,000 Population and Over	6	6
700,000 - 999,999	7	6
400,000 - 699,999	15	9
100,000 - 399,999	85	62
50,000 - 99,999	31	24
2,500 - 49,999	23	10
Nonurban	27	1

[1]According to Crocker and Rogers, the "concentration of particulates must exceed 70 or 80 micrograms per cubic meter per day before even the most susceptible parts of the population will suffer any sort of health effects" [Crocker and Rogers, 1971].

Source: U.S. Bureau of the Census, Statistical Abstract of the United States, 1972, Table 290.

population and economic activities concentration. Why do we not find in rural areas an equivalent or an adequate availability, diversity and quality of services? An important and maybe a fundamental reason is that they are not sufficiently populated.[6] It is the aggregate income of a large population which enables a community effectively to demand and support a diversity of services and which reduces their unit costs, at least up to a certain limit. If there is anything valid in the economists' theories about economies of scale and about agglomeration and external economies, this should be the case. It can be added here that agglomeration and external diseconomies also account for the problem of excessive concentration in the cities. These theories will be reviewed in the next chapter.

The preceeding discussion leads one toward the conclusion that the U.S. has an unbalanced distribution of population and economic activity.[7] It suggests that there are too many people in the largest urban areas and not enough

---

[6]Jane Jacobs argues extensively that concentration is a necessary condition for city diversity and convenience [Jacobs, 1960, ch. 11].

[7]Another argument not mentioned here, supporting this conclusion would be that the actual distribution of population does not correspond to people's residential preferences revealed in Gallup Polls. Despite the fact that public policy should be guided by people's values and preferences, this is a weak argument. These Polls reveal unconstrained residential preferences and very few if any private or public decisions are unconstrained. This however can motivate research to discover what constrains people to live where they do not wish and search for means to alter that situation.

people in rural areas. But the population has been observed to move from rural to urban areas and from central cities to the suburbs of the large metropolitan areas. The pattern of movement suggests that people are moving in search of the amenities and opportunities of urban life: the close access to the abundance, diversity and quality of services now provided with a better performance by urban areas, while avoiding the disadvantages of life in the excessively concentrated central cities. One could argue that this is the solution. Let us examine this proposition more closely.

First, net migration from the central cities of SMSAs is not of a sufficient magnitude to completely offset the natural increase of population in many central cities, even among the largest [U.S. Bureau of Census, 1970]. Thus the absolute size of these not only does not decrease but is not even prevented from increasing, which would be desired, if, as it was suggested, they are already too large.

Second, it can be argued that the rate of migration of people toward the suburbs of the large metropolitan areas will make of these, in a few decades problem areas just as much as the central cities are today. And since many suburban people commute to work in the central cities, one wonders how this population settlement can ease congestion and even pollution problems in the cities themselves.

It can be objected to the preceeding argument that the problems of the cities are the results of a misplanning

of their development rather than of excessive density, that we can reshuffle their internal organization, learn how better to organize transportation in cities and how to control pollution in order to avoid these problems and apply this knowledge to the development of our suburbs. It is likely that much can be done in that sense to alleviate some of the cities' problems. We may doubt however that this will solve all the cities' problems and that it is the most appropriate solution to some of these problems. With respect to pollution, as one case, one wonders how severe will have to be the controls if huge suburbs are going to be developed around already huge cities. Severe pollution control is certainly costly. It is always a trade-off between more goods and services or more clean air and water. Part of it may be a pure social loss if it is necessitated because we permit most of our economic and social activities to be contained within a very small percentage of the land area while part of the assimilative capacity of the rest of the territory remains unused. Moreover, a better planning of the development of our cities and suburbs may complement rather than supplement the expansion of growth outside the metropolitan areas, as A. Downs suggests:

> "In our diffused political system, creating a rational urban development strategy is extraordinarily difficult, even within a single metropolitan area. My own experience on the National Commission on Urban Problems convinces me that certain specific policy objectives must be attained before we can create any such

> "strategy. These objectives are aimed at expanding the possible forms of future urban development beyond peripheral sprawl, which now encompasses almost all urban growth" [Downs, 1970].

Finally it can easily be shown, from statements of persons whose task or function is to translate people's values and preferences into a consistent set of goals for the society and/or specific policies and programs to achieve them, that the current settlement trend is not socially accepted nor perceived as a solution to the combination of problems described. For example, there is the statement from the National Goals Research Staff in a report published in 1970:

> "Hence the choice of no change in public policy as discussed earlier in this chapter, would run the high risk of bringing about the kind of future in which the communities of both urban and rural America would further deteriorate. It means that hundreds of American towns will continue to lose young people and economic opportunity; and that the large metropolitan areas, already burdened with social and fiscal problems and characterized by fragmentation of government responsibility, may reach a size at which they will be socially intolerable, politically unmanageable, and economically inefficient. On the other hand there is the choice of decisive public policy and action to achieve a different and more promising future for the country as a whole. The objective of this choice might be to promote more balanced demographic growth in order to affect positively the quality of life in both urban and rural America" [National Goals Research Staff, 1970].

The next statement is from the Congress of the United States:

> "The Congress commits itself to a sound balance between rural and urban America. The Congress considers this balance so essential to the peace, prosperity and welfare of all our citizens that the highest priority must be given to the revitalization and development of rural areas" [U.S. Congress, 1970, p. 1383].

And the President, when signing the Rural Development Act in August, 1972, said:

> "Even with the shortcomings I have noted in this Act, it is a significant first step in our determination to strengthen economic opportunity and community life throughout rural America" [National Area Development Institute, 1972].

It is clear from the above statements that one of the main reasons why the current settlement pattern is not socially accepted is that it leaves nonmetropolitan areas behind. The rationale why this fact would be unacceptable is not spelled out in the literature covered. It is taken for granted or as given. It could probably be taken as such here. Tweeten for one, in a recent paper, on rural development starts from a description of the same types of rural problems we have discussed to conclude: "Clearly a strong program of research and action is essential to deal with problems of rural areas and to promote rural development" [Tweeten, 1972]. Nevertheless, the author of this thesis prefers to offer in the following separate section, since this is a highly normative matter, an argument suggesting why it is not acceptable for society to leave rural areas with their problems.

A More Personal Statement of the Author on the Settlement Problem

The author believes that the most fundamental reason why the current settlement pattern needs to be modified is that it leaves behind rural areas which are losing their population and probably many of the most productive elements of that population.[8] He believes that rural areas should gain not lose population, not only because it would ease or facilitate the solution of the problems of other areas but for the sake and well-being of rural residents themselves.

This proposition is believed to follow from one of the most commonly held values of the citizens of this country: fair treatment, equality of opportunities and access without discrimination. It is simply an application of the principle of equality of opportunities and access, to the quality, abundance and diversity of collective services which are the products and probably the sole purpose of our social organization.

Before going further, it must be noted that the preceeding proposition is different from advocating equality of income distribution. Income distribution is the product of

---

[8]Natural migration movements are probably never a solution to any problem of an area because they typically remove from the area many of the elements that could best cope with its problems, those most able to adapt themselves to changing situations. Net migration from the central cities can be a solution to cities' problems only if it is balanced in terms of the age, social characteristics, economic intelligence and attitudes of the migrants.

both the social organization and the personal effort and individual contribution to the products of the nation.[9] Promoting equal income distribution would conflict with another common value of the citizens, the correspondence of rewards with the personal contribution to the social product. Equality of access to collective services is almost totally the product of the social organization. It is a matter of social justice which is believed not to conflict with any other important values.

One may object that the above proposition to promote equality of access to social services assumes a greater uniformity of values and preferences of people for these services than exists in fact. He can argue that several people have been observed to move to rural areas to "escape" these services. He can argue that rural people, who never lived in an urban environment, do not suffer the deprivations we assume they do. As a partial answer to this objection, we suggest to verify if the majority of those who leave the big city do it to "escape" its services or its smog. They may also be people who, after their migration, will remain in a better position than the average rural resident to have access to urban services. With respect to the idea that

---

[9]Social scientists increasingly believe that it is probably much more the product of the social organization than we have been used to thinking. Thus a move toward more equal income distribution would also be justified but it is unnecessary to burden the above arguments with this additional matter.

rural people may not expect a 20th century urban lifestyle, one has only to look at the writings of people who have listened to the testimonies of rural people themselves and people who work with them [see Bonnen, 1968, especially, p. 5, 9, 12 and 13]. Even if it was the case, who could argue that we should leave rural people with a poor schooling system, for one example, because they are happy with it?

We must now address ourselves to another objection which will lead us to reformulate the argument of this section in a somewhat different framework. One may wonder how it is possible to argue for equality of access to collective services without discrimination no matter the place of residence. One can argue that if an individual feels discriminated in his access to the collective services he desires because of his place of residence, he has the option to move just as, we have shown, so many people do. This might be a valid objection under certain circumstances, or for certain areas, but it cannot be argued that society has no general responsibility to promote rural development for one very specific reason, which is important to explicitate and understand.

Personal location has generally been considered a matter of individual choice. This is right for a democratic society. It is a right, however, which is constrained by one's choice of occupation. Once this choice has been made, severe constraints may substantially limit the range

of further choice. For example, one may choose to be a food retailer and settle where he wants provided there are customers at the location selected. He may choose to be a General Motors employee and settle where he wants but he must be close to where G.M. has plants. Or he may choose to be a farmer and settle where he wants but he still must be close to where his farm is located. One can hardly be a resident of the Detroit area and a full time worker on a farm very far away from Detroit.

But, these remote rural areas may have valuable non-mobile resources (like agricultural land). Given modern technology, the number of persons required to exploit fully these resources may be too limited to constitute an agglomeration of population of the size necessary to support the services that these persons, as citizens, expect and to which, we have suggested, they are entitled. If there are forces at work in the economic system tending to concentrate in other areas the population and economic activities not closely tied to the exploitation of these resources, a problem arises which confronts the society with a choice between a few alternatives. It may (a) forego the resources of rural areas and be prepared to help people moving from these areas, (b) provide to the people exploiting these resources the means to derive from this activity the supplement of income that would compensate for the lack of access to good collective services, (c) increase the research

efforts and public programs to make available in these areas the services that their limited population cannot support or to give them easy access (through subsidized air transportation facilities perhaps) to remote centers where the services are adequately supplied, (d) take the appropriate means to bring into selected centers of rural areas the economic activities without current ties to rural areas that will generate the aggregate income and support the population size required to produce locally a variety of good services at comparable costs and within a conveniently commuting distance of rural residents.

For certain areas the first alternative might be the logical choice as well as the second in other cases. The current debate about rising food prices strongly suggests that the society is not prepared for any of these two choices if they were to be applied on a significantly large scale.

The third alternative includes any ideas or means researchers on rural development might imagine and promote to improve on the quality, delivery and access to good services to the actual rural residents. The approach makes sense. The concern for high quality services to rural residents is the same as our concern. But to provide high quality services to a sparsely settled population is certain to be costly. It cannot be offered but on a subsidized basis. How permanent such an approach would be is

certainly questionable. Unless it can prove to be an effective means of attracting to rural areas the population size that would eventually support by itself these services, the approach runs the risk of being discarded. A secondary hypothesis of this research is that public spending to make rural areas attractive is a weak means to bring more economic activity and population into rural areas.

This brings us to the fourth alternative which aims at diverting growth from large metropolitan areas to selected centers of rural areas. This appears as the most logical and obvious choice and answer to the combination of problems we have described. It offers an answer to the equity problem of a society which benefits from the exploitation of the resources of rural areas but which is so organized that those directly linked to these activities often live in a depressed and partly disorganized social environment. Unlike the other three alternatives discussed, it simultaneously offers an answer to the problem of increasing overconcentration in large metropolitan areas.

It must be noted that this proposition is very different from advocating a dispersed settlement pattern which might be equally costly for the society as either the pollution control or the reshuffling of the internal organization of the increasingly overconcentrated metropolis or the subsidization of the delivery of good services to a sparsely settled rural population. We would not

propose to divert growth from the large metropolitan areas to each of the 14,557 small towns and villages of the country, but to a limited number of centers of rural areas which will serve as industrial production and service centers for the hinterland rural population. An important part of the theoretical argument presented in the next chapter suggests that a more balanced distribution of population and economic growth would produce substantial benefits for the society as a whole. There remains the question of how this might be achieved. That is precisely what this research is about.

The Need for Further Research on the Question

If the current settlement pattern is not socially accepted, research designed to better understand how it is generated is necessary before one can intelligently plan any action to modify it.

It might be argued that we know the answers to these questions, since the public authority has already provided legislation whose aim is to achieve a more balanced demographic and economic growth [U.S. Congress, 1972]. This legislation may embody the current state of knowledge on the question, but it is easy to suggest that our knowledge of how the settlement pattern is generated is limited. The Rural Development Act contains the same approach and the same type of provisions (loans and grants to incite

enterprises to locate in depressed areas and small cities and public spending for facilities making these areas attractive) which have been used for years in this country and others [International Information Center for Local Credit, 1964]. These efforts have failed since the problem is still more than ever with us.

This is not to argue that the approach is totally wrong. The theory on which it rests has some validity, as we will see. One might argue that we have yet to provide the minimum level of funds necessary for success. However, the thesis which is examined here is that the theory has not yet identified all the relevant and important factors explaining why some regions grow and others do not and therefore has not yet suggested the most appropriate and effective means to alter the settlement pattern. This brings us to the formulation of the basic hypothesis of the research.

The Basic Hypothesis of the Research

To reverse in favor of rural areas the observed trends towards the geographic concentraton of population and economic activities in the large metropolitan areas is not an easy task. It will require extremely powerful forces. There are not very many such forces at work in our society to which one could assign the task.

One of these powerful forces is the federal government. Its intervention is likely to be required although probably

not through the approach it has followed thus far which, we just suggested, appears to be a weak one. This might be considered as a secondary hypothesis of this research.

Another very powerful force at work in our social organization is the large corporation. While we have observed a trend toward the geographic concentration of population and economic activities, the industrial organization specialist has been observing another type of trend toward concentration: the concentration of the control of economic activities in the hands of a few hundred corporations (Table 9).

Table 9. Percentage of the Value Added by Manufacture and of the Total Manufacturing Assets Owned by the 200 Largest Manufacturing Corporations, Selected Years.

Year	Value Added	Assets
1929		45.8
1939		48.7
1947	30	45.0
1954	37	50.4
1958	38	55.2
1962	40	55.1
1963	41	55.5
1966	42	56.1
1967	42	58.7
1968		60.4

Sources: 1) U.S. Bureau of the Census, Concentration Ratios in Manufacturing, 1967, Special Reports, 1970, Pt. 1, Table 1.
2) Federal Trade Commission Staff, Economic Report on Corporate Mergers, 1969.

It is suggested here that these two trends may not be unrelated, that there is a causal relationship between the concentration of the control of economic activities within a few hands and the geographic concentration of population and economic activities. It may be that these large "controllers" have few natural reasons to disperse their increasing activities over too huge a territory and especially over small rural centers. This may be because they believe it is easier in this way to supervise the activities of their many establishments, for the convenience of air traveling between important centers or for other reasons. We would even argue that if we could convince (by the threat of dissolution or other means) the 200 or so largest manufacturing corporations--which control more than 60 percent of the manufacturing assets of the economy--to develop rural areas, they would succeed regardless of any opposition they might meet in their attempt to do it.

More specifically, it is hypothesized that the choice of locations of the largest manufacturing corporations is the dominant factor accounting for area differentials in the growth of economic activities. The investigation of this hypothesis is the prime object of this research.

The next chapter formulates theoretical arguments suggesting that the large corporations can change the distribution of economic growth while the empirical part

of the research will try to verify if they actually have changed some elements in that distribution between 1960 and 1970. First we must formulate the specific objectives of the research.

The Objectives of the Research

The specific objectives of this research are the following:

1. To investigate and describe the geographic distribution of the employment of the largest manufacturing corporations and relate this distribution pattern to the level and growth of population and economic activities in the areas investigated, for the period 1960 to 1970.
2. To test the hypothesis that the choice of locations of these large corporations importantly contributes to explaining area differentials in the growth of economic activities, and simultaneously verify the significance of other variables long believed to contribute something to these differentials.
3. To draw some policy implications from the findings for the future planning of rural development and rural development strategies.

CHAPTER II

A THEORETICAL BASE TO SUPPORT THE HYPOTHESIS FORMULATED

One logical first step of a research process designed to find better means than those previously used to solve a problem is to try to develop a better theoretical understanding of how the problem is generated. We also need to understand the reasons why the current means used to perform the task are inadequate and to draw from that knowledge and other sources support for a hypothesized new approach. This is our task in this chapter.

We first review, without bringing in any new arguments what theory and theorists have suggested about the location of the firm, the location of economic activities and the reasons why the global pattern of location might be more concentrated than socially desired. We then question the validity of some of the assumptions of these theories, emphasize aspects of these and other theories and the results of some empirical investigations to suggest that:

1. The choice of locations of the large manufacturing firms may be relatively free vis-a-vis either the basic location factors identified by

the theories and the related policy tools used by public authorities to influence firms' location decisions and,

2. the choice of locations of the large manufacturing firms may be of critical importance in explaining why regions and areas grow at widely varying rates.

Location Theories and the Spatial Distribution of Economic Activities

Location theories were first developed to remedy an important shortcoming of the received economic theory: its almost complete abstraction from space considerations. It is no surprise that the first major and a still important concern of location theorists is the analysis of transfer costs. Such is the case, to name a few of Von Thunen and his rent theory in which the main variable explaining spatial differentials in rent is the distance to the market center, or Alfred Weber and his material or market oriented industrial production according to the transportation characteristics of the material used (localized material, weight losing material, etc.), of Hoover and his location point minimizing total transfer (procurement and distribution) costs, and of Isard and his transport inputs.

Transfer costs, however, are not the only location factors considered by theorists. Isard classifies these factors into three groups: (a) transport costs and other types of transfer costs, (b) the several costs associated

with labor, power, water, taxes, insurance, interest and, (c) the elements which give rise to agglomeration and deglomeration economies [Isard, 1956, p. 138].

The last two categories of factors are not completely distinct. They have at least in common to be part of an important location theory first introduced by Weber and which suggests that savings on labor costs and economies due to the large scale of operation of a firm or of a group of firms agglomerated in a given location can compensate for possibly higher transfer costs.

We will see later, when we will come back on this important theory, that labor is one of these elements giving rise to agglomeration economies. For now let us only emphasize the substitution framework in which this formulation puts the production cost aspect of the location problem. Isard suggests that when a unit of production decides to shift to a center of agglomeration, it "may be visualized as substituting transport outlays for production outlays of one sort or another" [Isard, 1956, p. 179]. In fact, a proper calculation of all these possible substitutions enables the firm to derive an "outlay substitution line" [Isard, 1956, p. 129] or a "space cost curve" [Richardson, 1969, p. 77] or a set of such lines when it considers several possible levels of output. It can this way determine a least cost location point.

But the firm does not necessarily locate at the least cost of production point. Its decision also depends on the level of demand it can expect at that point. It must therefore look at the demand side of the location problem. August Losch with his demand cone was among the first theorists to develop tools to derive spatial demand relationships. Richardson criticizes the Loschian demand cone and comes up with a "modified spatial demand cone" from which can be derived a "space revenue curve" [Richardson, 1969, p. 69 to 77]. Comparing the space revenue to the space cost curves, or using Isard's iso-revenue-less-outlay lines [Isard, 1956, p. 134], the firm can then find its profit maximizing location or optimum location if the usual assumptions regarding the objectives of the firm are made.

The theories mentioned thus far do not make any explicit inference about the total distribution of economic activities arising from the location decisions of the individual firms attempting to settle at the profit maximizing location. Attempts to do so have been made however. Isard integrates his transport input concept of the theory of production into a mathematical formulation of what he himself modestly calls: aspects of a general location theory which is concerned with an "optimum space-economy, primarily from a location standpoint with emphasis on transportation costs" [Isard, 1956, Ch. 10]. Richardson reviews

the contributions of three other authors to a general theory of location [Richardson, 1969, Ch. 5]. Losch and Greenhut's contributions are judged far too restrictive in their assumptions. Lefeber's formulation is presented as having much greater generality and representing a worthwhile attempt to incorporate space in a Walrasian general equilibrium framework. His model is designed to determine the optimum locations, the optimum allocation of productive factors and the spatial flows of final goods to each market and to maximize the value of total output. All this is obtained under conditions of pure competition, perfect knowledge and no institutional rigidities. Its major drawback and difference from the Walrasian system is that it is a programming model bound by linear maximization assumptions and by an inability to handle demand relationships: the prices have to be specified arbitrarily rather than determined within the model.

Richardson's general comment on these attempts is that no fully satisfactory general theory of location has been developed. Nevertheless, it seems that we have been brought, in the intentions if not the achievements of these authors, close to a spatial equivalent of the optimum of the spaceless economic theory. These mathematical formulations are not, however, the only nor necessarily the most enlightening way to examine how the actual settlement pattern has been generated, how large industrial centers

have developed. It seems worthwhile anyway to examine in greater detail Weber's agglomeration theory as expressed by Hoover and Isard.

Weber suggested that economies can result of the enlargement of the size of an industrial concentration at a given geographic point. These are called agglomeration economies or sometimes economies of concentrated production. Isard classifies them as follows: (1) Large-scale economies within a firm, consequent upon the enlargement of the firm's scale of production at one location, (2) localization economies for all firms of a single industry at a single location, consequent upon the enlargement of the total output of that industry at that location, and (3) urbanization economies for all firms of all industries at a single location, consequent upon the enlargement of the total economic size of that location, for all industries taken together [Isard,1956, p. 172].

Hoover suggests that three basic principles operate to reduce the costs of production within a firm with larger output: "multiples", "massing of reserves" and "bulk transactions" [Hoover, 1948, p 78-80]. In other terms, economies of large scale within a single unit of production arise because (1) it is possible to use more fully imperfectly divisible units of equipment and labor, (2) because the massing of reserves necessary to provide for accidents, routine maintenance, interruptions of supply and variation in demand would be less than proportional to the normal

output and finally, (3) because bulk transactions command a lower unit price for materials, supplies and services purchased because of savings in the costs of delivery or the greater bargaining power of the large enterprise.

Localization economies arising with the clustering of several firms of a given industry into a single location result (1) from the access to a larger pool of skilled labor, trained for the specific requirements of that industry and rapidly interchangeable between establishments, (2) from a greater availability and fuller use of specialized and auxiliary industrial and repair facilities, (3) from large lot buying and selling through common brokers and jobbers, (4) from carload or trainload or shipload delivery of materials or (5) from the development over the years of the specialized financial, accounting, counseling or actuarial services needed by the firms of that industry.

Urbanization economies presented earlier as those which arise from the clustering of several firms of several industries into a single area of production, stem (1) from "a higher level of use of the general apparata of an urban structure (such as transportation facilities, gas and water mains, and the like) and (2) from a finer articulation of economic activities (daily, seasonally and interindustrially) [Isard, 1956, p. 182]. The finer articulation of economic activities is the result of various kinds of linkages existing between industries like trade connections, the

complementary use of labor or other inputs or auxiliary services like banks, utilities, fire and police protection, of which Hoover gives several examples [Hoover, 1948, p 116-123].

If there are economies of concentrated production, it is well known that there are diseconomies as well. As Hoover points out, the managerial requirements of some types of business may convert scale economies into scale diseconomies, the advantage of the access to a large pool of trained labor can be converted into a disadvantageous inflexibility with the increase in the bargaining power of this specialized labor force. Isard also provides examples: as population numbers increase, as congestion multiplies, as the journey to work increases as well as the time lost by truck drivers in traffic jams, as rents, land values and the cost of food supply rise, diseconomies mount in relative importance.

It is probably possible to illustrate graphically this discussion about agglomeration economies and diseconomies. Isard anyway invites us to imagine that somehow it is possible a priori to identify for every service and commodity, whose production or costs reflect urbanization economies and diseconomies, a net economy curve (economies less diseconomies) in relation to given city sizes. The figure, taken from Isard's book is shown below [Isard, 1956, p. 187]. The curves corresponding to a few of the activities

subject to urbanization (dis) economies are shown plus one curve which is a summation of the others.

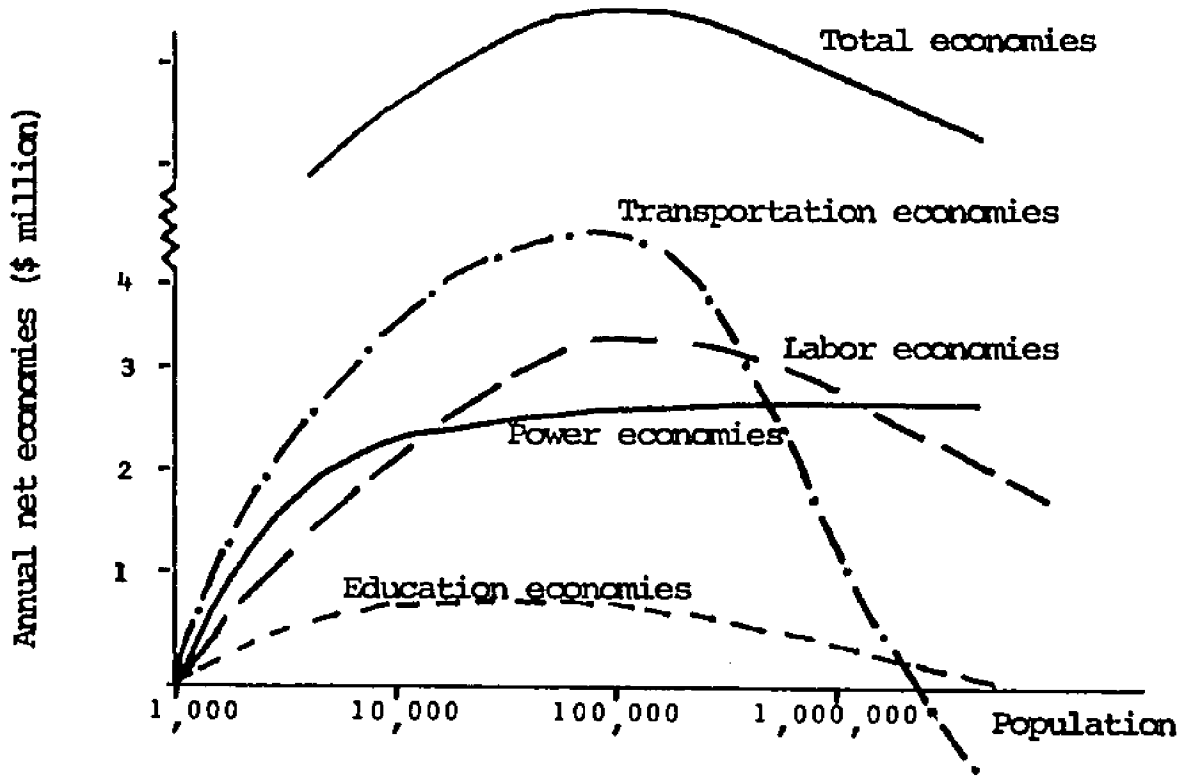


Figure 1. Hypothetical economies of scale with urban size.

There are obviously great difficulties to construct empirically each of these curves and logical objections to the construction of their summation. The main objection is that the total net economy curve assumes the existence of standardized cities where the congestion costs, for example, operate the same way regardless of physical configuration. It also assumes that an equal weight should be given to each component curve for every city regardless of its industrial composition. Standard cities do not exist and the industrial

mix varies from city to city. We cannot therefore expect that a regular curve like the one shown exists. It seems reasonable to believe however, that a curve with that general shape, perhaps with more than one high net economy point, does exist.

These agglomeration economies and diseconomies should normally be reflected in the firm's production costs. If the economy was so organized that the firms had to bear the costs of agglomeration diseconomies, a firm facing a location decision might well expect its unit cost, for a given level of output, to be, in fact, a function of the city size it might choose. We might diagram a firm's expected unit cost curve in relation to city size which looks like Isard's net economy curve turned upside down. Such a diagram would suggest the existence of at least one basic economic incentive for firms not to locate in larger centers than they should and a likelihood that an economically efficient distribution pattern would arise from their decisions.

Few people would argue that the economy is so organized or that, for example, the discomfort to the population of living in a polluted and noisy city, overrun with criminals, is taken into account in the workers wage scale. It is easier to argue that there are various kinds of externalities leading to a divergence between private and social accounts and, with respect to the problem discussed here, to inefficient location decisions. This is at least one of

J.M. Neutze's conclusions in a book in which he examines, theoretically and empirically in the Australian context and from an efficiency point of view, the proposition that the government would be justified in pursuing a decentralization policy. His conclusion is stated as follows: "If we could correct the imperfections of the price mechanism to compensate for external effects, the result would probably be a less concentrated pattern of location" [Neutze, 1967, p. 27].

Neutze's discussion is interesting in the context of this chapter because he emphasizes a distinction between the internal and external effects of location decisions in conjunction with a discussion of the agglomeration theory we just reviewed. Looking first at the external effect he suggests that a firm (or family) deciding to locate at a given place makes this place grow (by at least one family) and this has a favorable or unfavorable effect on those already located there, an external effect which is not taken into account by the locating firm (or family). He points to a number of arguments and some rough measurements suggesting that the effect of growth on traffic, parking facilities, fares on public transport, length of journeys to work, costs of public services and costs of private goods and services is less defavorable or more favorable if growth occurs in small rather than in large centers.

> "Where there are external diseconomies from growth they appear to be more important in

> "large centers, while external economies appear to be more important in small centers. Considering only external effects we can say that, on balance, growth in small centers tends to make them more profitable places to operate and more attractive places to live, that is the external economies are more important than the external diseconomies. But with growth they reach a stage where this is reversed. Further growth, on balance makes them less attractive and less profitable" [Neutze, 1967, p. 27].

Thus there are substantial external benefits if growth is diverted from large to small centers. The firms and people already located in these centers gain as well as those already located in the large center which is prevented from becoming larger.

Then Neutze looks at the internal effect or the costs of a location decision to the locating firm and family. He first notes the following:

> "The fact that so much of Australia's population and economic growth is going to large cities is a strong prima facie reason for believing that decentralization would be unprofitable to private firms, the internal cost, on balance being higher" [Neutze, 1967, p. 82].

One reason for this is:

> "Small centers are much less attractive to most firms and families. They cannot offer the large city employment, educational or recreational opportunities, nor its supplies of components and services and its large market and labor supplies" [Neutze, 1967, p. 110].

We have therefore a counterpart to the external benefits of growth of small centers. If this growth tends to

make them more attractive and profitable places to live and operate, the agent causing it, by moving in, would have been better off, had he selected a larger center.

Thus there are benefits and costs involved in a location decision and, as a result, in a decentralization policy. The benefits accrue to those already settled and remaining in small and large areas while the costs are borne by those diverted from large to small centers. Since most people do not take location decisions on the basis of the benefits accruing to others, we can easily understand that firms and families prefer large centers, a preference reflected in the growth rate of the metros.

We cannot argue that people are wrong in locating as they do. Thus far, we cannot conclude either that the total settlement pattern arising from their decisions is overly concentrated nor, or course, that a public decentralization policy would be economically justified. It may be that such a policy would not produce a net social benefit. It would not if the external benefits are totally or more than offset by the internal losses in profits and real income to those diverted from large centers. This could be asserted only after a very careful and precise measurement of these benefits and losses.

Neutze does conclude however that there is a net social benefit to divert growth from large to intermediate-sized centers. For him, there are all reasons to believe that most of the agglomeration economies available in the largest

centers are already present in centers of 500,000 and maybe in centers of 200,000 people, while the diseconomies are less important and increasing less rapidly.[10] Thus, the people diverted to these centers will not suffer any loss and important increased diseconomies will be avoided. This sums to a net social benefit accrusing to the population remaining in the large centers.

We now summarize the part of our argument related to economies of urban size with a diagrammatic exposition which will simultaneously emphasize a striking difference between Isard's and Neutze's treatment of agglomeration (dis)economies as well as lead us toward an answer to the first question we addressed ourselves at the beginning of this chapter.

You will recall that, after Isard's total net economy curve was presented, we were tempted to draw another diagram with his curve turned upside down and to label it a firm's expected unit cost curve in relation to city size. Such a curve would have assumed that all agglomeration diseconomies are internalized to the firm in some way. It seems much more appropriate, as we did in Figure 2, to label this curve the

---

[10] A whole section of his book is devoted to an empirical examination of that question. We may add here that, in the U.S., Gabler suggests a greater tendency towards diseconomies of scale in cities over 250,000 people [Gabler, 1971]. Halpern talks of encouraging the growth of middle-sized communities (usually 50,000 up, but as small as 25,000) [Halpern, 1970]. Epp reports that "it has been suggested that the minimum point on the cost curves for such services as water and sewage treatment, education, protection services and cultural amenities is reached for a city of between 50,000 and 100,000 people" [Epp, 1970].

social cost of producing one dollar's worth of goods and services and to draw another curve labeled the private cost of producing one dollar's worth of goods and services in relation to city size. This one embodies Neutze's discussion, specifically his belief that intermediate-sized cities (point B) are more profitable places to operate than smaller cities (point A) because of agglomeration economies and about equally profitable as larger centers (point C) because most of the agglomeration economies have been reached and the diseconomies are external. This does not necessarily assume that all agglomeration economies have been reached in intermediate-sized cities, nor that all diseconomies are external. Although he is not totally explicit on this point, it seems that his assumptions are that, as the size of the city goes from B to C, some new economies appear but are offset by some diseconomies which are internal to the firms (time lost by truck drivers in traffic jams, higher rents, etc.).

This diagram clearly suggests why the total pattern of location may be more concentrated than it should be. Firms can locate in cities of size C without suffering the costs they impose on society. Firms have no particular incentive to locate in cities of size close to B, although this is a socially more efficient location. Firms have economic disincentives to locate in cities of size A, although this might be under certain conditions, the location generating the largest net social benefits. The last point needs an explanation.

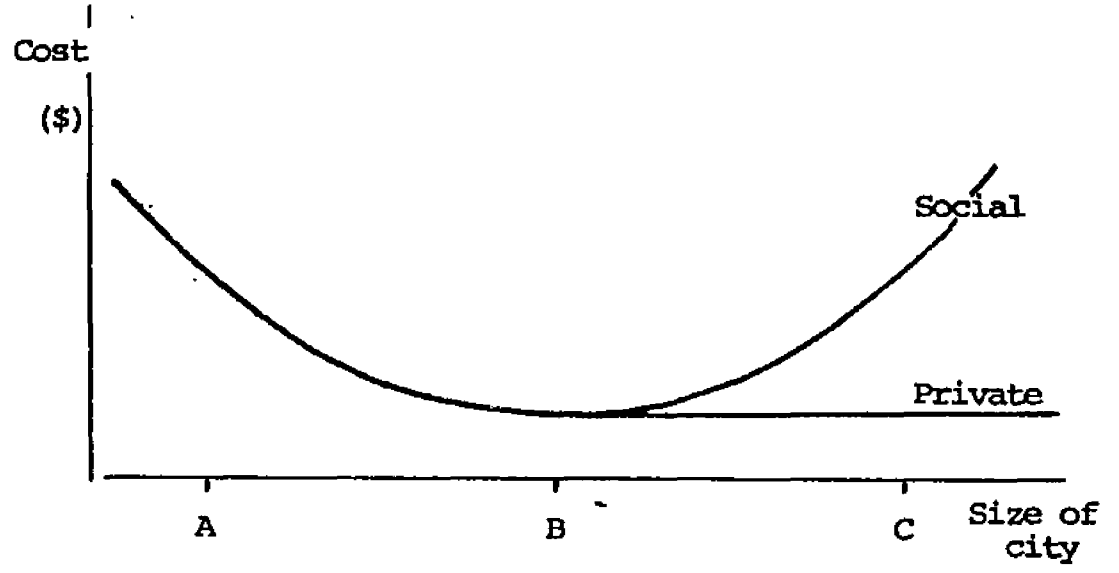


Figure 2. Hypothesized social and private cost of producing one dollar's worth of goods and services with city size.

Neutze, after his conclusion that large net social benefits would be produced if growth occurred in intermediate-sized centers, wondered why the price mechanism does not produce more of these centers which are not numerous in Australia.[11] "The answer," he suggests, "seems to lie in lack of coordination of location decisions. Single firms and families may be loath to go to a small center, but they would go if they could be persuaded that many others would go there too, since this would make the small center significantly larger. Each of them depends on being close to the others, and this applies not only to private firms but to government services as well. Even a group of firms would

---

[11]He found support for his view related to the private profitability of these centers in the fact that the few existing in Australia are growing as fast as the largest and have a good representation of more industries [Neutze, 1967, p. 104].

not be willing to go to a small center unless they knew that road, rail, power, sewerage and water would be provided. But government authorities are unwilling to provide them unless they know that the growth is going to take place" [Neutze, 1967, p. 112-113].

Neutze believes that the lack of coordination of location decisions is the most important factor preventing decentralization in Australia. The solution he emphasizes is to coordinate and channel the decisions of several firms and families towards a limited number of small centers so that "they can quickly be made into medium-sized centers" in order to reduce or eliminate the internal costs to those diverted from the large centers [Neutze, 1967, p. 104].[12] It is immediately apparent from the diagram above that if, by such an action, as many firms and families could be brought into a center of size A as necessary to "quickly" convert it into a center of size B, a net social benefit larger than in the other case would be created. This would avoid increased diseconomies in the large centers, without imposing losses to those diverted and at the same time it would add substantial external benefits to the firms and families of the small center (and its hinterland) converted into a medium-sized center.

---

[12]This has some resemblance conceptually with the idea of the new towns as briefly discussed by Schmid in relation to this investment coordination problem or what he calls "problems in sequential optimizing" [Schmid,1968].

One may suggest here that it would be interesting and important to have a precise quantification of Figure 2. We can answer simply that we do not have this quantification. We believe the general shape of the curves drawn embodies the generally accepted theories of agglomeration economies and externalities, although the curves might not be so regular point B might extend over a relatively wide range of city sizes and the private cost curve would at some point also begin to rise. Much more information would be necessary if the objective was to design a program to promote the most efficient pattern of location. This is not necessarily society's sole objective. It is not our's here. We simply attempted to gather a number of sound theoretical arguments and organize them into a framework from which can be examined the questions with which we are concerned.[13] The framework helps us understand one reason why an overly concentrated pattern of location might develop. Let us turn to the next question.

---

[13]One may object that the framework does not embody and even conflicts with another well known theory: Central Place Theory. The exclusive focus of this theory on service activities and the other drawbacks pointed out by Richardson reduce or eliminate its applicability to the context we are studying [Richardson, 1969, p. 62-65]. Friedman also suggests that the theory "seems, in fact, to be applicable only to the intermediate period between the early homogeneous stage of development and the most advanced stage characterized by the phenomenon of continuous urbanization" [Friedman, 1956, p. 219].

The Location Pattern of the Largest Manufacturing Corporations

Mueller and Morgan report the results of an empirical investigation conducted in Michigan in 1961 which indicates that both large and small firms do not take location decisions exclusively nor even mainly on the basis of the set of factors identified by the theories [Mueller and Morgan, 1962]. The 239 manufacturers interviewed, when asked to identify important location factors, emphasized the traditional costs and market advantages. To the question inviting them to give the reasons for their present location, the most frequently mentioned answer was personal considerations and chance or accident rather than the costs and market advantages found in particular cities.

Why would Michigan manufacturers in their choice of location give more weight to their personal preferences than to the results of costs and market calculations? If the above theoretical framework has any validity, it should help us understand that. It seems clear from Figure 2 that a manufacturer looking for a site to build a plant has much room to allow to his personal preferences if the alternatives he considers are all cities of size B or larger. It is likely however, that a number of the manufacturers interviewed did select a site in a city size smaller than B on the basis of his personal preference. We may wonder how he could afford to make a decision which, according to our theories, is at his own economic disadvantage.

There are at least two reasons why firms may not make location decisions exactly along the lines suggested by the theories reviewed. One reason is that profit is not necessarily the unique nor the main motivation of firms. Richardson emphasizes that point:

> ". . .just at a time when location theory had developed to where it was possible to construct a concrete profit maximizing model, microeconomic theorists in general were beginning to display grave doubts about the value of profit maximization as a rationale for entrepreneurial behavior. It is an empirically tested fact that many firms prefer to be sited in region A rather than region B or near a given city rather than at an isolated rural location, regardless of the congestion costs incurred and no matter where the theoretically optimal site is to be found" [Richardson, 1969, p. 91-92.].

Richardson also points to a number of other objectives entrepreneurs may have: Sales maximization, survival or long-run viability, market share, managerial salaries which are more related to size than profitability. He suggests that firms may well not attempt to maximize anything. On this point he emphasizes the behavioral satisficing theories, specifically Herbert Simon's work:

> "Simon has argued that managers recognize the complexity of calculations required and imperfections of data used in any optimality calculation and for this reason make no attempt to maximize profits or indeed anything else. They may set some minimal standards of achievement which they expect will insure the firm's long run viability and achieve a reasonable level of profits" [Richardson, 1969, p. 99].

The author concluses that the main limitation of the satisfying hypothesis is that it results in an indeterminacy in location. Its compensating advantage is to offer a rational a priori explanation of location decision, enabling us to accommodate the environmental preferences like the access to a metropolis or a favorable cultural and social milieu.

Before looking at the implications of the above statement, let us go one step further. It can be argued that in a "perfectly competitive" economy firms would not have the choice to strive for other than profit objectives, that the satisficing firm could not exist. In such an economy, the maximum profit, after payment of the competitive remuneration to all factors, is zero. Thus it is a survival condition. If firms can afford to aim at limited objectives, to avoid cost comparisons between alternative sites and to locate where it pleases their managers to live, it is because the real world in which they operate is not the "perfectly competitive" world of our models. This is the second reason why firms may not make location decisions as theoretically expected. And here, contrary to the previous argument which could apply to both small and large firms, we are brought more properly to the domain of the large firms.

The locating firm of the above theories in its search for an optimum location seek to maximize profits, given the product market, given the labor market, given the availability of power, waste disposal facilities, the framework of transport

costs, the sources of material, the availability of agglomeration economies, etc. Given all these, a detailed calculation of costs and market advantages of alternative locations will come close to dictating to the firm the very specific location where it will maximize profits or simply survive. In the economic theoretic world very few, if any, of these dimensions are under the control of the firm. Its economic environment is given.

While this may have some resembalance with the operating framework of many small firms, it heavily contrasts with one of Galbraith's descriptions of the behavior of the large corporation:

> ". . .in addition to deciding what the consumer will want and will pay, the firm must take every feasible step to see that what it decides to produce is wanted by the consumer at a remunerative price. And it must see that the labor, materials and equipment that it needs will be available at a cost consistent with the price it will receive. It must exercise control over what is sold. It must exercise control over what is supplied. It must replace the market with planning" [Galbraith,. 1968, p. 35].

While many may disagree with much of Galbraith's writings, few people could negate that he and other writers have pointed to an important aspect of a modern industrial economy: the world of the large corporation has little similarity with the world of perfect competition. In the world of the large corporation the economic environment is not a given. These firms have developed far reaching powers over it.

One of these powers is the power to manage the prices at which they sell products. This has an important implication which reinforces one of our previous conclusions. In the preceeding section, we argued that firms can locate in larger centers than they should, without suffering the costs they impose on society, because many agglomeration diseconomies are external. We concluded that this is a reason why the total pattern of location may be more concentrated than it should be. Here, we can argue that the largest firms could locate in larger centers than they should, without suffering the costs they impose on society, even if aggomeration diseconomies were internal, that is, if the private cost curve of Figure 2 was rising and (let us assume the extreme) was at the level of the social cost of cities of a size larger than B. The largest firms could do that because they have the power to manage their prices, because they can set the price of their products at a level consistent with their profit objective and their actual cost, even if this cost was higher than it would be, were they located elsewhere. This is another reason enabling us to argue that the total pattern of location may be more concentrated than it should be.

The challenge of the implicit perfect competition assumption of location theories has another implication reinforcing the conclusion to which the challenge of the assumption of profit maximization also leads: the indeterminacy in location already discussed. Even the satisficing firm in a highly

competitive economy would be compelled to search for the most profitable location in order to survive. Such is not the case of the large firm. The large firm, we suggest, given its power, its financial strength, its ability to control outside economic forces, can manage not only to survive, but flourish regardless of its location. Its location is, to a large extent, indeterminate. It can locate in an already developed and profitable industrial center as well as in a less organized smaller center.

It is also clear that in a less than highly competitive economy where larger than zero profits are allowed the location of the small firm is indeterminate as well. The mangers need not aim for maximum profits to survive. Like the family farm, where the manager is an owner-manager, he may be satisfied with zero profits, as well as less than the competitive remuneration for his own resources. This is probably one reason why the managers of the small firms interviewed by Mueller and Morgan, to a greater extent than the managers of the large firms, answered that the choice of their location had been strongly influenced by their personal preferences.

It is important to emphasize now that our proposition that the large firms can locate in small centers is not based on a belief that their managers will be satisfied with zero profits or are indifferent to profits or even will sell the products manufactured there at higher prices. The managers of the large firms certainly are not indifferent to profits.

But they have the financial strength to plan for longer periods. They may be prepared to support temporary losses in one or a few of their plants. Most importantly they are in a position to make this location a much more profitable place in which to operate than would the small firm locating there. This is based on aspects of the location theories reviewed above, whose assumptions have been challenged here but not their internal consistency.

These aspects relate to the agglomeration theory reviewed. Both Hoover and Isard emphasize that the distinctions made between the three types of "economies of concentrated production" they have identified are not as neat as appears. Isard suggests that:

> ". . .analysis of urbanization economies can be said: (1) to resemble, or (2) partially evolve from, or (3) even to contain, according to certain persons, the analysis of localization economies."

And he adds a footnote:

> "The discerning reader may have already concluded that in several respects there is also only a fine line of distinction between localization economies and economies of scale" [Isard, 1956, p. 182].

This is also Hoover's position when he makes the statement that the economies of urban concentration rest on the same basic principle as those of the individual producing unit: multiples, massing of reserves and bulk transactions; these are the principles he singled out as sources of economies of scale.

This has an important consequence. It means that the large firm, given the size of the new investment it can start within a new location, by itself creates some economies of concentrated production or agglomeration economies. These economies, that the small investor would have to wait for, are internal to the large firm and contribute to make its production, at the beginning of its operation, more profitable than it would be for the small investor locating in the same relatively unsettled area.

We find strong support for this view in a part of Neutze's discussion of the coordination issue mentioned above and presented as one possible basis for a decentralization policy which avoids or at least reduces the internal cost to the firms diverted from large to small centers. He considers, as an example, the case of a group of small interdependent firms now established in a large city and individually considering a move to another center and writes:

> "In every other center the range of industry the level of industrial and personal services and size of the local market are much less favorable, and therefore no one firm in the group would find it profitable to decentralize. . . .However, if they all decide to move they might all find it profitable. Whereas the individual firm would have no appreciable influence on the production conditions in the region, the whole group would. The employees and families of the group would, themselves, add considerably to the size of the local market, especially when multiplier effects had been taken into account. If a group of firms moves they could take with them the parts and components suppliers and the repair firms and service firms. If local and central governments participate in the decision, public services will

> "be available. In short, coordinating the location decisions of the group internalizes the pecuniary external effects, and the group decision is more likely to maximize community welfare" [Neutze, 1967, p. 32-33].

Neutze's argument is in favor of the coordination of the investments of a group of small interdependent firms. But who would argue that General Motors or another large firm does not coordinate as "large blocks" of interdependent investments as 25 or 50 or even 100 small firms? Who would suggest that an investment of the size one large firm can make in an area will have no "appreciable influence" on the production conditions in that center? We would argue that the large firm, which is often or can be its own supplier of parts, components, repair and other services, given the size of the investment it can start within an area, does coordinate very large amounts of interdependent investment and does internalize many of the pecuniary external economies for which small firms have to wait.[14]

Our conclusion therefore is that the large firm can locate and flourish in a small center, if that happens to be

---

[14]Holis Chenery also suggests that one way to coordinate investment decisions and to internalize pecuniary external economies is to enlarge the scale of the private decision unit [Chenery, 1959, p. 114]. Neutze reports a statement from Scitovsky to the effect that pecuniary external economies justify planning of economic development but are less important in developed countries where there are large and highly integrated firms [Neutze, 1967, p. 34].

(or can be made) the location preference of its "technostructure."[15] In other terms, the choice of location of the large firm is relatively free vis-a-vis the basic location factors identified by the theories.

We will argue in the next section that the decision of such a firm to locate in a small area, in addition to the appreciable influence it certainly has by itself on the production conditions in the area, may have an influence on the location decision of many other firms. This will reinforce the first effect and may substantially modify the global picture of the geographic distribution of economic activities. Before reaching that point, we must discuss briefly a few more questions.

The above conclusion can, of course, be extended to suggest that the choice of locations of the large manufacturing corporation is also relatively free vis-a-vis the policy tools derived from the theories and used by public authorities to attract firms in small centers. One of these tools is public spending to improve the infrastructure (roads, water supplies, sewage facilities) and the manpower of the small center. A favorable industrial infrastructure already exists in large centers. The public investments made in small centers simply tend to decrease their disadvantages.

---

[15]This preference may rather be for the cities which already have a football or baseball team, a large airport, a symphonic orchestra, etc.

They cannot be an important factor attracting the large firm which anyway can reasonably expect that such improvements would be made, either before or after its decision to locate in the center.

Another tool is to offer financial advantages, special loans, tax reductions, direct subsidies, to assist the firm at the beginning of its operations. To suggest that this is a determinant location factor for the large firm would assume that, in the planning of investments that will last years and years, it gives a very large importance to short term advantages which, we have suggested, are not critical considerations to the location decision. This does not mean that the firm will not manage to let people believe these advantages are very important when negotiating them with a local authority, if it has decided, for one reason or another, to locate an establishment in a small center.

One word about the possible impact of these tools on the small firms. Let us note first that they make much sense. If we refer to our Figure 2 and consider the case of a center of size A, where the advantages may be offered, we can see that they contribute to a reduction of the private cost of producing goods toward the level that prevails in larger centers (B or larger). Unless enough money is involved to reduce the costs under this level, the advantages granted simply widen the range of city sizes over which the firms can apply their locational preferences. If only a few small

firms with no "appreciable influence" on the production conditions of the center, have been attracted, when the temporary advantages are removed, they produce at higher costs than if they had selected a larger center. This is why we argue that these tools are weak means with which to promote an important deconcentration movement.

We have to emphasize finally that the argument developed in this section is limited to the location pattern of the large manufacturing firms by opposition to the large service firm. Intuitively, it seems very unlikely that Sears and Roebuck could succeed at or even think of opening a retail store employing a thousand employees in a relatively unsettled area.[16] The reason is that most of the articles sold by the Lansing Sears store are sold to residents of the Lansing area. On the contrary, the cars built by G.M. in Lansing (19,000 employees) or the airplanes built by Lockheed Aircraft in Sunnyvale, California (29,000 employees) are sold throughout the U.S. and even the world. For these establishments the proximity to a given specific large market, which may absorb a very small proportion of the establishment's output, has little overall significance. This is why in the second part of this section, we paid little attention to the market as a location factor. This is also probably

---

[16]To do that, Sears would have to rely on mail in orders for the whole or most of its business which implies a very important and unlikely change in the shopping habits of most consumers.

what has been forgotten by certain theorists who argue that, with the improvement of transportation and communications, which reduces the importance of the source of supply of raw materials as a location factor, the proximity to a large market has become a dominant location factor. For a discussion of this argument see Estall and Buchanan, 1966. If this was true for every type of firm, one wonders how the settlement pattern could ever be modified. This argument seems to forget that "a market is often more a derived than an original feature. A concentration of industry at one point creates a market at that point" [Estall and Buchanan, 1966, p. 27]. The position throws little light on the process by which a market becomes large and even less on how it starts from scratch. Markets once start from scratch.

The Large Manufacturing Corporation and Area Growth

At one point in time, in the history of this country, California had a very small proportion of the total population and Los Angeles was a very small city. Today, California is the largest state and Los Angeles the second largest city in the United States. What accounts for such changes in the distribution of the population and economic activities and the varying state or area growth rates underlying these changes?

Could it be that the marginal propensity of some people to consume, save, invest, export and import in some

states and areas is very different from that of the rest of the country? This is what traditional growth models would suggest, since these are the basic elements which determine in these models the rate of growth of the country and Richardson argues that they could be applied to regional growth [Richardson, 1969, Ch. 13]. In the present analysis, these factors and models are discarded even without description for two reasons. We do not believe these variables can be so different from one region to another, from one area of a region to the other, to create large differences in area growth rates. Even if they were, it would be very difficult to test such models since it would require very detailed area accounts which are not available.

Is it possible that some regions and areas are growing very fast because large numbers of skilled workers with their families move into these areas to constitute a large reservoir of qualified labor waiting idle the fortunate event that a firm, aware of their presence, be attracted to the area and hire them? This seems very unlikely.

Our thesis is rather that areas grow or decline because of the decision of large enterprises to locate manufacturing establishments or expand their present facilities in some areas rather than others. We argue that this decision has a far reaching influence not only on the immediate production conditions of the areas but also serves as an impulse for satellite firms and industries to locate there, which results

in a high growth rate. We call these large firms location leaders, which means that they preceed or at least can preceed population into an area and generate changes in population and economic activities distribution pattern. This concept we have adapted from Estall and Buchanan giving it in part some additional meaning.

> ". . .we have as yet attempted no explanation of how the general pattern of distribution of all industry in a country might arise, i.e., how the pattern of distribution of the entire industrial population emerges and why it is as it is. There are in practice certain fundamental industries that are so important in their numbers of employees, or in the numbers and types of industries 'linked' with them, that they tend greatly to influence the main features of the distribution of industrial employment generally. Such major industries we may call the 'location leaders'. These are the industries on which a modern industrialized country's prosperity is usually based, and we may instance the iron and steel industry, heavy engineering, the heavy chemical industry, oil refining, aircraft manufacture and automobile production. . . . . .
>
> "These are the type of industries that provide the framework for the general pattern of industrial distribution. They are large and important employers of labour, with all the associated advantages that this offers to other industries in their area; they provide a high proportion of earning (and therefore spending) capacity; they contribute significantly to the national total of value added by manufacturing industry; they are industries in which a considerable proportion of total new investment takes place. . . . . .
>
> "Their leading role also arises naturally from the fact that they often provide the raw materials for, or use on an immense scale the products of, other industries and therefore powerfully attract them. It would be difficult to find an industrial process that did not use in some way

> "the products of the iron and steel or chemical industries, while many firms exist partly or entirely to provide parts for use in the major assembly industry establishments. . . . . .
>
> "Further, the pattern set by the location leaders is often reinforced by the fact that many occupations and processes not essentially 'linked' with them are nevertheless attracted to the same locations by the concentration of industrial employment there and by the general economies of concentration that are available. They thus form the main nodes round which great industrial complexes have developed and they provide the underlying rationale of the geography of industrial activity" [Estall and Buchanan, 1966, p. 146-148].

The authors have been talking thus far of leading industries rather than of leading firms. But is is obvious from their conclusion that they mean both since their leading industries are controlled by the largest firms as they themselves realize:

> "Our thesis here, then, is that there are enterprises of large scale which comprise the fundamental industries and services in an industrial economy and are the pattern formers of the general distribution of industry and of the industrial population.[17] Many smaller (an some not-so-small!) industries tend to follow the pattern set by the leaders, for their own optimum location occurs in proximity to them, ensuring the availability of materials or labour or markets or services, or all combined."

These quotations indicate the meaning these authors give to the concept they are discussing. Location leaders,

---

[17] They single out one specific service as a possible location leader, the provision of a large port.

because they are key elements in a number of inter-industry relationships, attract other firms and industries where they locate and thus are "pattern formers" of the distribution of industry and the industrial labor force.

Our conception of a location leader includes this aspect of course, but it is broader. Our hypothesis that the large manufacturing corporations are the major factor accounting for area growth differentials also asserts a singular causal importance between the distribution of secondary industry activity and that of overall economic activity including the service industries. Our leaders are "pattern formers" of the distribution not only of industry but of economic activities generally.

Estall and Buchanan come very close to suggesting some reasons for this view when they mention that many occupations and processes not essentially linked to the leaders are attracted to the same location because of the economies of concentration that are available. Even more importantly they mention that the leaders provide to an area an important source of earning and spending capacity. For us, this earning and spending capacity is necessary if an area is going to develop service activities. It is hard anyway to imagine how a community could grow and even be maintained if all its members were occupied in providing services to each other while importing from other areas its food, clothing, energy supplies, cars, etc. It would rapidly

face an untenable balance of payments deficit (just like a country doing the same thing would) which would rapidly shrink the community.[18] This idea that manufacturing or export industries provide the base for the development in an area of a variety of other activities (nonexport or non-basic or service activities) is not new. It has been formalized in the economic base theory of regional growth. Despite the limitation of the methodology used to compute multiplier effects and make employment predictions, the idea itself would appear to have great validity.

One may object that the above argument gives far too much importance to manufacturing as a determinant of population and economic activity distribution and of area growth. There are indications that this importance is justified. Perloff and others have found a correlation of .936 between each state's share of manufacturing employment and each state's share of population [Perloff and Dodds, 1963, p. 69]. Chinitz and Vernon have found a "marked convergence in the ratio of manufacturing employment to population among the different regions of the country toward some common national ratios" [Chinitz and Vernon, 1960, p. 127]. Therefore, the redistribution between areas of manufacturing employment of a country, even if it is growing relatively slowly can give hope to lagging areas.

---

[18]This would be true unless important sources of income from government transfers flow into the area.

This does not mean that a given area cannot grow if its manufacturing employment does not increase. An area with important recreational and tourist resources or which happens to be selected for the establishment of a state or federally supported educational or military institution or a federal administrative center can grow quite fast.[19] These activities have an important common characteristic with manufacturing: they are export industries in the specific sense that income from other areas in some cases from all over the country, flows into the area and represents an important spending capacity available to develop and support a variety of other local activities.

It is appropriate at this point to bring our discussion a little closer to an important aspect of the received area growth theory: that related to the growth center concept

---

[19]These types of variables were not included in our model. They came to our mind as an afterthought, once the model was elaborated, the data gathered and processed. One can argue that it is not that important to include them. First the basic hypothesis we wish to test does not relate to these variables. Their effect should appear in the residuals. Second, even if some rural areas might have good tourist possibilites, it does not seem that much effort has been made to exploit them and therefore it is probably hopeless to attempt explaining past growth rate differentials with a variable measuring these possibilities. As to the other variables, Irwin already attempted to explain population growth rate differentials between nonmetropolitan counties with a model including dummy variables accounting for the presence of a college, a military institution, the presence of a freeway. These variables were significantly different from zero but the R^2 was .09 and the author concluded that his results were disappointing as to proportion of variance explained [Irwin, 1972].

or Francois Perroux's 'pole de developpement' and 'pole de croissance' [Perroux, 1955]. Richardson's discussion of this concept provides us with several points of similarity between what accounts for the existence of a growth center and our concept of location leaders. He points out that:

> "Regional expansion takes place. . .because of interaction between key industries at the pole. These industries are called 'propulsive industries' and they form the nucleus of the development pole. . . .They tend to be highly concentrated and usually sell to national markets. They have marked multiplier and polarising effects on the region in which they are situated."

He also emphasizes that economies of scale and agglomeration economies are the "major polarisation forces" at the growth point. He suggests that the key industries are "probably export industries," that they "increase the effective demand" of the area, that growth point theory "implicitly draws upon the export base concept." He finally enumerates a large number of service activities which are developed at the pole, either business services or services for the population of the growth point and its surrounding area [Perroux, 1955, p. 415-428].

All this seems very similar to what we have presented as either the characteristics or the role of the effect of a location leader in an area. It is probably right to suggest that the propulsive industries (firms) which form the

nucleus of the development pole are nothing else than our location leaders.[20]

We have to emphasize now the reason why our concept of location leaders is applied only to the largest manufacturing corporations. It can be argued that any firm opening a large establishment in a small area may serve as a location leader and stimulates the growth of the area. It is certainly reasonable to expect this result. We must add however, that the result can be expected if, and only if, the firm does succeed in operating its establishment. It is much less certain that any firm can do that.

One reason is contained in a part of our previous discussion. Let us repeat and reemphasize this point, since this is one of the central arguments of this chapter. The large firm, because it has financial strength, given the size of the new investment it can start within a new area, because it is, or can be, its own supplier of parts, components, repair and other services, because it coordinates very large amounts of interdependent investment, does create by itself

---

[20]One dissimilarity may be noted here. Richardson distinguishes between natural and artificial growth points. Natural growth points are found at "substantial population centers within highly developed regions." Artificial growth points "could be created almost anywhere if policy makers were willing to pump in enough resources in the form of public investment in infrastructure and subsidies" [Richardson, 1969, p. 416]. Our thesis is that the largest manufacturing firms are in a better position than policy makers to act as location leaders or to initiate the pumping into a relatively unsettled area of the resources needed to create a growth point.

and internalize economies of concentrated production. This is one source of its ability to succeed where others would fail.

The large firm has other characteristics we have not mentioned yet which are of critical importance in the present discussion. The large manufacturing firm has a highly articulated marketing organization, well-developed market channels, it has a name and brand names which are known, it has a market share of which it is proud and that it protects. The largest firms taken together have a high market share of almost all the major markets. This share is not decreasing, it is increasing. The firms are not indifferent to this fact and they have some power to react if that share is threatened.

Let us consider, as an example, the auto industry. Assume that a man of good will in Michigan's Upper Peninsula is anxious to develop a large center that will bring to this area not only more jobs but the abundance, quality and diversity of services people of other areas enjoy. He believes the auto industry, which has done so much for Southern Michigan, is the number one prospect to do that for the Upper Peninsula. He conceives the idea to open a huge car assembly plant to employ, after some training, all the unemployed and underemployed of his area as well as thousands of others. What is the likelihood he will try to realize his project? Let us assume he does. If he has the money or can borrow it,

he can of course build the plant. How many cars will he produce and for how long if the current four manufacturers decide they want to keep a hundred percent of that market?

One can perhaps answer this question in different ways. We leave it as a question. However, the idea behind the hypothetical example leads us to argue that the trend towards the geographic concentration of economic activities may not be unrelated to the trend towards the concentration of the control of economic activities within the hands of the largest corporations. It also leads us formally to hypothesize that the location pattern of these corporations is the dominant factor accounting for area growth differentials.

In this chapter, we have reviewed and discussed a number of important location and area growth theories in an attempt to develop a theoretical base to understand better how an overly concentrated pattern of location may develop in a country, to understand the reasons why the approach followed thus far in modifying this pattern are inadequate and to support the new approach embodied in our basic hypothesis. Let us examine now the methodology we have designed to perform a small scale test of this hypothesis.

CHAPTER III

METHODOLOGY

The Delineation of Areas

The delineation of areas adopted in this research was used by the Economic Research Service of the U.S.D.A. in a study which built for 1960 an index of economic development to rank the areas [Galbraith, 1968]. It divides the United States into 489 multi-county areas, called Basic Trading Areas (BTAs).[21]

As explained in the ERS report, "these multi-county areas closely approximate functional economic areas in the sense of having a dominating central city that influences both the immediate urban area as well as the surrounding rural area. In most cases, residents of the rural areas live within commuting distance of the central cities [Edwards, et al., 1961, p. 9].

This area delineation has several advantages for our purposes in this research. It uses the county as the building block for each area which facilitates the use of secondary

---

[21]The delineation has been made by the Rand McNally Corporation which publishes a number of trade and market information on these areas in its Commercial Atlas and Marketing Guide [Rand McNally, 1970].

data. The dominating central city has been selected and the county grouping determined on the basis of the importance of exhibited shopping relationships between the center and its hinterland. The delineation should correspond reasonably well to the commuting facilities within the area. Therefore, the area can be considered also as an approximation of a labor market area, probably the most appropriate unit of observation within which to examine the influence a firm may have on its surroundings. Finally, the dominating central city of those areas which are small and, one may suggest, in need of growth and development, might eventually serve as the focus of a public decentralization policy. This would follow our line of argument in Chapter II, related to the diversion of growth from centers of size C to centers of size A as described in Figure 2. It would also be totally in line with the argument, in Chapter I, related to the growth of a limited number of centers in rural areas serving as an industrial production and service center for the hinterland rural population.[22]

The delineation has limitations however. The BTAs are aggregations of counties. Their boundaries are those

---

[22]Eliminating from the 489 BTAs those with an already large central city (and possibly those with an intermediate-sized center) we would be left with a small number of areas "in need of growth", a number contrasting sharply with the 14,557 small towns and villages which might be the focus of a dispersed settlement policy.

of the counties included. But counties are administrative division of a territory. One cannot expect that the distribution of economic activities will invariably follow these boundaries. It may even happen that the economic impact of a firm located in one county is mostly felt in the next county. Given the basis on which the aggregation has been made it is likely that most of the counties with important economic interdependence have been grouped. This emphasized however that BTAs are only approximations of functional economic areas--a practical limitation imposed by the use of available statistics. The problem of county boundaries is probably the most important objection one might have to the use of the individual county as a unit of observation, although in the statistical part of a case analysis covering a limited territory, the delineation into counties has the advantage of providing a larger number of observations and therefore a larger number of degrees of freedom.

Another difficulty involved in aggregating counties to form an area is that one may sometimes aggregate very different entities and lose, this way, a part of the information he is interested in as well as part of the variability he attempts to explain. In the first chapter, we observed that the central city and the suburban ring of the largest metropolitan areas are growing at widely different rates. This is the type of variability we want to explain. We are

interested in seeing if the location of the largest corporations accounts for this fact. The aggregation here does not help us. This is why we have defined a slightly different type of multi-county area that we call a modified basic trading area. It is modified in the sense that we have made two areas out of each of the BTAs which involve the largest metropolitan areas. One modified BTA includes the county of the central city of the metropolis, the other includes the ring counties. This, on the other hand, brings us back to the problem of county boundaries discussed in the previous paragraph.[23]

The previous discussion makes clear that the delineation of a territory into areas is a multidimensioned problem. One is faced with deciding on trade off's between these dimensions using very imperfect knowledge of the dimensions as well as the trade off's. This is why in the statistical part of the analysis we have used the three types of areas discussed: the BTAs, modified BTAs and the counties. We hope to be able to add something to this discussion once the results of the analysis have been presented.

---

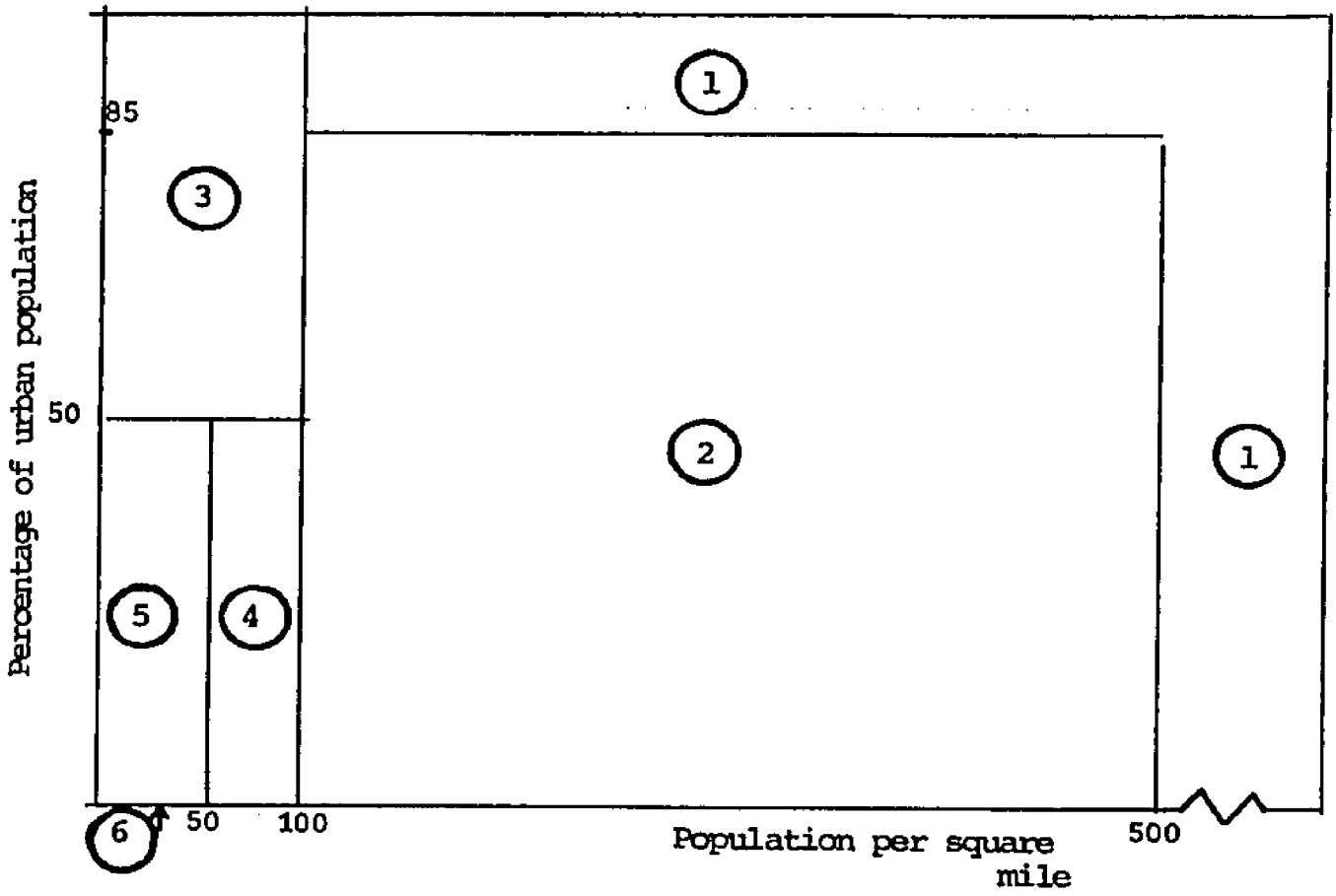
[23]One other possible area delineation has been discarded: the delineation into metropolitan and nonmetropolitan areas. This would be consistent with one of our purposes in this research as it will become clear in the next section. However it would provide a very small number of observations. Moreover the grouping of all the counties which are not part of an SMSA into one nonmetropolitan area is felt to be too much aggregation.

Urban and Rural Orientation of the Areas

A question related to our hypothesis is the following: Do the largest corporations tend to avoid locating in rural areas, or, alternatively, to what extent do they prefer urban areas? To answer this question we have to determine which of our areas are rural and which are urban. The census considers as urban residents the persons living in places of more than 2,500 persons. Bluestone retained this criteria but added another criteria, population density, to classify the counties of the United States into six urban-orientation classes or groups (Figure 3) [Bluestone, 1970]. With this classification he found that 20.9 percent of the population in 1960 were living in rural-oriented counties (groups 4, 5, and 6) as compared to the 26.5 percent of the population the census considers as rural residents.

We could use Bluestone's combination of criteria to classify as rural-oriented the Basic Trading Areas with an urban population of less than 50 percent of total and a population density of less than 100 persons per square mile. The other areas would be urban-oriented. Edwards, Coltrane and Daberkov used this classification in their study and found that in 1960, 17.8 percent of the population was living in rural-oriented areas [Edwards, Coltrane, and Daberkov, 1971].

One can certainly question the validity of using the population density of an area as a criterion to evaluate



Note: Circled numbers indicate the urban-orientation of the county:

1. Metropolitan
2. Urban
3. Semi-isolated urban
4. Densely settled rural
5. Sparsely settled rural with urban population
6. Sparsely settled rural without urban population (0% urban and 4-49.9 persons per square mile).

Source: Bluestone, H., "Focus for Area Development Analysis: Urban Orientation of Counties," ERS, U.S. Department of Agriculture, AER No. 183, May, 1970.

Figure 3. Criteria for grouping counties by urban orientation.

its urban or rural orientation since two areas with a same percentage of urban population can be classified in different groups simply because one of them includes several square miles of unhabited forest. One can wonder also if the rural population (by Census definition) living in Wayne county (which includes Detroit) is the same type of rural population as that living in Alcona county. An answer to this question would lead to a discussion of what people mean by rurality and urbanity. We believe that it is not necessary for our purpose to enter into this discussion. Duncan and Reiss, who examined the question, found that counties ordered by Metropolitan status and size of the largest urban place contained rural populations with sharply differing characteristics [Duncan and Reiss, 1956]. Hathaway, et al. formulated and tested the "general hypothesis that metropolitan dominance shapes and determines important social and economic characteristics of the rural population" [Hathaway, Beegle and Bryant, 1968]. Their investigation led them to a proposal for census classification and procedures which includes the metropolitan and nonmetropolitan categories now used by the Bureau of the Budget as a fundamental part of a residence classification scheme. They state the following:

> "The criteria currently used by the Bureau of the Budget in the delineation of standard metropolitan statistical areas have not been evaluated in this study. However, the importance of the influence of metropolitan areas on hinterland populations has been stressed throughout the monograph, and it is on the basis of the evidence

> "presented that we recommend a metropolitan-nonmetropolitan distinction as an essential part of the residence classification scheme" [Hathaway, Beegle and Bryant, 1968].

We will retain here Hathaway and Beegle's metropolitan-nonmetropolitan distinction and therefore consider as urban-oriented our BTAs containing one (or more than one) SMSAs and as rural-oriented our BTAs which do not include an SMSA. We cannot report how many U.S. residents were living in rural-oriented BTAs according to this criterion. We can do it for the two states included in our analysis. This appears in Table 10 which also indicates how many people in these states would be considered as living in a rural BTA if the other definitions discussed above were adopted.

Table 10. Percentage of Rural Population and Percentage of the Population Living in Rural BTA with Alternative Criteria Used to Define the Rural Orientation, Michigan and California, 1970.

	Percent Rural (Census)	Percent of Population in Rural BTA	
		Bluestone Criteria	Hathaway Criteria
Michigan	26.2	7.5	16.6
California	9.1	5.4	8.7
Both States	14.6	6.1	11.0

Source: Obtained from U.S. Bureau of the Census, U.S. Census of Population: 1970, Number of Inhabitants, Final Report, PC(1)-A1, U.S. Summary, Washington, D.C., 1971, and Appendix Table 1.

The Measurement of Area Growth Differentials

Area growth differentials can be measured simply by calculating a rate of growth for each area and comparing them. The differences observed, however, are the results of at least two distinct effects. One effect is related to the industrial composition of employment in the area; the other relates to the competitiveness of a location vis-a-vis other locations. In a study attempting to identify some factors that can be at work in a local economy to make it grow faster than others, the growth differentials resulting from the competitive effect appears as the most important to explain. It seems desirable to isolate this effect. The shift analysis technique, which was used by Fuchs, Ashby and Perloff, et al. in comparative growth studies, does precisely that. It identifies a "comparative gain or loss adjusted for industrial structure" [Fuch, 1962] or a "competitive effect" [Ashby, 1964] or a "local factor effect" [Perloff, 1963].

The formula used to compute this effect is the following:

$$M_x = \tfrac{1}{2}\left(Y_{s\cdot} - \sum_i X_{si}\frac{Y_{\cdot i}}{X_{\cdot i}} + \sum_i Y_{si}\frac{X_{\cdot i}}{Y_{\cdot i}} - X_{s\cdot}\right)$$

Where:

M_s = The comparative gain or loss in economic activities (employment or personal income), adjusted for industrial structure, in area s between the initial and the final year.

X_{si} = Economic activity in initial year of industry i in area s.

$X_{s\cdot}$ = Economic activity in initial year of all industries in area s.

$X_{\cdot i}$ = Economic activity in initial year of industry i in all the areas.

$X_{\cdot}$ = Economic activity in initial year of all industries in all the areas.

Y_{si}, $Y_{s\cdot}$, $Y_{\cdot i}$ represent the economic activities in the terminal year.

This formula is a combination of those used by Fuchs and Ashby. Fuch used the formula as formulated except that he included a denominator in order to express the comparative gain in percentage. We want to avoid this procedure for a reason given in the next section. Ashby used the following formula:

$$M_s = Y_{s\cdot} - \sum_i X_{si} \frac{Y_{\cdot i}}{X_{\cdot i}}$$

or the first term of the earlier expression after dropping the ½ before the parenthesis. In other words, Ashby computes his competitive effect, adjusted for industrial structure, the adjustment being entirely based on the structure of the initial year. Fuchs, by using the second term of the formula "a mirror image of the first," takes account of the structure of the final year in an attempt to approximate a more precise method that calculates the comparative gain for each year of the period and then sums them.

Ashby does not make the correction made by Fuchs probably because he has discerned a relative rise in the importance of the competitive effect as compared to the

industrial mix. Burrows, discussing this technique suggests that the adjustment for industrial structure is not impor- that [Burrows, 1971, p. 11-15]. He bases his judgment on Fuchs' findings of a high correlation between the comparative gain adjusted and unadjusted and no correlation between comparative gain or loss, unadjusted, and industrial structure. In other terms there would be little association between a state's unadjusted comparative growth and its proportion of high growth industries. It is important to note, however, that Fuchs findings are for very large areas (the states) and it is likely that the larger the areas, the similar the industrial structure. And, of course, if the areas considered have the same industrial structure, the adjustment for industrial structure is meaningless.

It should be noted finally that for the purpose of Burrows' analysis, which used 1950 socio-economic variables to explain employment in 1960 in each industry the shift technique is unapplicable. Fuchs, on the other hand, used this comparative gain adjusted as a dependent variable in a function designed to explain growth differentials between states.

The adjustment for industrial structure in our analysis is made using the U.S. Bureau of the Budget 1 digit industry level of classification rather than a finer detailed classification [U.S. Bureau of the Budget, 1967]. This is to keep the computation at a manageable level and because the

most important adjustment to be made is probably an adjustment accounting for the relative specialization of some of our areas in the declining industries of agriculture and mining. The 1 digit industry level of classification is enough to take account of that.

The Econometric Test of Significance of the Hypothesis Investigated

The hypothesis investigated in this research, you recall, asserts that area growth differentials are predominantly explained by the choice of locations of the largest manufacturing corporations. Testing this hypothesis requires that we measure the extent to which area growth differentials are explained by a variable reflecting this choice and to what extent they are explained by other variables. It involves the formulation and estimation of a function including these variables. The procedures followed to perform this test are described below.

The General Function to be Estimated

We have chosen the following equation for the determinants of the comparative gain or loss in employment in area s between 1960 and 1970:

$$X_{1s} = f(X_{2s}, \ldots, X_{ns})$$

Where the variables are defined as:

X_{1s} = the comparative gain or loss in employment in area s between 1960 and 1970 (Comparative Gain)

X_{2s} = Total employment in area s in 1960 (Employment-60)

X_{3s} = Largest firms' employment change in area s between 1960 and 1970 (Large Firms)

X_{4s} = Per capita local government expenditures in areas s, 1962 and 1967 (Government).

X_{5s} = Percent of persons 25 years and over with high school or more education in area s in 1960 (Education).

X_{6s} = Long term average temperature in area s (Temperature).

X_{7s} = Average manufacturing wage rate in area s in 1963 (Wage rate).

X_{8s} = Average price of agricultural land in area s in 1964 (Land). (A measure of the availability of cheap land).

X_{9s} = Distance of area s to nearest SMSA with 250,000 persons or more (Distance).

X_{10s} = Dummy variable, 0 for BTA or modified BTA located in Michigan and 1 if located in California.

e_s = Error term assumed to follow usual assumptions, see Kmenta [Kmenta, 1971, p. 202].

This equation states that the comparative gain in employment in an area is a function of the size of the area, the change in the activities of the leaders (largest firms) and a set of variables reflecting in some way the attractiveness or desirability of an area for industry.

The size of scale variable (X_2) was entered because both Fuchs and Burrows suggested that it is important to include. Fuchs used a scale variable to test a catching up hypothesis which asserts that those areas (states in his case) with a small employment base at the beginning of the period

are expected to grow faster [Fuchs, 1962]. Burrows' scale variable was assumed to account for the presence of agglomeration economies which are attractive for firms.

The largest firms' employment change (X_3) is the variable we chose to account for what is designated as the choice of location of the largest manufacturing corporations in the formulation of our basic hypothesis. Of course, the variable measures more than just new choices of location. But we believe that the expansion of a plant accompanied by an increase in employment also reflects a choice of location; it is the confirmation of a location decision. It certainly has an important impact on an area. We cannot leave it out. Moreover, the decision of a firm to close an establishment in an area, may be the result of a choice of location and it may have a strong impact on the area. The variable defined takes account of all these changes.

The measurement of this variable involved a few problems. First we had to determine which corporations we were to include in the analysis. Fortune Magazine publishes every year a list of the 500 largest industrial corporations [Fortune, 1971]. We decided to include in our analysis the 200 of these which were the largest in 1970 plus those among the remaining 300 which had their head offices in the states selected for the analysis. It is obvious that some of these are primarily mining companies and many others have other than manufacturing activities, but at this point that problem was set aside for more important difficulties.

Most of the corporations included purchased other firms during the period 1960 to 1970. It is obvious that if ITT purchased 50 other firms during the period and if we count the employment of ITT in 1970 and its employment in 1960, a part of the difference in its number of employees will be the result of its acquisitions rather than the result of new investment leading it to hire new employees in an area. What we really want to measure is the number of new employees hired by the largest corporations during the period. Depending on the type of links existing between firms, the controlled firm may either resume its operations under the same name or operate under the name of the controlling firm. Therefore, to avoid counting the employment of a firm in 1970 and omitting it in 1960, we had to include in our list for 1960 all the firms which had been the object of mergers or other forms of acquisition between 1960 and 1970. Fortunately the Moody's Industrial Manual [Moody's, 1971] provides a history of the acquisitions made by a very large number of firms. Using these historical notes we could then complete our list of company names. This list is given in Appendix Table 2.

The next task was to count the employment of each of them in 1960 and 1970 and measure the difference. The problems related to these employment figures are discussed in the section on the data sources.

The other variables were included to account for

characteristics reflecting the relative attractiveness of areas for firms or the efforts made to increase this attractiveness. You recall that a secondary hypothesis of this research is that public programs focusing on these characteristics are weak means to enhance rural growth. We do not expect that these variables will explain much of the variability of the dependent variable, but to test that matter we must include them. Some of the rationale leading people to believe that these variables may explain growth differentials is now spelled out briefly.

The higher the per capita local government expenditures, the better should be the local services to firms and families in the area. It may also reflect the efforts of local officials to improve the attractiveness of the area. The percentage of the adult population with a high school level or more of education may reflect the availability of skilled workers. Fuchs used a variable accounting for the temperature. His measure was a deviation from 65°F, assuming that this is an ideal temperature, reducing heating as well as air conditioning costs. We believe that the average annual temperature is a good measure since only one of our BTA areas reaches his optimal temperature. Variable X_7 is to account for the fact that manufacturers would tend to avoid high wage rates. It is assumed that the lower the price of agricultural land is, the easier it will be to find an inexpensive site on which to build a plant. Finally, the

further away an area is from highly developed centers (SMSAs) the least attractive it should be for industries.

We also included a dummy variable to take account of unidentified effects that might possibly explain higher gains in the areas of one of the two states.

The Different Functional Forms

The function above was estimated using two different functional forms. The first is the simple linear form as used by Fuchs, with which he got quite good results both in terms of statistical significance and sign of the coefficients of the explanatory variables, and the R^2 value. In this form, the function becomes:

$$X_{1s} = a_1 = b_2X_{2s} + ,. \ . \ . \ ., + b_nX_{ns} + e_s$$

It is appropriate at this point to explain why the dependent variable, comparative gain or loss in employment, adjusted for industrial structure, is not expressed in percentage as Fuchs did. Burrows [p. 15] rightly points out that if the comparative gain is expressed in percentage it distorts the model written above. If X_1 is expressed in percentage, ignoring now the fact that it is an average over the two base years, it can be defined, using the same notation as in Chapter IV, the inferences of the results, as follows:

$$X_{1s} = \frac{Y_{s\cdot} - \sum_i X_{si}\frac{Y_{\cdot i}}{X_{\cdot i}}}{Y_{s\cdot}}$$

But X_1 being defined this way the equation above becomes:

$$Y_s = a_1 Y_{s\cdot} + b_2 X_{2s} Y_{s\cdot} +,\ldots, b_n X_{ns} Y_{s\cdot} + \sum_i X_{si} \frac{Y_{\cdot i}}{X_{\cdot i}} + e_s$$

a function difficult to justify theoretically, in Burrows' opinion.

If we do not express the comparative gain in percentage, then, the function can be written:

$$Y_{s\cdot} - \sum_i X_{si} \frac{Y_{\cdot i}}{X_{\cdot i}} = a_1 + b_2 X_{2s} + b_n X_{ns} + e_s$$

which is acknowledged by Burrows to be a "more defensible model." He nevertheless makes another criticism of this model. He argues that this formulation constrains the coefficient of the constructed variable:

$$\sum_i X_{si} \frac{Y_{\cdot i}}{X_{\cdot i}}$$

to be 1. This constructed variable is nothing less than the expected employment in an area given its industrial structure. Since, as already noted, he thinks, based on his interpretation of Fuchs' results, that the industrial structure of an area does not influence its growth, he can hardly admit that this coefficient should be constrained to 1. He believes it should be zero, but he suggests that it should be the object of research, not an assumption of research. We have taken him at his word and, in one run of the regression, estimated the following function:

$$Y_{s\cdot} = a_1 + b_2 X_{2s} +,\ldots, b_n X_{ns} + b_{n+1} \sum_i X_{si} \frac{Y_{\cdot i}}{X_{\cdot i}} + e_s,$$

in which:

$Y_{s\cdot}$ = Total employment in area s in 1970 (Employment-70)

$\sum_i X_{si}\frac{Y_{\cdot i}}{X_{\cdot i}} = X_{n+1}$ = Expected employment in area s in 1970 (Effected employment)

The second functional form under which the function is estimated is proposed by Burrows. He states that the relationship specified in an equation such as the one specified here are

> ". . .almost certainly not linear. To assert linearity would be to assert, for example, that the absolute effect on employment of a one-year increase in average years of schooling is constant for all counties, independent of all other variables, including such 'size' variables as lagged employment or total labor force" [Burrows, et al., 1971, p. 24].

As an alternative to linearity, he proposes the following exponential form:

$$X_{1s} = X_{2s}^{b2} \exp(a_1 + b_3X_{3s} +,\ .\ .\ .,b_nX_{ns})u_s$$

Burrows suggests that all the right hand variables in this function can enter in a multiplicative form. It was decided for the purpose of this study, to modify the Burrows model and enter the variables expressing a rate in the exponential part and the variables which are absolute values in a multiplicative form:[24]

---

[24]We thank Dr. L. V. Manderscheid for the suggestion.

$$X_{1s} = \exp(a_1 + b_4X_{4s} + b_5X_{5s} + b_7X_{7s} + b_8X_{8s} + b_{10}X_{10s})$$
$$X_{2s}^{b_2}\ X_{3s}^{b_3}\ X_{6s}^{b_6}\ X_{9s}^{b_9} \cdot u_s$$

Written in logarithm, the function then becomes:

$$\ln X_{1s} = a_1 + b_4X_{4s} + b_5X_{5s} + b_7X_{7s} + b_8X_{8s} + b_{10}X_{10s} +$$
$$b_2\ln X_{2s} + b_3\ln X_{3s} + b_6\ln X_{6s} + b_9\ln X_{9s} + \ln u_s$$

in which $\ln u_s = e_s$ with its properties.

Burrows did not get very good results with this type of equation; he estimated several equations (one for each of 22 industries), few of the very many variables he used were significant in a majority of the 22 equations and the sign of the significant variables was not the same from one industry to another.

Nevertheless, we retained this exponential form because the poor quality of his results is not necessarily due to a misspecification of the functional form. One reason, as he points out, is "we are constrained to examine economic relationships with data which probably are for areas different from those relevant to the functions being considered" [Burrows, et al., 1971, p. 26]. The data he used was county data. He mentions that this does not take account of the fact that two counties can be functionally related. The areas (BTAs) we use should account for functional interrelationships.

The Estimation Procedures

The functions formulated will be estimated by the method of ordinary least squares (OLS) with all its assumptions. One problem, Burrows suggests, with a model of this type is that all the variables may be a simultaneous interaction of forces. He notes, however, that it would be exceedingly difficult to find a satisfactory solution to this problem.[25] We will report a matrix of correlation showing how these variables move together. The way in which the dependent variable is formulated in our model, comparative gain in employment between 1960 and 1970, leads us to believe that it cannot be hypothesized to be an explanatory variable of any of our predetermined variables. We do not see how the gain in employment of an area relative to the average area during a decade can be of any influence on the size of that area or the level of education or another characteristic of the population at the beginning of that decade. Therefore, we believe all our explanatory variables are really predetermined and the identification problem is avoided.

---

[25]Factor analysis is believed to take care, at least partly, of this problem by identifying among a group of interrelated variables independent factors to which a "score" is given which enters the regression. It may not help however the interpretation of the results nor the policy implications since it tests the significance of these composite factors rather than the original variables under study. For this reason and because it is more complicated this method has been discarded.

Another problem may arise from heteroskelasticity of the disturbance terms. Burrows suggests that a systematic relationship may exist between the size of the variance and the size of the area. He believes that his logarithmic estimating equation is roughly corrected for that since, in this form, the smaller observations are given a heavier weight or, "in relative terms, the upper ranges of the disturbances are scaled down and the lower ranges are scaled up" [Burrows, et al., 1971, p. 47]. It is difficult to assert a priori that the systematic relationship Burrows postulates does exist. This possibility is, however, a further reason to use both nonlogarithmic and logarithmic estimating equations.

The States Selected for the Case Analysis

To estimate the above functions, it would certainly be better to have observations for all the 489 Basic Trading Areas of the country. It was felt, however, that, for the purpose of a thesis, it could be as relevant and certainly more proportionate to the financial means of its author to perform a case analysis applying the methodology to observations gathered in a few states only. Michigan was selected because it is the state in which the research has been pursued. California was selected because this is the state with the largest comparative gain in employment in Fuchs and Perloff's studies. It is certainly an interesting case to investigate the factors accounting for comparative gains.

The two states together have 45 Basic Trading Areas. With 10 parameters to estimate, that leaves 35 degrees of freedom. The functions were also estimated using the observations for the modified Basic Trading Areas of each state separately. We have only 24 such areas in Michigan and 25 in California. In this case the number of degrees of freedom is substantially reduced. These results are not discussed but reported in the appendix.

The Data Sources

The data used in this analysis are secondary data taken directly or derived from publications of the Census Bureau of the United States for all the variables except the variables measuring the change in employment of the largest corporations, the distance to the nearest metropolitan area and the average temperature. A reference to the publications from which the data were obtained is given at the bottom of Appendix Table 1 in which we report these data for each county included in the analysis. We make here only a few comments on the reliability of these data and some other problems.

The employment data used to measure the dependent (X_1) and the scale (X_2) variables come from two alternative sources. When we use the BTA as units of observation the employment data are from the Census of population. These data are residential employment data while our data on the change of employment of the largest corporations are

establishment employment data. We believe that this does not introduce too much distortion in our model. Since the BTA are defined as functional areas, likely to approximate labor market areas, most people are expected to work in the area where they live. These employment data include all persons, 16 years old and over in 1970 and 14 years old and over in 1960, at work in the week of April 1. It is obvious, from the formula used to compute it, that the comparative gain in employment between 1960 and 1970 is understated by the fact that the persons of 14 and 15 years old at work are excluded in 1970.[26] It cannot be an important understatement however, since these persons account for only about 1 percent of the total employment. Finally these data on employment are based on a 20 percent sample. The data therefore, are subject to a sampling variability which is relatively larger the smaller the area for which a number of employees is estimated. This is shown in Tables 11 and 12.

In the set of regression runs using the modified BTAs or the counties as units of observations, the employment data are from County Business Patterns. These are establishment employment data. They are, of course, more appropriate data to use when the unit of observation cannot be considered as a functional area since the employment is accounted where the

---

[26]The number of persons 14 years old and over at work is given for 1970 but not by industry at the county level.

Table 11. Approximate Standard Error of Estimated Number of Employed Based on 20 Percent Sample.

Estimated Number of Employed	Number of Persons in Area							
	10,000	25,000	100,000	250,000	1,000,000	3,000,000	5,000,000	20,000,000
50.....	15	15	15	15	15	15	15	15
100.....	20	20	20	20	20	20	20	20
250.....	30	30	30	30	30	30	30	30
500.....	45	45	45	45	45	45	45	45
1,000....	60	60	65	65	65	65	65	65
2,500....	90	95	100	100	100	100	100	100
5,000....	100	130	140	140	140	140	140	140
10,000...	---	150	190	200	200	200	200	200
15,000...	---	150	230	240	240	240	240	240
25,000...	---	---	270	300	310	310	320	320
50,000...	---	---	320	400	440	440	440	450
75,000...	---	---	270	450	520	540	540	540
100,000..	---	---	---	490	600	620	630	630

Source: U.S. Bureau of the Census, Census of Population: 1970, General Social and Economic Characteristics, Final Report, PC(1)-C1, Appendix C.

work is performed.[27] These data do not cover the self-employed, farm workers, domestic service workers nor government employees but cover all other persons at work in the week of March 12. The data are derived from Treasury Form 941 which must be filed by all employers in such a way that their number of employees in each county appear separately. In manufacturing industries the reporting units are "conceptually the same as establishments," so that the number of reporting units in a county is equivalent to the number of establishments [U.S. Bureau of Census, 1971, p. 1-3]. County Business Patterns withheld the employment data for some industries in some counties to avoid disclosure of the operation of a given employer. The data withheld are included in the totals but this prevents us from making the adjustment for industrial structure when computing the comparative gain. Finally this publication was not produced in 1960. Therefore, the comparative gain we calculated with this source is a gain realized in 11 years (1959-1970) rather than 10 years.

Given all the differences noted between the two sources of information and the methods used to compute the comparative gains or losses in employment, variable X_1 in our analysis, there are certainly differences in the two sets of regressions performed. In Table 13, we illustrate

---

[27]Burrows used Census data with nonfunctional areas.

Table 12. Approximate Standard Error of Estimated Percentage Employed, Based on a 20 Percent Sample.

Estimated Percentage	Base of Percentage						
	500	1,000	2,500	10,000	25,000	100,000	250,000
2 or 98	1.3	0.9	0.6	0.3	0.2	0.1	0.1
5 or 95	2.0	1.4	0.9	0.4	0.3	0.1	0.1
10 or 90	2.7	1.9	1.2	0.6	0.4	0.2	0.1
25 or 75	3.9	2.7	1.7	0.9	0.5	0.3	0.2
50	4.5	3.2	2.0	1.0	0.6	0.3	0.2

Source: U.S. Bureau of the Census, Census of Population: 1970, General Social and Economic Characteristics, Final Report PC(1)-C1, Appendix C.

Table 13. Total Employment and Average Annual Rate of Change According to Alternative Source of Information, Michigan, California and Selected Areas and Counties, 1959, 1960 and 1970.

	Census of Population			County Business Patterns		
	1970	1960	Average Annual Change	1970	1959	Average Annual Change
	Thousand		Percent	Thousand		Percent
Michigan	3,253	2,727	1.93	2,497	1,866	3.07
California	7,485	5,761	3.0	5,517	3,713	4.42
Both States	10,738	8,488	2.65	8,016	5,579	3.97
Detroit Area	1,732	1,440	2.02	1,409	1.072	2.86
Los Angeles Area	3,371	2,616	2.89	2,831	1,942	4.16
San Francisco-Oakland Area	1,762	1,331	3.24	1,327	854	5.03
Wayne County	998	954	0.50	922	815	1.19
Los Angeles County	2,827	2,374	1.91	2,492	1,829	3.30
San Francisco County	318	331	-0.03	402	322	2.26
Alamenda County	417	338	2.33	295	210	3.68

Source: Appendix Table 1.

the differences between the two sources by reporting the employment figures and an average annual rate of growth, during the period considered, for the two states and selected areas or counties.

The employment figures for the manufacturing establisments operated under each firm's name in each county included in our areas were taken from a directory of Key Manufacturing plants published by Sales Management for both 1960 and 1970 [Markets Statistics, 1970; Sales Management, 1960].[28] The directory gives an employment figure rounded to the nearest hundred for all manufacturing plants with 500 or more employees in 1960 and for all manufacturing plants with 100 or more employees in 1970. We have taken for both years the employment figure for only the manufacturing plants with 500 or more employees. It is obvious that the measurement of the employment change would be more precise if we had a complete listing of all the establishments including the smallest in both years. Suppose, as an example, that the employment of a given plant increases from 400 in 1960 to 500 in 1970: the change is 100 employees but we count 500 employees since that plant is not listed in the 1960 directory. We believe, however, that the error involved is relatively small since most of the employment of these firms is in plants of a

---

[28] In 1970, the name of the publisher had changed, but the organization was the same.

larger size than between 100 and 500 employees (91 percent in 1970). Moreover, there is an error involved only in the cases of plants whose employment went from below 500 to over 500 during the decade.

It is likely that the measurement error discussed in the previous paragraph is relatively more important in the small areas where the firms have few employees and few large establishments. It is important to note that this would much more severely limit the precision of our data if we were expressing X_3 in our model in percentage terms. Where there is a very small base to calculate a percentage change, the omission of a few small establishments could make a huge difference. If, for example, our measurement indicates that the employment of the largest corporations went from 0 in 1960 to 500 in 1970, the percentage change is infinite. If, in fact, it went from 400 to 500, the percentage change is 25 percent. In an area like Los Angeles, which our measure indicates went from 304,400 to 362,300, an error of even a few thousand employees (due to the fact that in some establishments the employment was below 500 in 1960 and over 500 in 1970 and there is no way we may take account of the 1960 employment of this establishment) does not make much difference on the percentage change. Given the range of variability (between areas) of this variable, the absolute error involved in either large or small areas is not that important. It is probably however, an important reason not to formulate our model in percentage terms.

There are obviously other possible sources of errors like incorrect reporting of employment figures or even omission of some establishments in some areas. We have verified that in some cases, the employment figure of an establishment found in the directory we used does not correspond to the employment code given for the same establishment in the Dunn and Bradstreet, Reference Book of Manufacturers [Dunn and Bradstreet, 1970].[29] These cases are probably not very numerous nor are the cases of omission of establishments. As indicated in the introduction, the information contained in this Directory of Key Plants was gathered from "informed local agencies", state and local industrial directories and correspondence with the plants themselves after the Census Bureau, which was a presumably complete but confidential Classified Industrial Directory, had indicated "pretty much what to look for, namely, that in each county there were so many plants of a given size in specified 4-digit (sic) classifications" [U.S. Bureau of the Budget, 1967]. This should prevent most of the omissions. And, in fact, we have verified from the Census Bureau's County Business Patterns data on the number of manufacturing establishments that are in the counties and where the number of manufacturing establishments with 500 or more employees is zero or very small, the two sources

---

[29]These codes (W = 1.000 and over, V = 500 to 999, T = 100 to 499, etc.) are not precise enough to be used directly.

correspond closely [U.S. Bureau of Census, 1971]. In the counties where this number is larger, the Directory of Key Plants contains generally as many and most of the time more establishments than County Business Patterns indicates.[30] There is one noticeable exception. In Macomb county, County Business Patterns indicates there were 23 manufacturing establishments with 500 or more employees in 1959. The directory indicates the employment figure of only 13 such establishments in 1960. Since this is the opposite of what is occurring generally, we think several large establishments, many of which may be establishments of the companies we are considering, have been omitted in that county in the 1960 directory. Another indication is the fact that the employment of the companies in our list accounts for 42.4 percent of the total manufacturing employment in the two states, for 51 percent in Michigan and 60 percent in the Detroit area (without Macomb). Therefore, we dropped Macomb county from our data for the regression runs performed with the modified BTA or the counties as units of observation. In the regressions using the BTAs, we adjusted the 1960 Macomb figure for the employment of the largest corporations to 60 percent of the total manufacturing employment and also conducted one regression run without the whole Detroit area.

---

[30] A part of this difference may be due to the fact that we are comparing the 1960 Directory of Key Plants with the 1959 County Business Pattern.

With respect to other variables, we only mention that the variable reflecting the distance of one area from another was simply measured with a ruler on the Rand McNally Atlas map of the BTAs [Rand McNally, 1970]. We measured the distance from the main center of an area to the main center of another. The variable X_6 is an average temperature over the period 1931 to 1960.

CHAPTER IV

THE FINDINGS OF THE RESEARCH

The Geographic Distribution of the Employment of the Largest Manufacturing Corporations and its Relation to Area Growth in Michigan and California

When we discussed, in Chapter I, the problem investigated in this research, we observed that the population and economic activities of this country have been predominantly settling into metropolitan areas, especially into the suburban ring of the largest SMSAs. We suggested that this trend may be closely associated with the concentration of the control of economic activities within the hands of the largest manufacturing corporations and formally hypothesized that their choice of locations is the most important factor accounting for area differentials in the growth of economic activities.

This hypothesis has been tested with observations for the states of Michigan and California and the results are reported and discussed in the second section of this chapter. In this section we describe, for these two states, the geographic distribution of the activities of the largest firms, the population and total economic activity and we observe in

parallel the change in employment of the firms considered, the change in population and total employment in rural-oriented BTA and selected groups of urban-oriented BTA.

Our observations are presented in Tables 14 and 15. Table 14 shows that the largest firms have approximately 92 percent of their establishments and 96 percent of their employment in urban-oriented areas. They have more than 75 percent of their employment in the five largest areas, those including an SMSA with a population of at least one million people. It also shows that the proportion of their establishments and employment in the ring counties of these areas has increased importantly between 1960 and 1970. Finally, we can see that the firms considered opened many more new establishments and hired many more new employees in California than in Michigan, in urban than rural-oriented areas and in the ring than the central counties of the largest areas.

If we compare Table 14 and Table 15, we note that the activities of the largest corporations are substantially more concentrated in a few large areas than the population and total economic activities are. This is certainly consistent with the idea that these are their preferred areas of location. We also observe that, between 1960 and 1970, the changes in the distribution of the population, total employment and total manufacturing employment has followed the same pattern as the changes in the distribution of the activities of the largest firms.

Table 14. Number of Employees of the Largest Corporations in Establishments with 500 or More Employees and Number of Such Establishments in Selected Groups of Areas, Michigan and California, 1960 and 1970.

	Employees		Establishments	
	1960	1970	1960	1970
Michigan	579,400	595,700	199	219
California	470,000	585,400	184	247
Both States	1,049,400	1,181,100	383	466
BTA without SMSAs[1]	36,500	38,100	30	31
BTA with SMSAs[1]	1,011,300	1,140,000	351	432
SMSAs of Populations Greater than 1 Million	810,000	916,300	289	354
Central Counties	605,800	583,600	224	243
Ring Counties	204,200	332,700	65	111
SMSAs of Populations Less than 1 Million	201,300	223,700	62	78
	-------Percent Distribution--------			
Michigan	55.2	50.4	52.0	47.0
California	44.8	49.6	48.0	53.0
Both States	100.0	100.0	100.0	100.0
BTA without SMSAs[1]	3.5	3.2	7.8	6.7
BTA with SMSAs[1]	96.4	96.5	91.7	92.7
SMSAs of Populations Greater than 1 Million	77.2	77.6	75.5	76.0
Central Counties	57.7	49.4	58.5	52.1
Ring Counties	19.5	28.2	17.0	23.8
SMSAs of Populations Less than 1 Million	19.2	18.9	16.2	16.7

[1]Sum of Basic Trading Areas with and without SMSAs does not add to two states total because some counties of both states are part of BTA's of other states and some BTAs of the two states include counties of other states.

Source: Computed from Appendix Table 1.

Table 15. Population, Total Employment and Total Manufacturing Employment in Selected Groups of Areas, Michigan and California, 1960 and 1970.

	Population		Total Employment		Total Manufacturing Employment	
	1960	1970	1960	1970	1960	1970
	Thousands					
Michigan	7,823	8,875	2,727	3,253	1,036	1,169
California	15,717	19,953	5,761	7,485	1,391	1,615
Both States	23,540	28,828	8,488	10,738	2,427	2,783
BTA without SMSAs[1]	2,485	2,842	821	948	184	207
BTA with SMSAs[1]	20,905	25,821	7,612	9,728	2,225	2,553
SMSAs of Populations Greater than 1 Million	16,178	20,022	5,973	7,676	1,792	2,059
Central Counties	12,196	13,989	4,578	5,365	1,354	1,404
Ring Counties	3,982	6,033	1,395	2,311	437	655
SMSAs of Populations Less than 1 Million	4,727	5,799	1,639	2,052	433	494
	Percent Distribution					
Michigan	33.2	30.8	32.1	30.3	42.7	42.0
California	66.8	69.2	67.9	69.7	57.3	58.0
Both States	100.0	100.0	100.0	100.0	100.0	100.0
BTA without SMSAs[1]	10.6	9.9	9.7	8.8	7.6	7.4
BTA with SMSAs[1]	88.8	89.6	89.7	90.0	91.7	91.7
SMSAs of Populations Greater than 1 Million	68.7	69.5	70.4	71.0	73.8	74.0
Central Counties	51.8	48.5	53.9	49.7	55.8	50.4
Ring Counties	16.9	20.9	16.4	21.4	18.0	23.5
SMSAs of Populations Less than 1 Million	20.1	20.1	19.3	19.0	17.9	17.8

[1]Sum of Basic Trading Areas with and without SMSAs does not add to two states total because some counties of both states are part of BTAs of other states and some BTA of the two states include counites of other states.

Source: Computed from U.S. Bureau of the Census, 1970 and 1960 Census of Population, PC(1)-A1 and PC(1)-C, and Appendix Table 1.

The last observation suggests a close association between the change in the employment of the largest corporations and the change in population and total economic activities of an area. This association is more directly suggested in Table 16. Where the percentage increase in the activities of the firms is low or negative, the percentage change in population and economic activities is low. California has grown at a much faster rate. This corresponds closely to the changes observed in the number of employees of the largest firms.

Little more can be said about the relationship illustrated with these data without a more precise analysis to which we now turn.

The Results of the Statistical Analysis

The Linear Functions

Basic Trading Area as the Unit of Observation

Table 17 contains the simple correlation matrix of the variables used in this analysis and defined in Chapter III. It must be noted that the table includes, in some cases, alternative measurements of the same variable or variables which do not enter simultaneously into the same regression. Therefore, we must not be surprised to see some extremely high correlation coefficients. It remains that we have a few cases of explanatory variables substantially correlated which do enter simultaneously in the regression. These cases will be discussed.

Table 16. Percentage Change of Population, Total Employment, Total Manufacturing Employment and Employment of the Largest Corporations Between 1960 and 1970 and Employment of the Largest Corporations as Percent of Total Employment and Total Manufacturing Employment in Selected Groups of Areas, Michigan and California.

	Population	Total Employment	Total Manufacturing Employment	Large Corporation Employment	Large Corporations Employment as Percent of			
					Total Employment		Total Manufacturing Employment	
					1960	1970	1960	1970
Michigan	13.4	19.3	12.8	2.8	21.2	18.3	55.9	51.0
California	27.0	30.0	16.1	24.6	8.2	7.8	33.8	36.3
Both States	22.4	26.5	14.7	12.6	12.4	10.9	43.2	42.4
BTA without SMSA	14.3	15.3	12.8	4.4	4.4	4.0	19.9	18.4
BTA with SMSA	23.5	27.8	14.7	12.8	13.3	11.7	45.5	44.7
SMSAs of Populations Greater than 1 Million	23.8	28.5	14.9	13.1	13.6	11.9	45.2	44.5
Central Counties	14.7	17.2	3.6	-3.7	13.2	10.9	44.7	41.6
Ring Counties	51.5	65.6	49.8	62.9	14.6	14.4	46.7	50.8
SMSAs of Populations Less than 1 Million	22.6	25.2	14.1	11.1	12.3	10.9	46.5	45.2

Source: Computed from Tables 14 and 15.

Table 17. Correlation Matrix of the Variables Included in the Regressions with the Basic Trading Area as Unit of Observation, Michigan and California.

Variable	No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Comparative Gain	01	1.00												
Employment-60	02	.74	1.00											
Large Firms	03	.92	.90	1.00										
Government	04	.26	.12	.14	1.00									
Education	05	.61	.41	.49	.27	1.00								
Temperature	06	.33	.17	.21	.85	.40	1.00							
Wage Rate	07	.19	.29	.19	.11	.41	.22	1.00						
Land	08	.72	.57	.66	.45	.39	.49	.15	1.00					
Distance	09	-.31	-.29	-.23	-.28	-.39	-.51	-.54	-.43	1.00				
Dummy	10	.39	.16	.24	.91	.45	.91	.09	.48	-.32	1.00			
Employment-70	11	.76	.99	.91	.13	.41	.18	.29	.58	-.29	.16	1.00		
Expected Employment	12	.74	.99	.90	.12	.42	.17	.29	.58	-.29	.16	.99	1.00	
Unadjusted Gain	13	.97	.86	.97		.59		.23	.69	-.29	.31	.88	.87	1.00

The regression statistics for the function relating X_1, the comparative gain in employment adjusted for industrial structure, to the variables X_2 to X_{10} are reported in Table 18. We observe that the variable X_3 measuring the change in employment of the largest firms is the most significant. It contributes the most toward explaining the variability of the dependent variable (Beta weights = 1.10)[31] and it is the only one whose omission would substantially reduce the R^2 (R^2 delete = .78). The value of 3.28 for the coefficient means that an increase in the employment of the largest firms generates economic activities in an area in such a way that it gains employment, as compared to an area where there is no change in their activities, by more than three times the value of X_3 in the area, other independent variables assumed constant.

The only other significant coefficients, at the 95 percent level of confidence, are the coefficients of the variable measuring the level of education of the population which, as expected, is positive and the coefficient of the scale variable (total employment in 1960). The value of agricultural land (X_8) is significant at the 90 percent level of confidence. The fact that X_9 (distance to SMSA) is not significant contradicts Burrow's observation, but

---

[31]The Beta weight is a standardized regression coefficient that measures all variables in terms of their standard error.

Table 18. Regression Statistics for the Function $X_1 = f(X_2, \ldots, X_{10})$, Unit of Observation: BTA, Michigan and California.

Variable	Regression Coefficient	Standard Error of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	2124						
X_2, Employment-60	-.025	.066	-3.79	.001	-.41	.91	-.54
X_3, Large Firms	3.28	.359	9.14	<.0005	1.10	.78	.84
X_4, Government	2.20	21.0	.10	.917	.01	.93	.02
X_5, Education	673	311	2.16	.037	.14	.93	.34
X_6, Temperature	- 597	438	-1.36	.181	-.17	.93	-.22
X_7, Wage	- 458	4422	- .10	.918	-.01	.93	-.02
X_8, Land	7.84	4.40	1.78	.084	.13	.93	.29
X_9, Distance	-36.9	25.4	-1.46	.154	-.10	.93	-.23
X_{10}, Dummy	10542	9421	1.12	.271	.18	.93	.19
R^2	.935						
F Value	55.5			<.0005			

should not surprise. The effect of the proximity to an SMSA may be simply that the largest firms prefer to locate there and we account for that with X_3 while Burrows did not. The coefficients of variables X_4, X_6 and X_{10} are not significant. This was expected. First of all, these three variables are highly correlated. The dummy (X_{10}) is 0 in the areas of Michigan and 1 in the areas of California, the temperature (X_6) is 15 to 20 degrees higher and the local government expenditures (X_4) close to twice as much in the areas of California (Appendix Table 1). Within each state, the variability of these variables is pretty small but some areas gain and others lose employment comparatively. Therefore, X_4 and X_6 were not included in the regression runs performed after this one. Another nonsignificant variable whose variability is small is wage rates (X_7).

One result requires further explanation: the negative sign of the coefficient of the scale variable (X_2). Its small value cannot surprise since the gain or loss in employment is a relatively small number as compared to the size of an area. The negative sign was also expected even though we observed, in the previous descriptive analysis, that large areas are growing faster than small areas. The fact that most large areas are growing faster, or gain employment on small areas seems to be the result of at least two effects which may play in the same or opposite direction. First, the fact that the largest

corporations prefer to settle in some areas rather than others may contribute to preferred areas growing faster or gain employment. This is our basic hypothesis which is strongly supported by the results given. But the impact of the increased activity of the largest corporations is unlikely to be the same in small (relatively unsettled) and large (already abundantly settled) areas. In a small area the opening of a new large establishment is likely to have a large employment multiplier effect since it will attract suppliers and/or processors of the products of the new establishment and a number of service industries to serve the new employees and their relatives. This should lead to a comparative gain of that area over the large area where the opening of a new establishment may have none or little employment multiplier effect (a simple additive effect) since the linkages with the new establishment already exist as well as numerous service industries. This leads to the negative coefficient we observed for the scale variable.

This explanation is consistent and helps us to understand why we have a high positive simple correlation coefficient between the dependent variable (X_1) and the scale variable (X_2) while we have a negative partial correlation coefficient between these two variables. The fact that X_3 (large firms) is large in the large areas and affects positively X_1 is probably what leads us to

observe a positive simple correlation between X_1 and the scale variable, even though the distinct scale effect on X_1 might be negative, as suggested by the regression coefficient. This is probably why, holding X_3 constant, X_2 and X_1 move in opposite direction: ($r_{X_1X_2 \cdot X_3} = -.54$).

This divergence between the signs of the simple and partial correlation coefficients of X_1 and X_2 would not occur if X_2 and X_3 were not correlated, $r_{X_2X_3} = .896$. Therefore we have a multicollinearity problem in this function. Although regression theory indicates that it is difficult in such cases to separate the distinct effects of the two correlated regressors, it seems that, in the present case, the regression technique did succeed in separating the very different effects of X_2 and X_3 on X_1. We cannot verify from the results that this was correctly done. Fortunately, we will be in a position later, when using the modified basic trading area as a unit of observation, to check on the validity of this point.

For now we can at least mention that our interpretation of the scale effect seems to be consistent with the results of two more regression runs we performed of the function discussed (Appendix Table 3 and 4). In one of them the Detroit area was dropped from the observations. In the other the Detroit, Los Angeles and San Francisco-Oakland areas were dropped from the observations. These three areas are by far our three largest areas. Each of

them includes a very large city or well developed industrial production and service center where the arrival of a new large establishment may have only an additive rather than a multiplicative effect. In fact, the Detroit area has a comparative loss in employment despite a small increase in the activities of the largest firms while the other two have a comparative gain although smaller than expected given the large increase in the activites of the largest firms (Appendix Table 1). The results of the regression suggest clearly that the negative scale effect we identified above was determined by these areas. In the regression without the Detroit area the coefficient of X_2 is still negative but not significant. In the regression without the three areas the coefficient of X_2 is significant but positive rather than negative. Let us note that in both regressions, the coefficient of X_3 remains significant despite the fact that the range of variability of both X_1 and X_3 has been drastically reduced by the omission of these areas.

The next function estimated is a somewhat different model. The dependent variable is no longer the comparative gain in employment but the total employment in 1970 (X_{11}) which is related to the same set of explanatory variables as above. The results (Table 19), especially the extremely high R^2, may suggest that the function formulated is nothing else than an identity. In fact, it is not. It would be an

Table 19. Regression Statistics for the Function $X_{11} = f(X_2, \ldots, X_{10})$, Unit of Observation: BTA, Michigan and California.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	-51,664						
X_2, Employment-60	1.20	.008	148	<.0005	.94	.85	.999
X_3, Large Firms	3.89	.43	8.99	<.0005	.06	.999	.83
X_5, Education	1,176	357	3.29	.002	.01	.999	.48
X_7, Wage	143	5381	.03	.98	.00009	.999	.004
X_8, Land	7.45	5.39	1.38	.175	.006	.999	.222
X_9, Distance	1.08	27.57	.04	.969	.00014	.999	.006
X_{10}, Dummy	324	3897	.08	.934	.00027	.999	.013
R^2	.9997						
F value	21,078			<.0005			

identity ($X_{11} = X_2 + X_3$) if X_3, the change in the employment of the largest firms covered the total employment change in these areas. But X_3 represents only in average 5.7 percent of the total employment change. We can suggest with the results obtained, the extremely significant coefficient of X_3, that the change in the activities of the largest firms is a very strong indication of what will happen to total employment change in an area. This is simply another way of expressing the basic hypothesis we formulated. It appears to be strongly supported. It is no surprise, of course, to see that the total employment in 1960 is the most important variable of a function designed to predict the total employment in 1970 when we note that this total employment in 1970 varies from 9,954 in the smallest area to 3,370,878 in the largest. The variable X_3 in this function explains only the change in employment of the areas, whose range of variability is much smaller.

In the next function, we attempted to answer Burrow's criticism that a model such as ours arbitrarily constrains to 1 the coefficient of the constructed variable $\sum_i X_{si} \frac{Y \cdot i}{X \cdot i}$ which serves to correct for industrial structure when calculating the comparative gain in employment. This constructed variable (X_{12}) was therefore included in a function whose dependent variable is the total employment in 1970 (X_{11}) and which includes our other explanatory variables, less X_2. The results are shown in Table 20. The coefficient

Table 20. Regression Statistics for the Function $X_{11} = f(X_3,. . .,X_{10},X_{12})$, Unit of Observation: BTA, Michigan and California.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	-34050						
X_3, Large Firms	3.40	.38	9.04	<.0005	.06	.999	.83
X_5, Education	881	308	2.86	.007	.009	.999	.43
X_7, Wage	-465	4654	-.10	.921	-.000	.999	-.02
X_8, Land	9.15	4.7	1.96	.057	.007	.999	.31
X_9, Distance	-19	24	-.80	.430	-.002	.999	-.13
X_{10}, Dummy	1574	3371	.47	.643	.001	.999	.08
Expected Employment	.97	.006	171	<.0005	.941	.852	.999
R^2	.9998						
F Value	28196						

of X_{12} is 0.97 and is highly significant. It seems therefore, that we did not introduce any important distortion in our model by using this variable as we did in measuring the comparative gain in employment.

The above result does not establish however, the importance of making the adjustment for structure. If we compare the last two functions we can see that the only difference is that X_{12} appears in one of them and X_2 in the other and both explain about the same proportion of the variability of the dependent variable. Furthermore, the matrix of correlation given in Table 17 indicates that the correlation between the adjusted and unadjusted comparative gain is high, 0.97. This is why, probably, the results of the function we estimated with the unadjusted gain as the dependent variable, in an attempt to determine the importance of making the adjustment do not lead to a firm conclusion, (Table 21). This function explains a slightly larger proportion of the variability of the dependent variable. However the coefficient of the scale variable is no longer significant. This is probably because, as we suggested, the negative scale effect in the first function was caused by our three largest areas, which have a very small share of the most rapidly declining industry, agriculture and, as a result, an unadjusted gain substantially higher than the adjusted gain (Appendix Table 1). Thus a part of the information given by the function having the adjusted gain

Table 21. Regression Statistics for the Function $X_{11} - (X_2 \cdot 1.196) = f(X_2, \ldots, X_{10})$, Unit of Observation: BTA, Michigan and California.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	-51,663						
X_2, Employment-60	.001	.008	.176	.861	.015	.957	.029
X_3, Large Firms	3.89	.432	8.99	<.0005	.827	.862	.828
X_5, Education	1,175	356	3.30	.002	.155	.944	.477
X_7, Wage	143	5,381	.027	.979	.001	.956	.004
X_8, Land	7.45	5.39	1.38	.175	.076	.954	.222
X_9, Distance	1.08	27.6	.039	.969	.002	.957	.006
X_{10}, Dummy	324	3,897	.083	.934	.004	.957	.014
R^2	.957						
F Value	117						

as a dependent variable is lost when we shift to the unadjusted gain. The adjustment has therefore some importance.

Modified Basic Trading Area as the Unit of Observation

Let us recall first that the Basic Trading Areas have been modified by separating the central from the ring counties of the largest areas, that we use here County Business Pattern rather than Census employment data to define the comparative gain and that we could not make the adjustment for structure with the source of employment data.

A very important advantage of this modified unit of observation is that it eliminates the multicollinearity problem we had. The correlation between the scale and the large firms variables is now -0.02 (Table 23). This is simply because the central counties of the largest areas are much larger than the ring counties and the largest firms increased their employment in the ring counties.

The results obtained (Table 22) strongly confirm and improve on what we obtained previously. The coefficient of the variable large firms (X_3) is very highly significant. The scale effect is negative and highly significant. The T value of both coefficients is higher, the proportion of the variability of the dependent variable explained is higher

Table 22. Correlation Matrix of the Variables Included in the Regressions with the Modified Basic Trading Areas as Units of Observation, Michigan and California.

Variable	No.	1	2	3	4	5	6	7	8	9	10	11
Unadjusted Gain	01	1.00										
X_2, Employment-60	02	-.17	1.00									
X_3, Large Firms	03	.97	-.02	1.00								
X_4, Government	04	.14	.09	.10	1.00							
X_5, Education	05	.47	.32	.50	.29	1.00						
X_6, Temperature	06	.20	.15	.19	.85	.43	1.00					
X_7, Wage	07	.08	.26	.13	.11	.45	.23	1.00				
X_8, Land	08	.40	.27	.48	.33	.45	.40	.22	1.00			
X_9, Distance	09	-.14	-.27	-.15	-.30	-.43	-.52	-.56	-.36	1.00		
X_{10}, Dummy	10	.22	.13	.19	.91	.46	.91	.09	.38	-.33	1.00	
X_{11}, Employment-70	11	-.05	.99	.10	.11	.38	.18	.27	.32	-.29	.16	1.00

Table 23. Regression Statistics for the Function $X_1 = (f(X_2,. . .,X_{10})$, Unit of Observation: Modified BTA, Michigan and California.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	19856						
X_2, Employment-60	-.03	.006	-4.79	<.0005	-.15	.95	-.61
X_3, Large Firms	4.17	.16	26	<.0005	.97	.43	.97
X_4, Government	14.9	22.9	.65	.520	.05	.97	.10
X_5, Education	223	361	.62	.539	.03	.97	.10
X_6, Temperature	-813	517	-1.6	.124	-.14	.97	-.24
X_7, Wage	-3173	5015	-.63	.531	-.02	.97	-.10
X_8, Land	-5.02	2.60	-1.9	.061	-.07	.97	-.29
X_9, Distance	-50	28	-1.78	.083	-.08	.97	-.27
X_{10}, Dummy	12607	10577	1.19	.241	.13	.97	.19
R^2	.968						
F Value	130			<.0005			

and the value of R^2 delete for X_3 has dropped to .43, which confirms that we have eliminated the multicollinearity problem. (When one drops a very significant variable, with an extremely high beta weight, if the R^2 does not decrease substantially, it indicates that a correlated variable has captured its effect.) Another reason for the improvement of the results is that the parts of the largest areas which were blended previously and are not separated behave differently with respect both to growth and the activities of the largest firms. Their separation certainly facilitates the identification of the postulated effects. Moreover, the distribution of the observations is improved and their range increased (Detroit and San Francisco-Oakland without their suburbs have large comparative losses, while their suburbs have very important comparative gains).

We have also estimated the function with the total employment in 1970 as the dependent variable. The results are reported in Table 24.

The County as the Unit of Observation

With the county as the unit of observation we estimated our function with the observations of the two states together and with the observations of each state separately. When each state was taken separately the state rate of growth was used to calculate the unadjusted comparative gain. The results are reported in Table 25. The estimation by state is about equivalent to that for the two states together

Table 24. Regression Statistics for the Function $X_{11} = f(X_2, \ldots, X_{10})$ Unit of Observation: Modified BTA, Michigan and California.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	19856						
X_2, Employment-60	1.34	.006	240	<.0005	.99	.22	.999
X_3, Large Firms	4.17	.16	26	<.0005	.13	.99	.97
X_4, Government	14.86	22.9	.65	.52	.006	.99	.10
X_5, Education	224.7	361	.62	.54	.004	.99	.11
X_6, Temperature	-814	517	-1.6	.12	-.02	.99	-.24
X_7, Wage	3173	5015	-.63	.53	.003	.99	-.10
X_8, Land	-5.02	2.60	-1.93	.06	-.009	.99	-.29
X_9, Distance	-50.3	28.3	-1.78	.08	-.010	.99	-.27
X_{10}, Dummy	12608	10577	1.19	.24	.016	.99	.19
R^2	.9995						
F Value	8187			<.0005			

Table 25. Regression Statistics for the Function $X_1 = f(X_2, \ldots, X_{10})$ Unit of Observation: County.[1]

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
a) Michigan and California							
Constant	15067						
X_2, Employment-60	-.03	.003	-9.11	<.0005	-.20	.91	-.62
X_3, Large Firms	4.00	.094	42.6	<.0005	.94	.20	.96
X_9, Distance	-25	10	-2.5	.015	-.07	.94	-.21
X_{10}, Dummy	7515	3645	2.06	.041	.14	.94	.18
R^2	.947						
F Value	257			<.0005			
b) Michigan							
Constant	-812						
X_2, Employment-60	-.03	.018	-1.90	.061	-.14	.94	-.21
X_3, Large Firms	4.19	.25	16.8	<.0005	.89	.73	.89
X_9, Distance	-5.02	10.0	-.50	.618	-.02	.94	-.06
R^2	.94						
F Value	179			<.0005			
c) California							
Constant	-6988						
X_2, Employment-60	-.14	.003	-39.3	<.0005	-.83	.35	-.98
X_3, Large Firms	3.64	.116	31.3	<.005	.69	.58	.98
X_9, Distance	-40.6	15.1	-2.69	.010	-.06	.97	-.36
R^2	.98						
F Value	346			<.0005			

[1]For the variables whose coefficient is significant in at least one of the three regressions.

except that in Michigan, where there is only one very large county, the scale variable is not significant.

The Logarithmic Fuction

The results of the logarithmic function we estimated with our three types of units of observation are given in Table 26. These results are somewhat puzzling. With the BTA as unit of observation, the R^2 is very low and the whole function is not significant (F value - .115). With the modified BTAs or the counties as units of observation, the R^2 and F values are very high, the coefficient of X_3 is highly significant and the R^2 delete for X_3 is the lowest of all the functions we have estimated. We checked the print out for error in the input on a variable, but found none.

If the three results were very similar, we would suggest that a logarithmic estimating equation represents a misspecification of our function. But, this is not the case.

Another possible explanation is that the difficulties come from the fact that, in a logarithmic estimating equation, the upper ranges of the distribution being scaled down and the lower ranges called up, the smaller observations are given a heavier weight. Since, as we observed, the activities of the largest firms are not numerous and do not change much in the smaller areas, the total variability of X_3 is substantially reduced. It is unlikely however, that

Table 26. Regression Statistics for the Function: $\ln X_1 = f(\ln X_2, \ln X_3, X_4, X_5, \ln X_6, X_7, X_8, \ln X_9, X_{10})$, Michigan and California.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
a) Unit of Observation: BTA							
Constant	13.5						
X_2, Employment-60	-.74	.35	-2.1	.04	-.57	.16	-.33
X_3, Large Firms	.11	.18	.61	.54	.10	.24	.10
X_5, Education	.09	.05	1.83	.07	.34	.19	.29
R^2	.25						
F Value	1.80			.12			
b) Unit of Observation: Modified BTA							
Constant	1.22						
X_2, Employment-60	-.03	.02	-1.17	.25	-.02	.997	-.19
X_3, Large Firms	1.14	.01	91	<.0005	.99	.31	.99
X_5, Education	-.006	.004	-1.52	.14	-.02	.997	-.24
R^2	.997						
F Value	1343			<.0005			
c) Unit of Observation: County							
Constant	.40						
X_2, Employment-60	-.005	.004	-1.1	.265	-.009	.997	-.10
X_3, Large Firms	1.15	.006	186	<.0005	.99	.12	.99
X_5, Education	-.002	.0009	-2.5	.014	-.02	.997	-.21
R^2	.997						
F Value	4397			<.0005			

this alone could explain why we get such totally different results when we modify the BTAs. Of course, this modification makes a difference. It increases the number of areas where the largest firms have numerous activities. Moreover, it separates the very large and relatively stagnant central counties where the large firms decrease their activities from the smaller but rapidly growing ring counties where they increase their activities. The total variability of both the dependent variable and X_3 is therefore greater than with the BTAs in which central and ring counties are blended. We can therefore expect better results with the modified BTAs or the counties as units of observation, but not such greatly different results.

We think another explanation can be found if we examine more closely the logarithmic and nonlogarithmic observations of X_1 and X_3 for a few small[32] and our large areas on both the modified and nonmodified form. The data of Table 27 can be used for that purpose. The first thing we observe in this table is that there are negative values. The logarithm of the variables cannot therefore be obtained without modification of the variables to eliminate the negative values. To achieve that we decided to add to each observation the most negative value plus 1. In the case of

---

[32]The first three areas in alphabetical order of their names.

Table 27. Logarithmic and Nonlogarithmic Observations for Variables X_1 and X_3 in Selected BTAs and Modified BTAs.

	X_1	$\ln X_1$	X_3	$\ln X_3$
BTAs				
Adrian	-54	10.212	-2,300	0.00
Alpena	-2,629	10.112	0	7.741
Battle Creek	-5,951	9.968	-1,300	6.909
Detroit	-27,274	0.00	3,100	8.594
Los Angeles	145,772	12.061	57,900	11.005
San Francisco-Oakland	101,436	11.765	29,500	10.367
Modified BTAs				
Adrian	-1,020	12.160	-2,300	10.386
Alpena	-283	12.163	0	10.454
Battle Creek	-6,693	12.129	-1,300	10.416
Wayne County	-191,944	0.00	-34,700	0.00
Detroit Ring	105,045	12.601	28,100	11.048
Los Angeles County	-8,768	12.118	9,200	10.690
Los Angeles Ring	185,185	12.840	48,700	11.331
San Francisco-Oakland County	-29,202	12.000	-13,600	9,957
San Francisco-Oakland Ring	189,383	12.851	43,100	11.261

X_1 we added 27,275 to the value of X_1 in each area. Taking the logarithm we got a very particular type of distribution of observations: 0.0 value at one end of the distribution, with the other observations at the other end of the distribution with values varying from 9.71 to 12.06. In the case of X_3, the most negative value was -2300. Adding 2301 to

each observation and taking the logarithm we got again a 0.0 value at one end of the distribution. The observations for X_3 are more evenly distributed over the range of their variation than is X_1 simply because the value added to eliminate the negative values is much smaller. We can note also that the procedure followed to change to logarithmic observations has drastically changed the position of some areas relatively to others. The value of X_1, in Battle Creek is much closer to that of Detroit than of Los Angeles. For $\ln X_1$, the value in Battle Creek is closer to that of Los Angeles. Since the area with the 0.0 value is not the same for X_1 and X_3, the regression results could hardly be good.

When we turned to the modified BTA as unit of observation, Wayne county had the most negative value for both X_1 and X_3 and as a result had the 0.0 logarithmic observation for both variables. Moreover, the values added to eliminate the negative values being large for both variables, we have a two tail distribution in which all the values except the 0.0 are so closely bunched that we can almost consider them as one observation. Thus we have in effect only two effective observations. The regression results are extremely nice but meaningless. The same thing can be said, for the same reasons, of the results of the logarithmic function using the counties as units of observation.

This discussion strongly suggests that there are difficulties involved in formulating a logarithmic estimating equation if there are negative values among the

nonlogarithmic observations. There are, of course, some ways to get around these problems. One is to add to the observations a larger value than the most negative one to avoid the 0.00 logarithmic observations and the type of distribution we had. This is what we did before preceeding to a further estimation of this functional form. We added to each observation approximately twice the value of the most negative observation. This gave us a more normal type of distribution of observations, as is suggested in Table 28, and the regression results reported in Table 29. These results, grossly speaking, confirm the results obtained with the nonlogarithmic estimating equation as well as the rationale suggested to explain the differences between the results obtained with the BTAs and modified BTAs.

It may be suggested that another way to avoid the difficulties met in estimating our logarithmic equation would be to completely avoid the logarithms by using a function in which the variables would be expressed in percentage terms. Since some results are reported suggest that it is not important to make an adjustment for industrial structure in comparing areas' growth, the dependent variable could be the percentage change in total employment rather than the comparative gain. Similarly X_3 could be expressed in percentage. But we already mentioned that this procedure is almost certain to amplify, particularly in the small areas where there is a very small base from

Table 28. Logarithmic Observations for Transformed Variables X_1 and X_3 in Selected BTAs and Modified BTAs.

BTAs	$\ln X_1$	$\ln X_3$
Adrian	10.914	7.901
Alpena	10.866	8.517
Battle Creek	10.801	8.216
Detroit	10.230	8.999
Los Angeles	12.210	11.049
San Francisco-Oakland	11.960	10.449
Modified BTAs		
Adrian	12.855	11.123
Alpena	12.857	11.156
Battle Creek	12.841	11.138
Wayne County	12.165	10.472
Detroit Ring	13.101	11.494
Los Angeles County	12.835	11.279
Los Angeles Ring	13.252	11.684
San Francisco-Oakland County	12.779	10.940
San Francisco-Oakland Ring	13.259	11.636

Table 29. Regression Statistics for the Function: $\ln X_1 = f(\ln X_2, \ln X_3, X_5, X_7, X_8, X_9, X_{10})$, Michigan and California.[1]

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Percentage of Variability Explained
a) BTA				
Constant	8.21 E-0			
X_3, Large Firms	3.42 E-1	7.73 E-2	4.41	6.14 E-1
X_8, Land	1.63 E-4	7.88 E-5	2.07	6.71 E-2
X_5, Education	1.44 E-3	5.93 E-4	2.42	5.01 E-2
X_2, Employment-60	-6.04 E-2	3.89 E-2	-1.55	1.84 E-2
Total				7.65 E-1
F Value	17.1			
b) Modified BTA				
Constant	3.52 E-0			
X_3, Large Firms	8.43 E-1	3.20 E-2	26.3	9.33 E-1
X_2, Employment-60	-8.51 E-3	3.78 E-3	-2.25	8.96 E-3
X_8, Land	-1.23 E-5	7.905 E-6	-1.56	2.87 E-3
X_5, Education	-4.15 E-5	1.086 E-4	- .38	1.99 E-4
Total				9.479 E-1
F Value	200			

[1]Stepwise regression. Results given only for the variables for which the T value is higher than 2 in at least on of the regression runs.

which to calculate these percentages, the measurement errors resulting from the omission of the employment of the firms in establishments smaller than 500 employees. Therefore, unless one has access to more precise information sources, when estimating a function of this form he should probably

include only the observation of areas or counties where the largest firms have a relatively large employment base.

In the present case analysis we do not have very much such areas or counties. We decided nevertheless, to estimate the function with the 23 counties of our sample where the largest firms had at least 5,000 employees in both 1960 and 1970. We included only those variables whose regression coefficients were significant in at least one of the functions previously estimated. The results, reported in Table 30, approximate the results we already obtained although the R^2 is somewhat lower.

Table 30. Regression Statistics for the Function: $(X_{11} - X_2)\ X_2 = f(X_2, X_3/X_2, X_5, X_8, X_9, X_{10})$, Observations for the Larger Counties Only, Michigan and California.

	Regression Coefficient	Standard Errors of Coefficient	T Value	Percentage of Variability Explained
Constant	4.225 E-2			
X_3, Large Firms	5.267 E-1	1.185 E-1	4.44	7.99 E-1
X_8, Land	2.019 E-4	5.062 E-5	3.99	6.01 E-2
X_2, Employment-60	-1.900 E-7	8.750 E-8	-2.17	2.39 E-2
X_9, Distance	-3.307 E-3	1.889 E-3	-1.75	8.75 E-3
X_{10} Dummy	-2.005 E-1	9.963 E-2	-2.01	7.37 E-3
X_5, Education	1.061 E-3	5.685 E-4	1.87	1.81 E-2
Total				9.17 E-1
F Value	29.4			

Inferences from the Results

The empirical investigation conducted shows that, between 1960 and 1970 population, total employment, total manufacturing employment and the employment of the largest manufacturing corporations have evolved in close association within the various areas of Michigan and California. The statistical analysis performed singled out the change in employment of the largest manufacturing corporations as the dominant factor explaining total employment growth variability between these areas. The other factors included in the analysis explained a minor proportion of that variability.

The question now is: what can be inferred from this result? Does it enable us to conclude categorically that the choice of location of these firms causes or produces area growth differentials? The answer is no. But we can conclude that the results support this hypothesis. There are two categories of reasons why no stronger inference can be derived from the result: first, the weaknesses we have identified in the analysis performed and; second, as a general methodological matter the test of a hypothesis such as ours, no matter how broad it is and regardless of the quality of the data used, does not prove its validity. At best one can only fail to disprove the hypothesis.

First we repeat that we performed only a case analysis. In a case analysis we intentionally limit the information base on which the analysis rests. We, therefore, intentionally

limit, for particular reasons, our ability to proceed to a firm conclusion applicable in all situations. In the particular case analysis we conducted, there is no doubt that it would have been useful to have more intermediate sized and large areas. But the point we mostly want to emphasize here is related to the problem of making causal inferences from research results.

Our hypothesis, we recall, is that the choice of location of the largest manufacturing corporations is the dominant factor accounting for area growth differentials. It asserts, in fact, the existence of a causal relationship in which an increase in the employment of these firms in one area causes a comparative gain in total employment of that area over any other area where the firms did not increase their activities. It seems that in a strict sense the existence of such a relationship cannot be proven. "One admits that causal thinking belongs completely on the theoretical level and that causal laws can never be demonstrated" [Blalock, 1964, p. 6]. Blalock supports this view by emphasizing the necessity we always have to make some simplifying assumptions about the reality in our models. One of these assumptions is that the effect on the dependent variable of unidentified or unidentifiable variables is negligible. That is the case of experimental research as well since there are no completely isolated systems.

It can be argued here that, in the regression model, we have a measure of the effect of these omitted variables: the residuals. That is true and we can say that in our analysis these residuals are very small. The problem however is that there can be some omitted variable so highly correlated with an included regressor that its effect is confounded with the other. The regression easily identifies conflicting or disturbing effects on a dependent variable. It does not identify confounding effects. From the point of view of knowledge as such, this difficulty is quite disturbing. It implies that, in our attempts to explain the reality, we always remain with theoretical working assumptions. From a policy point of view or for people concerned with action, the difficulty may be much less serious. The unidentified variable which is so highly correlated with an included regressor as to have a confounding effect with it may have so close a mutual causal relationship with it that it becomes a matter of indifference whether we act upon one or the other of the two variables.

Our inference is therefore that the theoretical hypothesis formulated is corroborated by the empirical investigation conducted. The hypothesis survived the test to which it was submitted. This does not prove its validity. It simply supplies some evidence. The evidence could be increased with further testing of the hypothesis.

CHAPTER V

SUMMARY AND CONCLUSION

This research started with an investigation of the effectiveness of public policies and programs designed to enhance rural areas growth on the basis of activities and changes to be made within these areas, tending to make them more attractive to businessmen, and on the basis of supplying financial incentives to firms to locate in these areas. These types of programs, as Delano's work suggests, may well be effective only for small businesses whose impact on an area may be equally small. The 1950s and 1960s settlement trends certainly do not suggest that the implementation of such programs brought about the type of change in the population and economic activities distribution pattern which was expected in planning these programs and which is considered desirable here.

In an attempt to identify stronger policy tools to alter in favor of rural areas the current settlement trends, we undertook to investigate the significance of the contribution of the largest manufacturing corporations to the concentration of population and economic activities in the large metropolitan areas. More specifically the research

was designed to test the hypothesis that the most important determinant of area growth differentials is the choice of locations of the largest manufacturing corporations.

In Chapter II, a theoretical base was developed in support of this hypothesis. Location theories were reviewed first to find out what theorists have suggested about the way the total pattern of location is generated, especially the reasons why it may be more concentrated than socially desired. These reasons were focused around the concepts of agglomeration economies and diseconomies, the fact that the internal and external effects of location decisions differ greatly, and the lack of coordination of location decisions. These factors in combination were shown to induce firms to locate in large centers. It was also shown that important net social benefits could be produced if the location decisions of these firms and families could be channelled towards small centers on a scale necessary to develop the agglomeration economies which would convert such centers into profitable places in which to operate and attractive places to live.

The empirical observation that manufacturers, in their choice of locations, give more weight to their personal preferences than to the results of benefit and cost calculations led us to challenge the assumptions of the reviewed theories. Previous studies were brought in support of the view that firms do not necessarily attempt to maximize profits and, more importantly, that the largest firms have

developed great financial strength, and far reaching powers over their economic environment, particularly the power to administer prices--all characteristics which have little similarity with the world of perfect competition. The challenge of the profit maximization and perfect competition assumptions of location theories led us to the conclusions that the choice of location of the largest manufacturing corporations is relatively free 1) with respect to the basic location factors identified by the theories--i.e., the costs and market advantages found in given economic environments, and 2) with respect to the related policy tools used by public authorities to influence firms' location decisions--i.e., the attempts made to modify the benefit-cost relationship or to decrease or compensate for the disadvantages of particular locations. These were proposed as important explanations for the development of the nation an overly concentrated pattern of location and for the weakness of the current rural development approach.

To establish support for the new approach embodied in our basic hypothesis two more steps were left. We had to show that the free locational choice of the largest manufacturing corporations has a strong impact on the chosen area's growth and that these firms alone are in a position to have a <u>determinant</u> impact on the spatial distribution of economic growth. This we did by reference to aspects of the reviewed theories and to the characteristics of the largest firms.

We argued that because of their financial strength, powers, the size of the new investment they can start within a new area, the fact that they are often their own suppliers of parts, components, repair and other services, the largest firms do coordinate large amounts of interdependent investment, they do create and internalize the agglomeration economies for which small firms have to wait. Thus they can not only locate but flourish in small as well as large centers. Because of the agglomeration economies they have made available, they powerfully attract, to the same location not only the firms and industries linked with them but many occupations and processes not essentially linked with them. Because they provide to an area an important source of earning and spending capacity, they are the origin of the development of a large number of service activities. In other words, they are in a position to be location leaders or, in another type of terminology, to form the nucleus of a development pole or growth center.

We emphasized then that the highly articulated market organization which these firms have, the large and increasing market share which in aggregate they control, and the power they have to react if this share is threatened, place these firms in a privileged position to initiate important modifications in the structure of the geographic distribution of economic activities. All this suggests that their choice of location is the dominant factor accounting for area growth differentials.

The empirical part of the research was designed to test, on a small scale, if the largest firms actually played this role between 1960 and 1970. The states of Michigan and California were selected for a case analysis, the first because it is the state in which the research was pursued, the second because of its high growth rate. The two states were divided in 45 multi-county areas called Basic Trading Areas, which approximate the concept of functional economic areas which in turn are believed to be the most appropriate unit of observation within which to examine the influence a firm may have on its surroundings. We classified as urban oriented the BTAs including one, or more than one, SMSAs. All others were classed as rural oriented. The firms included are the Fortune Magazine 200 largest industrial corporations plus the thirty of the next three hundred largest which had their headquarters in either Michigan or California in 1970. Their employment figures were taken from the Sales Management Directory of Key Plants.

A descriptive analysis demonstrated that the largest urban areas are these firms' preferred area of location. Around 96 percent of their employees were found in urban BTAs and more than 3 out of 4 in the three largest of these. Between 1960 and 1970, they increased their number of employees mostly in the ring counties of these three areas. The change in total manufacturing employment, total employment and population was observed to follow that pattern very closely.

Proceeding then to a regression analysis, we defined, as a measure of the growth differentials we wished to explain, a variable named comparative gain in employment adjusted for industrial structure. This variable isolates the gain in employment of a specific area over the average of all areas resulting from certain factors at work in the local economy to make it grow faster, thus excluding the gain which might result from its specialization in fast growing industries. We formulated and estimated by the method of ordinary least squares a function in which the determinants of the comparative gain were assumed to be: a variable reflecting the choice of locations of the location leaders--the change in employment in the area of the 230 large firms included between 1960 and 1970, a set of variables reflecting the attractiveness of an area for industries or the efforts of the area to increase it and a scale variable. The results strongly supported our hypothesis. More than 90 percent of the variability of the dependent variable was explained by the model, the coefficient of the variable reflecting the change in the activities of the leaders in the area was highly significant and had by far the largest beta weight. Most of the other variables were not significant at the 95 percent level of confidence and they explained a very minor proportion of the comparative gain. Moreover the correlation was low between either the comparative gain or the largest firms variable and the variables related to the attractiveness of areas. Thus it cannot be argued that the largest

firms' choice of location is associated with this attractiveness.

We estimated a few more functions. Two of them were worthwhile additions. In one, we modified the unit of observation for our three largest areas in order to disaggregate what was believed to be an aggregation of such different entities (the central and ring counties of those BTAs which included the largest SMSAs) that we might lose a part of the variability we wished to explain. The results obtained were very similar. This regression contributed to a substantial increase in our confidence in the results of the first function, since it eliminated the earlier multicollinearity problem involved in the high correlation coefficient between the scale and the large firms variables while producing the same result.

In another function, we replaced the comparative gain adjusted for industrial structure by an unadjusted gain. The results, particularly with the modified BTAs as unit of observation were very similar to those previously reported. This suggests that it is unnecessary to make the adjustment for industrial structure which involves a substantial amount of additional data collection and processing.

The functions estimated with the county as a unit of observation and those with the exponential form did not add any new information.

Because this analysis is only a case analysis in which we had too few large and intermediate sized areas and because a hypothesis is not proven but only supported by a statiscal analysis we refrain from inferring too categorically that the hypothesis formulated is valid. We concluded that the weight of the evidence supports the conclusion that the largest manufacturing corporations are the most important factor explaining why areas grow at widely different rates. Assuming this conclusion is correct, we shall examine the policy implications of this analysis and put forward a recommendation.

A Policy Recommendation

In the concluding remark of a paper looking at the impact of changing industrial organization on community development, Willard Mueller suggests that:

> ". . .students of rural and community development are well advised to look at the broader economic environment within which they are plying their trade. Otherwise they not only may miss the forest for the trees; but may go hunting in the wrong forest" [Mueller, 1972].

In this research we have followed his advice. Our attention focused on one of the most powerful forces everywhere present in this broad economic environment except in rural areas: the largest firms. The analysis supported the hypothesis that the choice of location of the large firms is the dominant factor explaining why some areas grow

and others do not. It also supported the view that rural development efforts focusing on attempts to increase the attractiveness of rural areas themselves are weak means to achieve the task. It is, in Mueller's words, like hunting in the wrong forest. The right forest in which to hunt is the world of the largest manufacturing corporations.

What kind of hunting would, in this forest, achieve the task of enhancing the growth of rural areas is the question. Let us proceed to examine the implications of our analysis as to, first, what policy tools appear to be weak means of achieving the task, shifting gradually to means which the author believes to be the most effective.

A clear implication of our analysis is that a program designed to have all the agglomeration diseconomies associated with large urban centers internalized or reflected in some way in the costs of the firms located there would be a weak means to generate an important deconcentration movement in favor of rural areas. The reason, contained in one of our arguments in Chapter II and the results of our analysis is that the most important determinant of the concentration trend, the largest firms, are in a position to absorb the extra costs involved in the internalization of external diseconomies without changing their location. They can shift these costs to the consumers through their power to administer prices, resume locating as they used to and lead the path toward further concentration.

The same reasoning can be applied to a policy that would impose a tax on the sale of products manufactured in the locations considered as overly concentrated. The burden of the tax could be shifted to others and have no impact on the choice of location of the location leaders. To be effective, a tax would have to be imposed on the net profits realized by these firms.

In the last point we referred to the power of administering prices which the largest firms have and can use to eliminate or reduce the effectiveness of one possible means to achieve an objective. We have indicated in the research that the largest firms have far reaching powers over their economic environment generally. It is likely that we could refer to any one of their powers to suggest that they could get around most forms of market incentives public authorities might use in attempting to modify their behavior. We will not attempt to review what these other forms of market incentives might be, but turn immediately to examine other possible actions outside the framework of the market system. In that we are strongly supported by one of Galbraith's remarks:

> "In trying to place all problems within the framework of the market and all behavior subordinated to market command, economists do, we have sufficiently seen, render great service to the planning system--to the disguise of the power that it in fact wields. But this is socially a dubious function and not one that we need applaud" [Galbraith, 1973, p. 323].

Let us examine next one possible means, suggested by one of our previous arguments, to enhance rural growth without modifying the geographic distribution of the employment of the largest firms. We indicated that an important characteristic of the large firms which places them in a privileged position to act as location leaders is the large and increasing share of the major markets which in aggregate they control and the command they have over a substantial part of the country's total new investment. It may be argued that if, for a given number of years, further growth and even the replacement of worn-out facilities of the 200 or 500 or 1,000 largest firms were prohibited (or a 100 percent tax imposed on the net profits of those firms who do grow) substantial investment and market potentials would be opened to other people, many of which could be local businessmen in rural areas. The result might be an important increase in their share of the country's total employment. That is a possible but uncertain outcome. The question is where will growth occur if it does not occur through the largest firms. A number of small and medium-sized firms may expand in rural areas. But it is likely that most of them will choose to locate or expand their facilities in already developed areas. This follows our line of argument suggesting that a firm has to be large to succeed in initiating the growth of relatively unsettled areas. The least developed areas would be left unchanged, and the mans proposed would turn out to be a weak one.

An almost certainly stronger means would be to prevent the growth of the largest firms only in a number of designated areas. These might be the BTAs having already 200,000 or 500,000 and more inhabitants. It would leave the possibility to the largest firms, who are in a privileged position to do it, to locate in small and rural areas. It may be observed here that the past location trend of the largest firms suggests that they are unwilling to do it. But, given the commitment to growth these firms have, it is very likely that without the large BTA alternative, they would change their location pattern and initiate an important change in the geographic distribution of the country's total employment.

Because of the possibility that large firms might choose to stop growing rather than locate elsewhere, we should like to propose a means we believe to be even stronger and more specific. Let us assume that, among the 489 BTAs of the contiguous United States, we identify a number of them (let us say 200) which are in need of growth. Within these areas we identify a point where a growth center is to be created and where the largest firms will have to be found with employees in a given number of years. Then the largest firms would be faced with a gradient of income tax related to the percentage of their employment found in the designated points and areas in a given number of years. For example, assume that today General Motors has zero percent of its employment in the designated areas. If in five years, let

us say, this percentage is still zero percent, its annual income tax will be 100 percent of net profits before allowance for depreciation.[33] If it has 5 percent of its employment in the designated areas, the tax rate might be 75 percent and so on. Of course, the designation of areas in need of growth might change over time as well as the gradient of tax rate. One may also be more or less constraining depending on the current state of the economic cycle. When the GNP is expanding we might wish to proceed faster than when it is stagnant. Otherwise we would create a costly unused productive capacity in the largest areas.

Let us propose finally a use for the funds which would be raised with the high tax rate on the firms unwilling to relocate. These funds might be used to finance the infrastructural facilities accompanying the development of the designated growth centers. It might also be used as investment subsidies for groups of firms willing to initiate the development of a growth center in the designated areas.

The above proposal contains a much stronger means than those used thus far to alter the settlement pattern. We have now to address ourselves briefly to some of the objections people might have to this proposal.

---

[33]Note that this is a severe treatment. It would dry up the sources of a firm's economic powers and condemn the large firm to disappear if it failed to cooperate.

The first one is the objection of people concerned with the problem of absentee ownership which could arise in this proposal. Geoffrey Faux suggests that "there are rarely any employment benefits from absentee ownership in a small community" [Faux, 1972]. He supports this view in reference to studies related to the effects of mergers on jobs. Similarly Willard Mueller emphasizes the negative employment impact of the acquisition of a local firm by a large corporation [Mueller, 1972]. We are not overly concerned with these remarks since our proposal should not lead to, and might be designed in such a way that it prevents, any acceleration of the merger movement.

The authors quoted emphasize however that the absentee owner may be far less concerned with the quality of community life, the protection of the environment that he may be quicker to lay off workers at the slightest sign of a downturn than is the local firm whose management feels some responsibility in the community.

These are more serious difficulties. It may be a real problem for a community to have a major portion of its economic base controlled by outsiders. One may wonder however if this is a more serious problem than to have no economic base at all. We can argue also that the cities polluted by absentee owners were polluted long before the present concern about pollution had developed and before our society had taken means to control pollution. There

should be ways to direct the contribution of the largest firms to increase the economic base of small cities and rural areas without destroying them.

The second objection is that of people who will argue that the policy move involved in the above proposal is not an easy one for a government to make, that it overrides the concept of freedom of choice with respect to location which, in a democratic society, is generally accepted or, in a word, that we propose to replace the private decision making system with public planning (at least with respect to the problem discussed here). It is certainly true that the policy proposed is not an easy one to accomplish, but that the task of promoting a more balanced population settlement and economic activities distribution patterns is probably not any easier. Past experience with rural development policy suggests that. On the other hand, our analysis indicates that the largest firms are currently the main determinant of these settlement trends and that these firms control more than they are controlled by the forces of the market. We do not see how the task can be achieved if one does not act at the level we proposed.

The question can be raised of whether we want to override the freedom of choice of the largest corporations with respect to location and to replace the market with public planning with respect to the problem discussed. The answer is clearly yes. We do want to override the freedom of choice

of the largest corporations and we do have reasons to impose some form of planning on them. You recall that at the very beginning of this thesis we quoted Tefertiller as saying that a rural development policy has to address itself to the basic questions of where people are going to live and work in the future and under what conditions. Our analysis suggests that the largest corporations have answered this question, not in words but in facts, long before we addressed ourselves to it. We argued in Chapter I that the answer they provided is not socially acceptable. The question then is whose freedom of choice should count? That of the technostructure of two hundred corporations or that of millions of people who, as Gallup Polls reveal, are constrained to live where they do not wish (see footnote 7). For us the answer to this question is clear: the freedom of choice of millions of people should override the freedom of choice of 200 corporations. The problem is that we have too long been used to thinking that the public and private interest coincide in a market dominated solution. We believe that we have shown evidence that in the case studied here it does not. This is why we want to replace the market with planning or more exactly to replace private planning with public planning. It is because in this case, as is probably true in many others, the market does not work for the benefit of the majority.

Here again we are strongly supported by Galbraith. He suggests that the clearest conclusion of his most recent book is that:

> "Left to themselves, economic forces do not work out for the best except perhaps for the powerful" [Galbraith, 1973, p. xiii].

This is why when he turns to examine the question of what to do, he states that:

> "There will have to be a public planning authority. . . .The state, in short, will take steps to effect the coordination of which the planning system is incapable. It will impose overall planning on the planning system. This is the next and wholly certain step in economic development--one that is solidly supported by the logic of the planning system" [Galbraith, 1973, p., 318].

Suggestions for Further Research

When drawing the inferences from the results of our analysis, we indicated that repeated tests of an hypothesis are needed before one can be completely confident in its validity. We suggested that it would be useful to repeat our test on a broader basis, one that would include more large and intermediate-sized areas. A few methodological comments are in order. We believe that, in repeating our test, time and money would be saved without important losses of information if the analysis was limited to the estimation of one function, using the modified BTA as the unit of observation, the unadjusted comparative gain as the

dependent variable and the County Business Patterns total employment data.

We still think that the Basic Trading Area is conceptually the most appropriate area delineation within which to examine the relationships studied because it is a functional area. But one of the trade off's involved in this area delineation which we were unaware of before we estimated the function is the multicollinearity problem faced with it's use. The modification of only the largest BTAs enabled us to get around this problem while keeping a functional area for all our other observations. This causes us to suggest that all areas be defined as modified BTAs in establishing the unit of observation with which to repeat the test.

In our analysis, we were unable to show strong evidence for the importance of measuring growth differentials with a comparative gain adjusted for industrial structure. Since the adjustment involves an important amount of data collection and manipulation, it probably should be omitted.

County Business Pattern total employment data should be used inasmuch as we have suggested use of the modified BTAs as the unit of observation. In those areas which are modified and therefore no longer functional areas, it is certainly more appropriate to use establishment rather than residential employment data.

To follow the logic of our argument that an hypothesis

should be submitted to several tests, we do not believe that any of the independent variables we used should be dropped, even those which were not significant in any of the functions estimated. We would even recommend that one add a few variables namely those spelled out in footnote 18 on page 67 related to the presence of such things as the development of major highways or an educational or military institution.

The most important area of further research suggested by our analysis is related to the basic question with which we introduced the problem examined in this research: Where are people going to live and work in the future and under what conditions? The task we set to ourselves was not to answer this question but to identify in the recent settlement trends a solid justification for the socially accepted belief that more people should be able to work and live in rural areas and identify effective means to achieve this specific objective. This we did. However the nature of the hypothesis investigated embodied the belief that rural problems cannot be separated from urban problems and could not be solved in isolation from the broader economic environment of which rural areas are part. The hypothesis was supported by the analysis. We have shown evidence that the largest manufacturing corporations have in fact answered the broad question we asked. The means we identified to achieve the limited objective might be used, we believe,

by the public authority to whom this responsibility belongs, to reshape the total picture of the geographic distribution of population and economic activities. More information than we had is necessary to achieve this broader objective. As soon as we recognize that the private planning power of a few does not work for the best of all and want to substitute a public planning power for the private one and manage it toward other goals, we face a tough problem as Galbraith clearly states:

> "For here will be encountered the most difficult problems of the public cognizance. That will be to have planning that reflects not the planning but the public purposes" [Galbraith, 1973, p. 319].

Our analysis suggests that part of the increased information that will be needed relates to the quantification of our Figure 2 which gives only the general shape of the curves relating the private and social costs of producing goods and services to the size of cities (see page 47). If we want to direct the contribution of the largest firms toward the development of an optimum pattern of city sizes, we will have to know more precisely over what range of city sizes this optimum may be found. Note that the optimum may not be defined only in terms of the costs of producing goods and services. It may include the various aspects of what people call the quality of life. And, on this point, we

note that research should be directed toward the identification of means to make the large absentee owner more concerned about the quality of community life.

We offered a specific policy proposal based on our analysis. If others perhaps differ in any major way in their interpretation of the analysis presented here, it would be appropriate for them to identify and investigate alternative policy options.

Let us conclude finally that research efforts are needed with respect to the institutional framework within which the type of planning proposed here will be implemented. This is necessary if we are to achieve either the limited or the broader public objectives. Galbraith suggests that "the creation of the planning machinery, which the present structure of the economy makes imperative, is the next major task in economic design" [Galbraith, 1973, p. 319].

APPENDIX

Appendix Table 1. Selected Variables for Counties and Basic Trading Areas.

	Census Employment 1970	Census Employment 1960	Census Comparative Gain	Census Employment 1970	Census Employment 1959	Census Comparative Gain	Largest Firms Employment 1970	Largest Firms Employment 1960	Largest Firms Employment Change	Govern-ment	Edu-cation	Temper-ature	Wage	Land Value	Dis-tance
Adrian	30,604	26,284	-54	92,824	17,443	-1,012	5,600	7,900	-2,300	462	43.8	49.8	2.81	320	30
Alcona	1,820	1,895	-329	834	337	373	0	0	0	576	32.2	42.1		139	
Alpena	9,493	9,185	-1,267	6,827	5,454	-626	0	0	0	753	35.1	42.1	2.90	118	
Montmorency	1,412	1,345	-104	633	276	256	0	0	0	508	32.7	43.5	2.00	104	
Presque Isle	3,458	4,151	-929	1,845	1,557	-283	0	0	0	452	31.2	42.1	1.53	98	
Alpena	16,183	16,576	-2,629	10,139	7,624	-280	0	0	0	638	33.5	42.1	2.80	113	150
Barry	13,748	11,367	711	4,334	3,908	-1,008	900	1,000	-100	370	41.5	49.1	2.55	180	
Branch	13,254	12,538	-1,266	6,683	5,373	-662	0	0	0	546	37.9	49.3	2.46	212	
Calhoun	55,338	51,063	-5,395	44,827	36,467	-5,023	10,600	11,800	-1,200	537	43.7	48.8	3.04	207	
Battle Creek	82,340	74,968	-5,951	55,844	45,748	-6,693	11,500	12,800	-1,300	513	42.4	48.8	2.90	201	42
Arenac	3,508	3,198	-116	1,368	856	198	0	0	0	549	31.8	43.5	2.11	178	
Bay	40,908	36,416	-2,004	26,581	20,628	-1,617	7,800	9,000	-1,200	421	35.7	49.6	2.91	397	
Crawford	2,908	1,632	95	1,490	798	399	0	0	0	444	36.9	43.5	1.78	96	
Gladwin	4,110	3,319	436	916	544	172	0	0	0	465	33.0	45.0	2.55	123	
Iosco	5,579	4,382	350	3,229	1,983	518	0	0	0	481	46.2	43.5	2.10	161	
Midland	22,468	16,297	3,715	22,570	15,627	1,208	14,000	11,400	2,600	669	53.7	48.4	2.76	215	
Ogemaw	3,272	2,772	156	1,412	934	135	0	0	0	472	32.3	43.5	1.66	118	
Oscoda	1,258	1,086	25	401	305	-16	0	0	0	479	34.1	43.5	1.18	76	
Roscommon	2,691	2,231	5	1,173	627	316	0	0	0	581	42.0	43.5	2.01	188	
Bay City-Midland	85,870	71,333	2,664	59,140	42,302	1,313	21,800	20,400	1,400	499	40.1	48.6	2.76	216	43
Benton Harbor St. Joe	63,308	56,355	-1,787	54,145	36,115	4,776	11,200	9,700	1,500	494	39.3	50.1	2.64	474	11
Livingston	21,127	13,200	5,213	7,449	4,308	1,560	0	0	0	462	43.0	47.2	2.36	264	
Macomb	228,429	135,915	62,166	151,068	88,963	29,456	49,400	39,900	9,500	574	41.8	48.7	3.18	519	
Oakland	344,420	240,861	44,306	242,675	114,068	86,744	61,600	43,900	17,700	593	51.6	48.4	3.20	530	
Monroe	41,924	32,420	4,044	18,461	13,123	522	1,700	1,700	0	426	32.4	50.2	3.00	441	
Washtenaw	97,591	65,532	10,293	66,807	37,006	16,220	31,400	20,800	10,600	488	55.3	50.0	3.20	341	
Wayne	998,204	953,959	-153,297	922,705	815,398	-191,944	223,100	257,800	-34,700	630	38.2	49.7	3.27	1069	
Detroit	1,731,595	1,439,887	-27,274	1,409,165	1,072,866	-57,442	367,200	364,100	3,100	605	41.3	49.7	3.24	437	0
Delta	11,279	10,519	-939	6,903	5,671	-849	1,000	500	500	495	39.3	42.4	2.51	69	
Schoolcraft	2,319	2,507	-532	1,114	1,206	-535	0	0	0	629	31.8	41.4	2.29	61	
Escanaba	13,598	13,026	-1,471	8,017	6,877	-1,484	1,000	500	500	522	37.7	42.4	2.50	68	195
Genesee	159,476	132,406	-508	137,201	99,696	917	62,700	64,500	-1,800	594	40.0	49.5	3.43	347	
Lapeer	17,090	13,308	1,612	5,725	3,210	1,337	0	0	0	533	35.6	47.5	2.27	249	
Flint	176,566	145,914	1,104	142,926	102,906	2,254	62,700	64,500	-1,800	588	39.6	47.5	3.40	289	0
Allegan	23,978	19,923	1,690	10,535	6,496	1,792	600	600	0	412	34.9	49.3	2.30	251	
Ionia	15,388	13,695	-230	7,379	6,646	-1,706	1,600	0	1,600	439	38.8	47.6	2.28	192	
Kent	156,359	132,239	-3,264	141,488	99,687	5,216	18,800	20,100	-1,300	503	42.7	47.6	2.70	260	
Lake	1,625	1,490	-32	592	223	287	0	0	0	570	24.8	46.4	1.54	73	
Osceola	5,044	4,644	-79	3,060	2,092	200	700	0	700	499	36.5	46.4	1.99	87	
Ottawa	47,514	34,583	6,745	29,960	20,835	1,479	1,400	500	900	472	36.3	48.3	2.38	346	
Mecosta	9,289	6,756	1,132	3,761	2,360	535	0	0	0	416	41.2	46.4	3.06	101	

Appendix Table 1. Continued

	Census Employment 1970	Census Employment 1960	Census Comparative Gain	Census Employment 1960	Census Employment 1959	Census Comparative Gain	Largest Firms Employment 1970	Largest Firms Employment 1960	Largest Firms Change	Govern-ment	Edu-cation	Temper-ature	Wage	Land Value	Dis-tance
Montcalm	13,827	12,598	-427	9,210	6,357	520	4,600	1,800	2,800	465	40.0	47.6	2.62	159	
Grand Rapids	273,024	225,928	5,534	205,985	144,669	8,323	27,700	23,000	4,700	480	40.3	47.6	2.65	203	0
Houghton	9,426	10,241	-2,780	4,628	5,983	-3,551	0	0	0	366	33.4	40.9	1.91	67	
Keweenaw	528	615	-152	290	171	57	0	0	0	527	20.4	40.9	1.70	253	
Hancock-Houghton	9,954	10,856	-2,932	4,918	6,154	-3,494	0	0	0	377	32.5	40.9	1.88	69	250
Dickinson	7,741	7,683	-1,371	5,586	4,545	-627	0	500	-500	539	41.1	42.0	1.95	96	
Iron	3,920	5,040	-1,723	1,751	2,909	-2,226	0	0	0	637	39.8	42.0	2.81	61	
Florence (Wis)	1,027	1,028	-143	294	215	0	0	0	0	770	37.2	42.0	1.75	78	
Iron Mountain	12,688	13,751	-3,238	7,631	7,669	-2,853	0	500	-500	593	40.3	42.0	2.28	79	200
Gogebic	6,447	7,296	-1,824	3,477	4,529	-2,714	0	0	0	589	39.4	41.6	1.94	57	
Ontonagan	3,369	3,145	-27	3,651	2,165	689	0	0	0	624	31.4	41.6	1.84	51	
Iron (Wis.)	2,070	2,503	731	784	1,693	-1,530	0	0	0	702	35.0	41.6	1.31	41	
Ironwood	11,886	12,944	2,582	7,912	8,387	-3,555	0	0	0	617	36.7	41.6	1.84	50	105
Hillsdale	13,725	12,276	-202	6,509	4,004	1,036	600	0	600	445	45.6	48.7	2.38	190	
Jackson	52,209	45,798	-2,410	39,439	29,130	-381	5,700	4,700	1,000	513	41.1	48.7	2.91	205	
Jackson	65,934	58,074	-2,611	45,948	33,134	654	6,300	4,700	1,600	499	42.0	48.7	2.83	197	35
Kalamazoo	79,098	62,712	3,172	63,564	45,203	1,771	10,600	8,700	1,900	485	47.8	49.3	2.78	286	
Van Buren	19,930	17,179	625	9,933	6,826	602	0	0	0	533	37.6	49.4	2.20	275	
Kalamazoo	99,028	79,891	3,797	73,497	52,029	2,373	10,600	8,700	1,900	496	45.4	49.3	2.68	280	56
Clinton	17,746	13,009	2,533	4,286	2,663	646	600	500	100	370	39.6	47.6	2.88	256	
Eaton	26,269	18,047	4,595	7,873	4,439	1,805	1,200	0	1,200	483	44.9	47.6	2.20	234	
Ingham	105,416	79,222	4,215	83,582	57,325	5,219	26,600	26,500	100	642	53.2	47.6	3.39	300	
Lansing	149,431	110,278	11,341	95,741	64,427	7,670	28,400	27,000	1,400	581	50.1	47.6	3.28	262	0
Alger	2,590	2,677	-362	1,757	1,259	36	500	0	500	478	31.6	42.6	1.78	88	
Baraga	2,264	1,862	78	1,237	658	338	0	0	0	698	33.6	42.6	2.00	56	
Marquette	19,386	15,845	308	11,588	9,094	-844	0	0	0	441	42.4	42.6	1.69	84	
Marquette	24,240	20,384	25	14,582	11,011	-470	500	0	500	470	40.2	42.6	1.78	76	240
Mason	8,098	7,347	-297	4,734	3,630	-288	0	0	0	404	40.3	48.2	2.19	159	
Muskegon	56,081	51,703	-5,407	46,506	37,636	-4,942	14,800	15,400	-600	518	36.3	48.2	3.02	235	
Newaygo	8,811	7,370	656	3,717	3,051	-454	0	0	0	437	34.4	48.2	2.92	146	
Oceana	5,813	4,951	377	1,407	1,165	-186	0	0	0	469	34.6	48.2	1.42	153	
Muskegon	78,803	71,371	-4,672	56,364	45,482	-5,810	14,800	15,400	-600	493	36.4	48.2	2.92	166	34
Owosso	22,829	18,899	779	11,194	9,690	-2,052	500	0	500	489	40.6	48.4	2.47	265	26
Charlevoix	5,697	4,320	658	3,322	2,628	270	0	0	0	537	40.7	43.5	1.88	111	
Cheboygan	4,867	3,979	235	2,789	1,398	878	0	0	0	432	33.1	43.5	1.87	89	
Emmet	6,261	5,174	58	4,763	2,768	987	0	0	0	497	43.2	43.5	2.15	86	
Otsego	3,442	2,420	564	2,350	1,035	935	0	0	0	493	35.0	43.5	2.56	90	
Petoskey	20,267	15,893	1,514	13,224	7,823	2,530	0	0	0	489	38.6	43.5	2.04	94	185

Appendix Table 1. Continued.

	Census Employment 1970	Census Employment 1960	Census Comparative Gain	Census Employment 1970	Census Employment 1959	Census Comparative Gain	Largest Firms Employment 1970	Largest Firms Employment 1960	Largest Firms Change	Govern-ment	Edu-cation	Temper-ature	Wage	Land Value	Dis-tance
Huron	10,821	10,281	53	5,499	3,689	484	0	1,000	-1,000	436	29.9	46.4	2.26	248	
Sanilac	11,699	10,930	356	6,357	3,445	1,648	0	0	0	438	35.5	46.4	2.07	202	
St. Clair	41,207	35,039	88	24,748	18,833	-997	500	0	500	494	36.6	46.4	2.83	227	
Port Huron	63,727	56,250	496	36,604	25,967	1,135	500	1,000	-500	473	35.1	46.4	2.59	224	55
Clare	5,105	3,653	849	2,447	1,055	1,005	700	0	700	460	38.5	47.1	2.61	87	
Gratiot	13,750	12,552	-602	8,124	6,630	-939	0	0	0	442	40.2	47.1	2.37	311	
Isabella	15,627	11,624	1,340	5,606	3,294	1,103	700	0	700	423	41.6	47.1	2.40	193	
Saginaw	76,664	64,463	-221	64,010	46,261	771	21,300	18,500	2,800	515	36.6	47.1	3.19	337	
Tuscola	15,855	13,865	-5	5,808	3,779	642	500	0	500	409	33.5	47.1	2.17	345	
Saginaw	127,001	106,157	1,361	85,995	61,019	2,582	23,200	18,500	4,700	480	37.1	47.1	3.01	289	32
Chippewa	7,875	8,388	-1,930	3,105	3,769	-2,047	0	0	0	567	39.8	40.6	2.40	66	
Luce	1,977	1,944	-520	584	549	-166	0	0	0	513	30.2	40.6	1.49	83	
Mackinac	2,596	2,946	-783	1,106	940	-179	0	0	0	518	36.2	40.6	1.71	57	
Sault Ste. M	12,448	13,278	-3,281	4,745	5,258	-2,392	0	0	0	548	37.3	40.6	2.08	66	270
Antrim	4,084	3,198	468	1,997	998	633	0	0	0	535	38.8	45.6	2.00	107	
Benzie	2,846	2,547	-83	1,523	818	405	0	0	0	606	39.4	45.6	1.76	160	
Grand Traverse	13,820	10,173	1,276	10,815	6,012	2,597	500	0	500	469	43.1	45.6	2.28	274	
Kalkaska	1,402	1,307	-100	438	416	-131	0	0	0	551	36.4	45.6	1.83	77	
Leelenau	3,512	2,862	275	1,050	514	347	0	0	0	391	40.6	45.6	1.40	174	
Manistee	6,945	6,443	-421	4,728	3,500	-56	700	0	700	478	37.0	46.9	2.25	128	
Missaukee	2,246	2,073	14	432	334	-25	0	0	0	534	30.7	45.6	2.18	95	
Wexford	6,534	6,284	-839	5,270	3,443	563	0	0	0	485	36.1	45.6	2.31	73	
Traverse City	41,389	34,887	594	26,253	16,035	4,333	1,200	0	1,200	489	39.0	45.6	2.18	13.5	160
Menominee	8,320	---	---	4,960	4,496	-1,186	500	0		530	37.3	42.4	2.05	64	150
Cass	16,607	---	---	6,594	4,006	1,118	0	0		427	35.5	49.8	2.29	2.06	24
St. Joseph	18,287	---	---	14,300	10,659	-271	500	700		565	42.7	49.8	2.15	219	45
Bakersfield	109,539	98,273	-540	62,047	43,072	3,168	0	0	0	892	42.0	65.1	2.95	261	0
Butte	31,737	26,566	689	15,645	11,718	-374	0	0	0	721	45.3	61.1	2.64	401	
Glen	6,430	6,489	51	2,475	1,967	-214	0	0	0	938	44.7	61.1	2.86	310	
Chico-Orville	38,167	33,055	742	18,120	13,685	-588	0	0	0	755	45.2	61.1	2.68	357	82
DelNorte	4,909	6,045	-2,035	3,054	3,807	-2,150	0	0	0	863	38.6	52.3	2.85	301	
Humbolt	33,563	36,215	-8,815	21,227	22,251	-9,190	1,000	800	200	827	42.1	52.3	2.86	122	
Eureka	38,470	42,260	-10,849	24,281	26,058	-11,340	1,000	800	200	832	41.6	52.3	2.85	130	212
El Centro	23,479	28,027	-5,064	11,866	10,034	-1,850	0	0	0	917	33.8	72.6	2.49	703	95
Fresno	138,729	123,612	-748	81,880	61,369	-2,011	0	700	-700	828	40.8	63.0	2.46	572	
Madera	17,620	12,202	-29	4,718	3,935	-661	0	0	0	877	32.6	62.3	2.57	381	
Fresno	151,349	135,814	-775	86,598	65,304	-2,672	0	700	-700	833	40.0	63.0	2.47	522	0

Appendix Table 1. Continued.

	Census Employment 1970	Census Employment 1960	Census Comparative Gain	Census Employment 1970	Census Employment 1959	Census Comparative Gain	Largest Firms Employment 1970	Largest Firms Employment 1960	Largest Firms Change	Government	Education	Temperature	Wage	Land Value	Distance
Los Angeles	2,826,565	2,373,691	-83,342	2,491,889	1,829,303	-8,768	279,100	269,900	9,200	758	53.1	61.9	2.76	1384	
Orange	544,313	241,805	229,114	339,242	112,697	185,185	83,200	34,500	48,700	767	57.7	62.6	2.98	4594	
Los Angeles	3,370,878	2,615,496	145,772	2,831,131	1,942,000	176,417	362,300	304,400	57,900	758	53.5	61.9	2.79	2326	0
Sutter	14,201	11,256	2,171	5,196	2,846	1,306	0	0	0	782	44.7	62.3	2.54	762	
Yuba	10,001	9,695	-972	6,011	5,148	-1,026	0	0	0	881	40.6	62.3	2.57	352	
Marysville	24,202	20,951	1,199	11,207	7,994	280	0	0	0	833	42.7	62.3	2.54	577	38
Mariposa	2,059	1,987	-89	885	525	166	0	0	0	811	48.1	61.3	2.21	87	
Merced	31,162	25,377	4,284	13,103	8,380	1,648	0	0	0	1007	39.1	61.3	2.41	412	
Merced	33,221	27,364	4,194	13,988	8,906	1,814	0	0	0	996	39.8	61.3	2.41	338	50
Stanislaus	65,232	51,561	6,882	39,738	23,019	8,271	1,400	1,200	200	802	36.5	60.5	2.54	678	
Tuolumne	7,428	4,876	1,613	4,237	2,440	902	700	0	700	760	46.2	60.5	2.66	126	
Modesto	72,660	56,437	8,496	43,975	25,459	9,173	2,100	1,200	900	799	37.4	60.5	2.55	583	25
Shasta	25,602	20,082	1,765	14,979	9,621	1,827	3,000	2,100	900	827	46.8	63.2	2.95	127	
Tehama	9,914	8,736	330	5,269	4,599	-1,018	0	0	0	779	46.3	63.2	2.81	115	
Trinity	2,355	3,305	4,316	847	1,348	-996	0	0	0	902	40.9	63.2	2.80	80	
Redding	37,871	32,123	780	21,095	15,568	-187	3,000	2,100	900	821	46.1	63.2	2.88	117	145
Amador	3,969	3,423	-50	1,822	1,382	-67	800	0	800	900	45.9	60.7	2.84	146	
Colusa	4,607	4,563	113	1,747	1,230	66	0	0	0	1155	47.5	60.7	2.17	308	
Eldorado	16,463	10,567	3,972	6,507	3,485	1,743	0	0	0	1144	48.1	60.7	2.75	326	
Nevada	8,331	6,859	180	3,553	2,314	390	0	0	0	844	46.2	60.7	2.57	176	
Placer	26,449	19,465	2,920	11,800	5,881	3,761	0	0	0	885	43.6	60.2	2.77	433	
Plumas	4,177	4,259	-684	1,881	1,772	-541	0	0	0	1030	44.6	60.7	2.69	153	
Sacramento	227,013	184,009	0	119,297	85,843	1,950	14,100	16,000	-1,900	785	55.8	60.7	3.15	539	
Sierra	797	812	-116	364	457	-261	0	0	0	1444	46.8	60.7	2.30	90	
Yolo	33,786	24,881	3,946	12,913	7,336	2,885	0	0	0	736	47.0	60.9	2.90	606	
Sacramento	325,592	258,838	10,278	159,884	109,107	9,926	14,100	16,000	-1,100	820	52.8	60.7	2.95	401	0
Alameda	416,670	337,480	-5,777	294,814	209,450	8,496	19,700	25,400	-5,700	772	51.7	57.5	3.08	823	
Contra Costa	211,006	142,569	33,965	96,912	59,432	15,668	14,900	14,300	600	891	55.3	60.4	3.37	1057	
Marin	80,620	51,660	14,211	30,144	16,895	7,048	1,000	0	1,000	774	67.1	57.2	2.97	610	
Napa	28,756	21,495	2,044	12,709	8,141	1,580	900	900	0	619	44.6	58.3	2.68	534	
San Benito	6,530	5,682	779	3,754	2,020	993	0	0	0	678	34.4	57.5	3.23	207	
San Francisco	318,311	331,156	-88,800	401,863	321,552	-37,699	4,000	11,900	-7,900	814	51.0	56.9	3.12	82981	
San Mateo	241,036	175,099	23,475	154,195	85,013	38,982	23,100	12,900	10,200	798	61.9	58.7	3.15	1066	
Santa Clara	409,077	228,156	117,790	310,392	138,287	121,354	66,600	35,300	31,300	923	56.2	59.4	3.02	1577	
Solano	50,128	38,038	3,752	22,212	12,768	4,758	0	0	0	788	49.1	60.5	2.79	484	
San Francisco-Oakland	1,762,134	1,331,335	101,436	1,326,995	853,558	161,180	130,200	100,700	29,500	820	54.0	57.5	3.10	702	0

Appendix Table 1. Continued.

	Census Employment 1970	Census Employment 1960	Census Comparative Gain	Census Employment 1970	Census Employment 1959	Census Comparative Gain	Largest Firms Employment 1970	Largest Firms Employment 1960	Largest Firms Employment Change	Govern-ment	Edu-cation	Temper-ature	Wage	Land Value	Dis-tance
Inyo	5,951	4,607	691	3,303	2,295	166	0	0	0	1079	52.5	63.8	2.48	49	
Riverside	151,760	104,679	28,464	86,169	52,283	14,698	3,500	2,500	1,000	811	49.4	63.1	2.53	1125	
San Bernadino	223,263	164,989	21,607	125,333	73,982	24,200	15,000	9,000	6,000	734	48.4	63.8	3.09	291	
San Bernadino-Riverside	380,974	274,275	50,762	214,805	128,560	39,064	18,500	11,500	7,000	768	48.8	63.8	2.88	472	0
Lake	5,793	4,324	955	1,941	1,022	544	0	0	0	708	40.1	59.2	1.84	307	
Mendocino	17,233	16,123	-1,742	9,171	8,893	-2,986	0	0	0	653	41.4	59.2	2.76	137	
Sonoma	67,753	48,307	9,670	33,371	19,947	6,103	0	0	0	802	43.9	57.6	2.65	643	
Santa Rosa	90,779	68,754	8,842	44,483	29,862	3,661	0	0	0	762	43.0	57.6	2.69	333	50
Salivas	77,690	55,296	14,284	41,505	23,972	8,735	700	0	700	683	49.4	57.2	2.50	369	45
San Diego	430,495	311,911	43,149	290,958	202,801	13,729	39,200	29,300	9,900	698	54.6	63.2	3.17	744	0
Calaveras	4,278	3,658	-1	1,730	1,697	-590	0	0	0	736	39.8	61.3	2.78	132	
San Joaquin	101,430	88,331	-1,116	59,014	39,663	4,795	1,800	1,800	0	864	36.9	61.3	2.63	779	
Stockton	105,708	91,989	-1,117	60,744	41,360	4,205	1,800	1,800	0	859	37.0	61.3	2.64	566	0
San Luis Ob.	35,687	26,936	3,444	14,702	9,833	1,260	0	0	0	754	46.0	59.1	2.48	189	95
Santa Barbara	94,980	61,937	18,424	60,868	30,225	19,550	5,300	0	5,300	743	55.9	60.3	2.66	410	0
Santa Cruz	44,025	28,404	9,989	24,658	12,642	7,376	0	0	0	906	43.1	56.8	2.43	1254	25
Kings		15,839	1,372	7,783	5,280	565	0	0	0	823	33.8	64.1	2.75	354	72
Tulare		56,923	6,708	29,325	17,808	4,981	0	0	0	850	33.1	64.1	2.24	764	65
Visalia-Hanf.	83,502	72,762	8,079	37,108	23,088	5,646	0	0	0	843	33.3	64.1	2.32	606	65
Ventura-Ok.	131,901	67,851	48,624	58,932	29,546	18,543	5,500	600	4,900	846	47.0	59.3	2.72	2130	0
Modoc	2,917	3,184		800	662	105	0	0	0	1011	50.5	55.8	2.83	89	225
Siskiyou	11,280	12,208		5,746	5,925	-2,353	900	900	0	836	44.3	55.8	2.71	95	225
Alpine	194	106		66	8	55	0	0	0	1916	32.9	49.5		191	140
Lassen	5,232	4,778		1,924	1,666	-353	0	0	0	718	42.4	49.5	2.61	62	140
Mono	1,764	1,069		1,293	269	925	0	0	0	2008	62.1	49.5	3.83	118	140

Sources:
1. Counties and Basic Trading Areas: 1970 Rand McNally Commerical Atlas and Marketing Guide, Rand McNally and Company.
2. Census Employment: U.S. Bureau of the Census, Census of Population, General Social and Economic Characteristics of the Population, 1960 and 1970, Michigan and California.
3. County Business Patterns (CBP) Employment: U.S. Bureau of the Census, County Business Patterns, 1959 and 1970, Michigan and California.
4. Largest Firms Employment (LFE): Sales Management, The Sales Management Directory of Key Plants, New York, 1960.
5. Government Expenditures: U.S. Bureau of the Census, Census of Governments, 1962 and 1967.
6. Education: U.S. Bureau of the Census, Census of Population, 1960.
7. Temperature: U.S. Weather Bureau, Local Climatological Data.
8. Wage: U.S. Bureau of the Census, County and City Data Book, 1967. (Wages entire year, divided by number of man-hours).
9. Land Value: U.S. Bureau of the Census, County and City Data Book, 1967.
10. Distance: 1970 Rand McNally Commercial Atlas and Marketing Guide (measured from a map).

Appendix Table 2. List of firms' names included in the analysis.[1]

1. General Motors
2. Standard Oil (N.J.)
3. Ford Motor
4. General Electric
5. International Business Machines
6. Mobil Oil
7. Chrysler
8. International Tel. & Tel.
9. Texaco
10. Western Electric

11. Gulf Oil
12. U.S. Steel
13. Westinghouse Electric
14. Standard Oil of California
15. Ling-Temco-Vought
16. Standard Oil (Ind.)
17. Boeing
18. E.I. du Pont de Nemours
19. Shell Oil
20. General Telephone & Electronics

21. RCA
22. Goodyear Tire & Rubber
23. Swift
24. Union Carbide
25. Proctor & Gamble
26. Bethehem Steel
27. Eastman Kodak
28. Kraftco
29. Greyhound
30. Atlantic Richfield

31. Continental Oil
32. International Harvester
33. Lockheed Aircraft
34. Tenneco
35. North American Rockwell
36. Litton Industries
37. United Aircraft
38. Firestone Tire & Rubber
39. Phillips Petroleum
40. Occidental Petroleum

41. General Dynamics
42. Caterpillar Tractor
43. Singer
44. McDonnell Douglas
45. General Foods
46. Continental Can
47. Monsanto
48. Sun Oil
49. Honeywell
50. W.R. Grace

51. Dow Chemical
52. Internation Paper
53. American Can
54. Borden
55. Rapid-American
56. Burlington Industries
57. Union Oil of California
58. R.J. Reynolds Industries
59. Sperry Rand
60. Xerox

61. Boise Cascade
62. Cities Service
63. Minnesota Mining & Manufacturing
64. Consolidated Foods
65. Gulf & Western Industries
66. Textron
67. Coca-Cola
68. TRW
69. Armco Steel
70. Beatrice Foods

71. Ralston Purina
72. Uniroyal
73. Aluminum Co. of America
74. American Brands
75. Bendix
76. National Cash Register
77. American Standard
78. Signal Companies
79. Ashland Oil
80. Owens-Illinois

81. United Brands
82. CPC International
83. Standard Oil (Ohio)
84. Republic Steel
85. U.S. Plywood-Champion Papers
86. FMC
87. American Home Products
88. Raytheon
89. Warner-Lambert
90. Genesco

91. Allied Chemical
92. National Steel
93. Weyerhaeuser
94. U.S. Industries
95. Getty Oil
96. Teledyne
97. Colgate-Palmolive
98. B.F. Goodrich
99. Georgia-Pacific
100. Whirlpool

101. Inland Steel
102. American Cyanamid
103. Deere
104. Ogden
105. Kennecott Copper
106. Olin
107. PepsiCo
108. Borg-Warner
109. PPG Industries
110. American Motors

111. Amerada Hess
112. Carnation
113. Mead
114. Celanese
115. Reynolds Metals
116. General Mills
117. Norton Simon
118. Marathon Oil
119. Standard Brands
120. Johnson & Johnson

121. Eaton Yale & Towne
122. Grumman
123. Philip Morris
124. Bristol-Myers
125. General Tire & Rubber
126. Anaconda
127. Campbell Soup
128. Crown Zelterbach
129. Combustion Engineering
130. Martin Marietta

131. National Lead
132. Lykes-Youngstown
133. J.P. Stevens
134. Burroughs
135. H.J. Heinz
136. Kaiser Aluminum & Chemical
137. International Utilities
138. Pfizer
139. Allis-Chalmers Manufacturing
140. National Biscuit

141. Kimberly-Clark
142. Whittaker
143. Studebaker-Worthington
144. St.Regis Paper
145. SCM
146. American Metal Climax
147. Texas Instruments
148. Babcock & Wilcox
149. Walter Kidde
150. White Motor

151. Hercules
152. Motorola
153. Anheuser-Busch
154. Dress Industries
155. Interco
156. Phelps Dodge
157. Ingersoll-Rand
158. Avon Products
159. Avco
160. Scott Paper

161. Illinois Central Ind.
162. Merck
163. American Melting & Refining
164. Iowa Beef Processors
165. White Consolidated Industries
166. United Merchants & Manufacturers
167. Squibb Beech-Nut
168. Dart Industries
169. Geo. A. Hormel
170. Pullman

171. Otis Elevator
172. Del Monte
173. Crane
174. Central Soya
175. Pillsbury
176. Gillette
177. Jim Walter
178. Clark Equipment
179. Dana
180. National Distillers & Chemical

Appendix Table 2. Continued.

181. Colt Industries
182. Pet
183. Emerson Electric
184. Land O'Lakes
185. Anderson, Clayton
186. AMF
187. Time Inc.
188. McGraw Edison
189. Northrop
190. Oscar Mayer

191. Kellogg
192. Farmland Industries
193. GAF
194. Agway
195. Quaker Oats
196. Sterling Drug
197. Carrier
198. Corning Glass Works
199. Eli Lilly
200. Essex International

201. Lear Siegler
202. Times Mirror
203. Fruehauf
204. Tecumseh Products
205. Upjohn
206. Kaiser Steel
207. Kelsey-Hayes
208. Di Giorgio
209. Ex-Cell-O
210. Hygrade Food Products

211. Hewlett-Packard
212. Levi Strauss
213. Purex
214. Potlatch Forests
215. Ampex
216. Mattel
217. Rohr
218. Norris Industries
219. Federal-Mogul
220. Republic

221. Fairchild Camera & Instrument
222. Gerber Products
223. Mclouth Steel
224. Automation Industries
225. Varian Associates
226. Max Factor
227. Arcata National
228. Capitol Industries
229. Hoover Ball & Bearing
230. Fibreboard

231. Philco Ford
232. Socony Mobil Oil
233. Virginia-Carolina Chemicals
234. Grinnell
235. Rayonnier
236. Continental Baking
237. Spencer Chemical
238. Jones & Laughlin Steel
239. Ling Altec Electronics
240. Wilson

241. Ling-Temco Electronics
242. Temco Aircraft
243. Chance Vought
244. Radio Corporation of America
245. National Dairy Products
246. Armour
247. Baldwin Lima Hamilton
248. Atlantic Refining
249. Sinclair Oil
250. Richfield Oil

251. Consolidation Coal
252. American Agr. Chemical
253. J.I. Case
254. Packaging Corp. of America
255. Tennesee Gas Transmission
256. Newport News Shipbuilding
257. Kern County Land
258. North American Aviation
259. Rockwell-Standard
260. Middle-Goss Dexter

261. Royal McBee
262. Hooker Chemical
263. Island Creek Coal
264. Singer Manufacturing
265. General Precision Equipment
266. Friden
267. Douglas Aircraft
268. McDonnell Aircraft
269. Surray DX Oil
270. Surray Mid Continent Oil

271. Minneapolis-Honeywell Regulator
272. BVD
273. Stanley Warner
274. Glen Alden
275. Schenley Industries
276. Pure Oil
277. R.J. Reynolds Tobacco
278. McLean Industries
279. Tennesse Corporation
280. Columbia Charbon

281. Brown
282. Universal American
283. E.W. Bliss
284. Consolidated Cigars
285. Spencer Kellog & Sons
286. Bell Aircraft
287. Duncan Foods
288. Thompson Ramo Wooldridge
289. U.S. Rubber
290. Sunshine Biscuits

291. Andrew-Jergens
292. American Tobacco
293. American Forest Products
294. Westinghouse Air Brake
295. American Radiator & Standard
296. Signal Oil & Gas
297. Mack Trucks
298. Garret
299. Ashland Oil & Refining
300. AMK

301. United Fruit
302. American SealCap
303. John Morrell
304. Corn Products
305. U.S. Plywood
306. Champion Papers
307. Link Belt
308. American Viscose
309. Food Machinery & Chemical
310. Ekco Products

311. American Optical
312. Parke Davis
313. Warner-Lambert Pharm.
314. Union Texas Natural Gas
315. Tidewater Oil
316. Skelly Oil
317. Ryan Aeronautical
318. Peabody Coal
319. Olin Mathieson Chemical
320. Pepsi-Cola

321. Frito-Lay
322. Pittsburg Plate Glass
323. Hess Oil & Chemical
324. Oliver
325. Amerada Petroleum
326. Woodward Iron
327. W.P. Fuller
328. Hunt Food Industries
329. McCall
330. Canada Dry

331. Ohio Oil
332. Plymouth Oil
333. Eaton Manufacturing
334. Yale & Towne Manufacturing
335. Grumman Aircraft Engineering
336. Mead Johnson
337. Anaconda Wire & Cable
338. American Marietta
339. Martin
340. Harvey Aluminium

341. Glenn L. Martin
342. Lykes
343. Youngstown Sheet & Tube
344. Chas. Pfizer
345. Telecomputing
346. Worthington
347. Studebaker
348. Studebaker-Packard
349. Alco Products
350. Glidden

351. Smith-Corona-Marchart
352. American Metal
353. U.S. Lines
354. Oliver
355. Harbison-Walker Refractories
356. International Shoe
357. Paul Revere Life
358. Iowa Beef Packers

Appendix Table 2. Continued.

359. Hupp
360. Blaw-Knox

361. White Sewing Machine
362. Beech-Nut Life Savers
363. Rexall Drugg & Chemical
364. California Packing
365. CF & I Steel
366. Colorado Fuel & Iron
367. U.S. Pipes & Foundry
368. Bridgeport Brass
369. Crucible Steel
370. Fairbanks Whitney

371. PetMilk
372. American Machine & Foundry
373. McGraw Electric
374. Consumers Cooperatives Association
375. General Oniline & Film
376. Ruberoid
377. Coop. Grange League Fed. Exchange
378. Eastern States Farmer's Exchange
379. Essex Wire
380. Siegler

381. Lear
382. Republic Pictures
383. Fibreboard Paper Products
384. Pabco Products
385. Federal Electric
386. Industrial Asphalt Inc.
387. Amoco Chemicals
388. Lenkurt Electric
389. Stramberg Datagraphix
390. Westab

400. Glass Containers
401. United Can
402. American Petrochemical
403. Tasker Industries
404. Pendleton Tools Industries
405. Granny Goose Foods
406. Pratt & Whitney
407. Voit W.J. Rubber
408. Waste King
409. Michigan Fruit Canners
410. Charmin Paper Products

411. Holley Carburator
412. Escanaba Paper
413. Aluminium Extrusion
414. Michigan Tool
415. Gibson Product
416. Keeler Brass
417. Dow Corning
418. Kawneer
419. Motor Wheel
420. Allied Paper

421. Kalamazoo Paper
422. Cadillac Gage
423. Campbell Wyant & Canro Fo.
424. Tyler Refrigerator
425. Wagner Industries

1) The first 200 names are the names of the largest corporations in 1970. The next 30 names are companies which were among the 500 largest in 1970 and had their headquarters in Michigan or California. The remaining are old or local names of companies already included or companies which were merged by these during the period 1960 to 1970.

Sources: Fortune Directory of the 500 largest Industrial Corporations, Fortune, May, 1971.
Moody's Industrial Manual, 1970.

Appendix Table 3. Regression Statistics for the Function $X_1 = f(X_2, \ldots, X_{10})$, Unit of Observation: BTA, Detroit, Area Dropped.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	-32,172						
Employment-60	-.001	.016	-.08	.94	-.02	.94	-.01
Large Firms	2.20	.745	2.95	.006	.75	.92	.44
Education	837	283	2.95	.006	.18	.92	.44
Wage	-1,085	4,206	-.26	.80	-.01	.93	-.04
Land	9.70	4.34	2.23	.03	.16	.92	.35
Distance	-12.38	22.1	-.56	.58	-.03	.93	-.09
Dummy	1,676	3,097	.54	.59	.03	.93	.09
R^2	.933						
F Value	72.0						

Appendix Table 4. Regression Statistics for the Function $X_1 = f(X_2, \ldots, X_{10})$, Unit of Observation: BTA, Detroit, Los Angeles and San Francisco-Oakland Areas Dropped.

Variable	Regression Coefficient	Standard Errors of Coefficient	T Value	Significance	Beta Weights	R^2 Deletes	Partial Correlation
Constant	-23,091						
Employment-60	-.051	.021	2.43	.021	.28	.77	.38
Large Firms	1.98	.600	3.31	.002	.35	.75	.49
Education	625	233	2.68	.011	.27	.77	.42
Wage	-3,822	3,400	-1.12	.269	-.11	.80	-.19
Land	16.15	3.690	4.37	<.0005	.45	.70	.60
Distance	12.17	18.62	.65	.518	.07	.81	.11
Dummy	-285	2,437	-.12	.909	-.01	.81	-.02
R^2	.81						
F Value	20.4						

BIBLIOGRAPHY

BIBLIOGRAPHY

Adams, W., 1961. The Structure of American Industry: Some Case Studies. New York: Macmillan.

Ashby, L. D., 1964. "Regional Change in a National Setting." Staff Working Paper in Economic and Statistics, No. 7, U.S. Department of Commerce, April.

Blalock, H. M., 1964. Causal Inferences in Nonexperimental Research. Chapel Hill: University of North Carolina Press.

Bluestone, H., 1970. "Focus for Area Development Analysis: Urban Orientation of Counties," AER No. 183, ERS, U.S. Department of Agriculture, May.

Bonnen, J. T., 1968. "Progress and Poverty: The People Left Behind." Paper prepared for presentation at the Minneapolis Farm Forum in Minneapolis, Minn., March 6.

Burrows, J. C.; Metcalf, C. E.; and Kaler, J. B., 1971. Industrial Location in the United States, An Econometric Analysis. A Charles River Associates Research Study. Lexington, Mass.: Heath Lexington Books.

Chenery, H., 1959. "The Interdependence of Investment Decisions," The Allocation of Economic Resources. Stanford, Calif.: Stanford University Press.

Chinitz, B., and Vernon, R., 1960. "Changing Forces in Industrial Location," Harvard Business Review, January-February.

Crocker, T. D. and Rogers, A. J., 1971. Environmental Economics. Hinsdale, Ill.: The Dryden Press, Inc.

Downs, A., 1970. Urban Problems and Prospects. Markham Series in Public Policy Analysis. Chicago.

Dun and Bradstreet, 1970. Reference Book of Manufacturers, Fall 1970. New York: Dun and Bradstreet, Inc.

Duncan, O. D. and Reiss, A. J., Jr., 1956. Social Characteristics of Urban and Rural Communities, 1950. New York: John Wiley and Sons, Inc.

Edwards, C.; Coltrane, R.; and Daberkow, S., 1971. "Regional Variations in Economic Growth and Development with Emphasis on Rural Areas," AER No. 205. ERS, U.S. Department of Agriculture, May

Epp, J., 1970. "In Search of a Better Distribution of Population, What Are the Key Determinants?," American Journal of Agricultural Economics, Vol. 52, No. 5, December.

Estall, K. C. and Buchanan, R. O., 1966. Industrial Activity and Economic Geography, A Study of the Forces Behind the Geographic Location of Production Activity in Manufacturing Industry. London: Hutchinson University Library.

Everett, R. O. and Leach, R. H. (eds.), 1965. Urban Problems and Propsects. New York: Oceana Publication, Inc., Dobbs Ferry

Faux, G., 1972. "Absentee Owners of America-I, Colonial New England," The New Republic. November 25.

Fortune, 1971. Fortune Directory of the 500 Largest U.S. Industrial Corporations. Chicago: Time Inc., May

Friedman, J. R. P., 1956. "Locational Aspects of Economic Development," Land Economics, Vol. 32, No. 3, August.

Fuchs, V. R., 1965. Changes in the Location of Manufacturing in the United States Since 1929. New Haven and London: Yale University Press.

Gabler, L. R., 1971. "Population Size as a Determinant of City Expenditures and Employment--Some Further Evidence," Land Economics, Vol. 47, May.

Galbraith, J. K., 1973. Economics and the Public Purpose. Boston: Houghton Mifflin Co.

_____, 1968. The New Industrial State. A Signet Book Published by the New American Library, October.

Halpern, J., 1970. "In Search of a Better Distribution of Population, What Are the Key Determinants?, Discussion" American Journal of Agricultural Economics, Vol. 52, No. 5, December.

Hathaway, D. E.; Beegle, J. A.; and Bryant, W. K., 1968. People of Rural America, A 1960 Census Monograph. U. S. Department of Commerce, Bureau of the Census.

Hoover, E. M., 1948. The Location of Economic Activity. New York, Toronto, London: McGraw-Hill Book Company, Inc.

International Information Center for Local Credit, 1964. Government Measures for the Promotion of Regional Economic Development, Results of a Study Carried Out in Different Countries. The Hague Martinus Nijkoff.

Isard, W., 1956. Location and Space-Economy. New York: Published jointly by the Technology Press of Massachusetts Institute of Technology and John Wiley and Sons, Inc. London: Chapman and Hall, Ltd.

Jacobs, J., 1960. The Death and Life of Great American Cities. New York: Vintage Books.

Kmenta, J., 1971. Elements of Econometrics. New York: Macmillan.

Market Statistics, Inc., 1970. Market Statistics Key Plants 1970-71. New York: Market Statistics, Inc.

Moody's Investors Service, Inc., 1971. Moody's Industrial Manual. New York: Moody's Investors Service, Inc.

Mueller, E. and Morgan, J. N., 1962. "Location Decisions of Manufacturers," American Economic Review, Vol. 52, No. 2.

Mueller, W. F., 1972. "Impact of Changing Industrial Organizations on Community Development." Paper presented at the Annual Meeting of the American Agricultural Economics Association, August 22. (Unpublished).

National Academy of Sciences, 1971. The Quality of Rural Living. Proceedings of a Workshop. Washington, D.C.

National Area Development Institute, 1972. "New Nonmetro Development Law: What's In It," American Development Interchange. Vol. II, No. 18, September, 15.

National Goals Research Staff, 1970. A Report Toward Balanced Growth: Quantity with Quality. Washington, D.C., July 4.

Neutze, J. M., 1967. Economic Policy and the Size of Cities. London: Frank Cass and Co., Ltd.

Perloff, H. S., with Dodds, W. V., 1963. How a Region Grows, Area Development in the U.S. Economy. Supplementary Paper No. 17, Published by the Committee for Economic Development.

Perroux, F., 1955. "Note sur la Notión de Póle de Croissance," Economie Appliqués, July.

President's National Advisory Commission on Rural Poverty, 1968. Rural Poverty in the United States. Washington, D.C.

Rand McNally and Company, 1970. Rand McNally Commercial Atlas and Marketing Guide.

Richardson, H. W., 1969. Regional Economics Location Theory--Urban Structure--Regional Change. New York, Washington: Praeger Publishers.

Sales Management, 1960. The Sales Management Directory of Key Plants. New York: Sales Management. November.

Schmid, A. A., 1968. "Economic Theory of Space for Land Settlement Policy Analysis," Land Settlement Policy. Seminar Southern Land Economics Research Committee, North Carolina State University, Agricultural Policy Institute, April 22-23.

Tefertiller, K., 1973. "Rural Development in an Urban Age," American Journal of Agricultural Economics, Vol. 55, No. 5, December.

Tiebout, C., 1965. "The Economics of Community Growth," Community Resource Development. Proceedings of First National Extension Workshop in Community Resource Development, Michigan State University, July 12-30.

Tweeten, L., 1972. Research Application in Rural Economic Development and Planning. Agricultural Experiment Station, Oklahoma State University Research Report P-665, July.

U.S. Bureau of the Budget, 1967. Standard Industrial Classification Manual. Washington, D.C.: Government Printing Office.

U.S. Bureau of the Census, 1971. 1970 Census of Population and Housing, "General Demographic Trends for Metropolitan Areas, 1960 to 1970." PHC(2)-1, Washington, D.C., Tables 6,11 and 11a and Computations.

_____, 1971. County Business Patterns, 1970, Michigan. Washington, D.C.: Government Printing Office, CBP-70-24.

_____, 1972. "Projections of the Population of the United States, by Age and Sex: 1972 to 2020," Current Population Reports. Washington, D.C.: U.S. Government Printing Office, Series P-25, No. 493.

U.S. Congress, 1971. "Agricultural Act of 1970," Public Law 91-524, Statutes at Large, Vol. 84, Part I.

_____, 1973. "Rural Development Act of 1972," Public Law 92-419, Statutes at Large, Vol. 86.

U.S. Congress, 1967. Joint Economic Committee, Urban America: Goals and Problems. Washington.

U.S. Congress, Senate, 1972. Rural Development, by R. Irwin, Committee Print, No. 74-949, 92d Congress, Washington, D.C.

U.S. Department of Labor, 1972. Employment and Earnings, States and Areas, 1939-1970. Washington, D.C.: Bureau of Labor Statistics.

_____, 1972. Employment and Earnings, United States, 1909-1971. Washington, D.C.: Bureau of Labor Statistics.

Wilson, J. Q., ed., 1967. The Metropolitan Enigma, Inquiries into the Nature and Dimensions of America's Urban Crisis. Washington, D.C.: Chamber of Commerce of the United States.