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TOWARDS A CLARIFICATION OF REGIONAL ECONOMIC CHANGE: THE UNITED STATES AS A CASE STUDY, 1962-1980

The University of Oklahoma PH.D. 1984

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

TOWARDS A CLARIFICATION OF REGIONAL ECONOMIC CHANGE: THE UNITED STATES AS A CASE STUDY, 1962-1980

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fullfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

by

NANCY ETTLINGER

Norman, Oklahoma

1984

TOWARDS A CLARIFICATION OF REGIONAL ECONOMIC CHANGE:

THE UNITED STATES A CASE STUDY, 1962-1980

A DISSERTATION

APPROVED FOR THE DEPARTMENT OF GEOGRAPHY

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Acknowledgements

I am grateful for the constructive criticism and advice that have been given to me by my committee Chair, Rebecca Roberts, and by my other committee members Fred Shelley, Daniel Fesenmaier, Craig St. John, and John Harrington. Edward Malecki also offered helpful comments. I also thank Daniel Reff for his advice and constant support. Finally, I thank Neil Salisbury, and the Department of Geography at the University of Oklahoma, as a whole, for the support and encouragement I have received throughout my graduate education.

TABLE OF CONTENTS

LIST OF TABLES

List of Tables, Cont'd.

LIST OF FIGURES

Chapter 1

Introduction

In recent decades the socio-economic structure of the United States has undergone dramatic changes. The American economy has entered a post-industrial era, characterized by a rapid expansion of the service sector, including both low (tertiary) and high (quaternary) skilled occupations. By 1950, agricultural employment dropped precipitously, and the manufacturing labor force began to decline. However, these general processes appear differently when regions in the United States are considered separately. In particular, the service sector has virtually replaced the manufacturing sector in the Northeast, while the manufacturing sector has replaced the traditional agricultural base of the South.

The general shifts occurring in the northeastern and southern United States provide examples of regional economic change, the general subject of this dissertation. Two antithetical viewpoints prevail regarding regional changes in the United States. On the one hand, the shift of manufacturing from the Northeast to the Sunbelt has led many scholars to conclude that the South will eventually supersede the Northeast as the dominant economic region in the United States (Chinitz 1978; Goodman 1979; Naisbitt 1982; Rees 1979; Rostow 1977; Singleman 1981; Sternlieb and Hughes 1978). Alternatively, the growing emphasis in the Northeast on an advanced service sector, in comparison to the emphasis on manufacturing in the South, has led

others to conclude that the Northeast persists as the dominant economic region (e.g. Cohen 1977, 1981). These strikingly different conclusions about empirical realities in the United States are reached on the basis of entirely different observations. The former and popular viewpoint — that the South is rising in competitive economic leverage with respect to the Northeast — is based on a comparison of manufacturing employment in the two regions. The latter and less popular viewpoint, is based on qualitative observations about types of labor in the two regions, with specific reference to skill levels. The conclusion of this latter view is reached according to the following logic: the South continues to lag behind the Northeast because low skilled labor predominates in the South and depends for many goods and services upon skilled labor forces in other regions, notably the Northeast.

These two opposing viewpoints about regional changes in the United States exemplify two prevalent conceptualizations of regional economic change. The fundamental issue is the appropriate basis for comparison among regions. Generally, regional economic changes are perceived either in terms of absolute increases in indicators such as population, employment, income, net output, and infrastructure, or in terms of changes in system-wide parameters. To date, the differences between these viewpoints are unresolved, and the considerations of these perspectives remain mutually exclusive (Hirschman 1981). This research is an effort to resolve these differences. Specifically, the purpose of this dissertation is fourfold: 1) to develop an alternative conceptualization of regional economic change by integrating qualitative and qualitative observations; 2) to develop an explicit classification of change that distinguishes regional change as a result of absolute increases in growth indicators within regions from the overall change

in one region relative to another; 3) to develop a methodology that allows for an operationalization of the proposed conceptualization and the empirical identification of types of change; and 4) to give empirical content to the proposed concepts and formal specification, using regions in the United States as a case study.

The remainder of this chapter elaborates on the problems associated with assessing regional economic change. This chapter is divided into three sections. The first section discusses the two above stated opposing viewpoints with respect to the basis for regional comparisons in the United States. Long-term sectoral changes that differentially occur in different regions, and the dynamics of interregional interaction, are cited as the two issues that are most fundamental to differences of opinion between the "qualitative" and "quantitative" schools of thought. The second section addresses regional economic change in an international context. Specifically, recent comparisons between rapidly industrializing countries and advanced economies are conceptually quite similar to North-South comparisons in the United States, indicating the generality of the problems associated with the identification and explanation of regional economic changes. The third section provides an outline of the chapters that follow.

1.1 Regional Economic Change in the United States

1.1.1 Sectoral change and regional economic change

If it is appropriate to compare two regions on the basis of a variable such as manufacturing employment, then we clearly find a 'plus' registered for the South, and a 'minus' registered for the Northeast, and we can easily and reasonably conclude that the South's changes relative to the Northeast's

translate into changes in the overall ranks of the two regions. This type of comparison is, however, problematic because it assumes that the sectoral transformation of the South (from agriculture to manufacturing) provides a baseline for the entire national economy. However, the Northeast has not stagnated in sectoral terms; rather, it gradually has witnessed the development of a high technology service sector, as manufacturing has declined (Birch 1979a, p. 31). This rise of the service sector has been fueled, in part, by the growth of final demand as per capita income has risen; in part, it is also the result of a growth in intermediate demand by manufacturing industries that increasingly require corporate services capable of managing transactions among firms and branches of corporations (Fuchs 1968)[1].

The development of an advanced service sector in the Northeast does not necessarily mean, however, that this region is experiencing a boom in its overall socio-economic structure. The transformation from an industrial to a post-industrial economy is slow and fraught with problems. In particular, the transition from an industrial to a post-industrial context involves what has come to be known as "structural unemployment", a situation in which labor is rendered useless or superfluous by a new and evolving employment structure (Hanisch 1980; Hirschorn 1979; Rothwell and Zegveld 1981). Manufacturing labor in the Northeast is increasingly being laid-off as plants are either closed or relocated to other regions (Bluestone and Harrison 1982; Hekman and Smith 1982). Particularly as the recession of the early 1980s exacerbated unemployment problems, Northeastern manufacturing labor has migrated, often to the Sunbelt [2].

Laid-off blue collar workers face several problems. For example, as

manufacturing employment decreases, blue collar workers who want to retain their jobs in manufacturing must either find other jobs of the same type in their locale or they must relocate to another region where employment opportunities are better; alternatively, these workers can change their occupation to fit the growing demands of a new economic structure. There are, however, several problems associated with these options. First, it may not be possible for a blue collar worker to find another manufacturing job near his or her place of residence. Second, relocation is often difficult because it is expensive. Traditionally, white collar workers have been far more mobile than blue collar workers because they have greater financial and informative resources at their disposal (Moriarty 1980; Schlottman and Herzog 1981). Furthermore, relocation may entail risks in cases in which individuals move because of perceived rather than real employment opportunities. Third, the individual descended from generations of blue collar workers may be reluctant to change what has become a family occupational tradition. Moreover, finding an alternative job is not necessarily easy because the absorptive capacity of the tertiary (low skilled, non-professional) sector is not yet keeping pace with declining manufacturing employment (Freeman 1981). Finally, an alternative job may not be a pleasant prospect, since the new job may require far less skill and therefore be less rewarding (Warf 1983).

Like the South, the Northeast is experiencing major sectoral alterations that imply positive economic change, although the specific details of the Southern and Northeastern transformations differ. In general, the South has evolved from an agricultural to a manufacturing economy while the Northeast has evolved from a manufacturing to a service economy, with

particular emphasis on high technology. From the negative point of view, the South, with the exception of a few "pockets", has not experienced to the same degree as the Northeast the development of endogenously produced high technology (Fisher 1981). The Northeast, although far ahead of the South in terms of technological innovation, confronts problems of structural unemployment to a greater degree than does the South (Hirschorn 1979; Varaiya and Wiseman 1981). Certainly, the changes experienced by the South relative to the Northeast are not a clearcut issue because the weighing of the positive and negative aspects of absolute changes is a complex matter. To compare one region with another is often analogous to comparing apples and oranges because the sectoral components of the regional systems often differ dramatically. Nevertheless, the different conclusions reached about the status of the South relative to that of the Northeast generally are based on a consideration of one particular sector. Those who conclude that the South will supersede the Northeast often base their conclusions on changes in the manufacturing sector in both regions. Those who conclude that the South will continue to lag behind the Northeast often base their conclusions on changes in the advanced service sector in these regions. Thus, the rift between these camps and the strikingly different conclusions should be of little surprise. One way to overcome this "stalemate" is to account for several sectors simultaneously by examining divisions of labor in the United States as they are spatially differentiated across regions. This strategy recognizes that interregional interaction through corporate organization is directly related to regional differentiation.

To compare regions, it is necessary to recognize not only sectoral differences, but also the permeability of regional boundaries. Economic

actors in regions — specifically, individuals in corporate organizations — interact and create an interregional network of transactions across large distances, thus specifying the basis for interregional interaction (Pred 1976). For those who conclude that the South will supersede or converge with the Northeast on the basis of manufacturing employment, corporate organization is rarely considered as a relevant variable. The often negligible treatment of corporate organization as a vital element contributing to regional economic changes is not really surprising because it is difficult to express in quantitative terms. Few data sources, for example, provide information on linkages within corporations from one plant to another or from a number of plants to their respective headquarter locations in other regions. The problems associated with the examination of corporate organization as an element of regional economic changes are unfortunate because corporate organization is crucial to an understanding of regional relationships, and is, to a large extent, responsible for the rather visible sectoral changes already discussed.

1.1.2 The development of corporate organization in the United States as related to sectoral change

The twentieth century, especially the last fifty years, has witnessed the evolution of corporate organization from the single firm establishment to the large, multi-locational corporate enterprise (Chandler 1962; Watts 1980). Large corporate enterprises evolved in association with the urban and industrial revolution in the United States — not to replace but to complement small firms in order to satisfy the demands of a changing economy (Glover 1980). By 1920, large enterprises had emerged in transportation, public utilities, and manufacturing. Industries providing powered machinery, electric power, fuel, iron, steel, chemicals, and

transportation and communications services rapidly developed in few numbers but in large sizes, mobilizing more capital than individual investors could handle. The development of these enterprises, equipped with their own vertical integration of numerous plants, nurtured this growing metropolitan-industrial economy by providing an infrastructure. This new organizational type, the large enterprise, evolved as an extensive division of labor that fostered linkages among goods and service production units within a corporate body in geographically distinct areas.

In general, technological progress has allowed for the development of communications and transportation, thus reducing transportation costs and facilitating long-distance transactions among different units of a corporation (Carlino 1982; Williamson 1981). Furthermore, developments in miniaturization and substitute light-weight material inputs has freed many manufacturing operations from dependence on raw material production sites and high costs of bulk transportation (Pred 1965)[3]. The interactive system internal to large corporations has allowed many types of activities, especially low-skilled manufacturing, to locate in non-metropolitan locations. Small firms, in contrast, have tended to concentrate in urban areas because they lack the integration of goods and services inherent in large corporations and must, therefore, depend upon the inter-industry interaction that occurs in urban centers. Particular activities of large corporations that require specialized services or skills also tend to locate in or near metropolitan areas because metropolitan areas are essentially the repositories of skilled labor pools and specialized or high technology services. To a large extent, it is the unskilled manufacturing operations integrated into large corporations that provides the background for the sectoral transformation of the South and the

Northeast.

The evolving "footlooseness" of unskilled manufacturing has meant that these operations can be located in non-metropolitan areas at sites far removed from headquarters and research and development (R&D) locations. Manufacturing plants increasingly have been located in the Sunbelt to take advantage of cheap labor, low unionization, and alluring climatic conditions that can draw management officers from northern locations (Bluestone et al. 1981; Cromley and Leinbach 1981; Erickson 1976). Furthermore, increasingly high land values in cities have encouraged corporations to locate activities that do not require high skill levels in non-metropolitan areas. The less urban character of the South, as compared with the megalopolises of the Northeast, and the lower land rents are particularly suited to low skilled manufacturing. The changing character of corporate organization has thus strongly influenced the general North-South shift of certain types of manufacturing employment, and concomitantly, has stimulated the growth of medium to small sized SMSAs (Standard Metropolitan Statistical Areas) and non-metropolitan areas that are amenable to low and semi-skilled manufacturing activities. Thus, the relatively new wave of exurbia and the development of non-metropolitan growth since the early 1970s (Berry 1978) are thus also inextricably connected to the dynamics of corporate organization and locational decisions.

The division of labor within corporations involves a hierarchy of activities ranging from high skilled (e.g. management, administration, R&D, information processing, advanced corporate and financial services) to low skilled (e.g. manufacturing, storage, distribution) operations. The South has attracted many low skilled activities; high skilled activities generally have

tended to be located in such areas as the large cities along the East Coast because these areas provide skilled labor pools as well as extensive networks of corporate services.

This general North-South dichotomy with respect to corporate spatial divisions of labor reflects the simple central place principle that emphasizes the positive correlation between city size and numbers and types of goods and services (Christaller 1966). Much of the recent industrial location literature accounting for the complex organizational features of the large industrial enterprise has drawn the connection between types of activities and site locations in settlements of different sizes. Norcliffe (1975), for example, has suggested that manufacturing operations can be classified on the basis of the degree to which production involves value-added operations: the greater the degree of value-added inputs, the more likely it is that operations will be located in or near large metropolitan areas. This continuum of value-added operations is consistent with low to high skilled operations, and also with a continuum of operations requiring few to many intermediate services. Norcliffe's highest ranked corporate activity is administration, which often is located in large cities that house advanced corporate and financial services and high skilled labor[4].

The relevance of corporate divisions of labor to regional economic change is threefold. First, the development of the extensive division of labor that characterizes large, multi-locational corporations is directly related to the sectoral transformations experienced by both the South and the Northeast. This division of labor has generated a spatial separation of types of activities, enabling many low skilled activities that do not require various services to become footloose. The formerly agricultural South has

accommodated this low skilled end of the corporate hierarchy. In contrast, high skilled activities have been attracted to the Northeast, particularly in the large metropolitan centers. These high order activities have developed concomitantly to the growing network of corporate labor (Cohen 1981). Moreover, changes within manufacturing itself are also directly related to the development of a service-oriented economy as technological advances have fostered the development of value-added manufacturing processes that require a sophisticated service base.

The evolution of the large corporate enterprise has strongly influenced the regional locations of types of activities, which in turn, define the basis for interaction. Prior to the development of large corporations, regions tended to specialize in the production of particular commodities. In contemporary times, certain industries do tend to cluster in particular regions, but to a large extent, regions tend to specialize in types of activities, or divisions of labor, across a spectrum of industries. For example, the South, percentagewise, predominantly houses low skilled manufacturing; the Northeast, predominantly headquarters, research and development (R&D), management and advanced corporate and financial services. This changing character of regional production from industrial to activity specialization holds particular significance for relationships among regions. In the past, the South lagged behind the Northeast because the Northeast had a well developed industrial base while the South was primarily an agricultural economy. Now that the South has developed an industrial base, the popular presumption is that the relative ranks of these two regions are undergoing change. Consider, however, that the predominant type of activity in the South is low technology manufacturing, often controlled by

headquarters located in another region, often the Northeast. The implications of this situation are fourfold. First, the exogenous location of headquarters that control branch plants means that the local population has little or no input into important decision making processes that often result in plant shut-downs or relocation, negatively affecting employment. Second, high-echelon offices are often staffed and maintained by personnel drawn from outside the local population, meaning that the local population participates primarily in low or unskilled jobs, and little if any skill upgrading occurs. The net result is little if any positive effect on socio-economic mobility among a predominantly blue collar population (Cromley and Leinbach 1981; Gray 1969; Leigh and North 1978). Third, external ownership means that profits associated with particular branch manufacturing plants flow outside the region (Britton 1978; Erickson 1974). Fourth, large corporations that have many plants located across large distances often find it lucrative to purchase inputs to production from other plants within the corporate structure. This situation often results in the importing of inputs into a region and the exporting of output from the branch plants, meaning that little if any inter-industry interaction is stimulated among local, independent manufacturing firms (Klimasewski 1978). Viewing the relationships between regions in terms of corporate organization and spatial divisions of labor, the interaction among regions assumes a pattern of dominance and dependence, defined by a hierarchy of spatially distinct corporate activities (Clark 1981). From this point of view, the alleged changes in the relative ranks of the Northeast and the South are highly questionable.

The South/Northeast comparison is a consideration of regional

economic change from the point of view of changes within a national system. As we examine regional changes at an international scale, we find that the same issues emerge, thus indicating the generality of the problem of assessing regional economic change.

1.2 Regional Economic Change in an International Context

The comparison between advanced economies such as the United States and western European countries and nations currently classified as "rapidly industrializing" (e.g. Brazil, Korea, Taiwan, Singapore) is isomorphic with the American South/Northeast situation. The rapidly industrializing countries are experiencing a sectoral transformation from agriculture to manufacturing to such an extent that they have begun to capture increasing shares of the world's manufacturing market (OECD 1979). Increasingly, scholars have noted the declining status of the advanced economies in the world's market relative to the increasing status of many so-called less developed nations (Friedman 1982; Schott 1981; Tyler 1981). Overall, shares in total world exports between 1970 and 1980 increased from 17.9 to 28 percent in less developed countries (LDCS) and decreased from 71.3 to 63.1 percent in the developed countries (DCs) (United Nations 1982, p. 25). Between 1963 and 1976 the LDCS' share in world exports of manufactures to DCs more than doubled, increasing from 2.6 to 7.9 percent; the LDCs' share in world exports nearly doubled with respect to exports to other LDCs, increasing from 4.7 to 8.1 percent (OECD 1979). Although the DCs' shares far exceed those of the LDCs, the rapid rate of increase of LDC manufactured exports is striking. The small percentage of LDC shares may be large enough to have negatively affected exogenous aggregate demand for manufactured goods from DCs, thus

compounding recession conditions for manufacturing industries in the DCs. The relationship between this international situation and internal dynamics within such countries as the United States is reflected in corporate reactions to stressful conditions to disinvest and concomitantly, to decrease manufacturing employment either by closing plants, as seen in the Northeast, or by relocating, often to the South (Ettlinger and Malecki 1983).

The international comparisons echo the South/Northeast comparison because the question has been posed as to whether the relative ranks of the advanced economies and the rapidly industrializing countries are undergoing change. Again, however, two points in particular may be raised that cast doubt on this perspective. First, although the rapidly industrializing countries increasingly are capturing larger shares of the world's manufacturing market, high technology manufacturing and high technology corporate services (including computer services and products) remain under the aegis of corporations headquartered in the advanced economies (Katz 1982; Rose 1977)[5]. Second, although the numbers of nationalized industries have increased in many less developed countries over the past decade, many operations continue to be owned and controlled by multinational (or transnational, see Linge and Hamilton 1981) corporations whose headquarters are located in other countries, especially in the advanced economies (Frobel et al. 1980; Hymer 1972). Multinational corporations often are located in less developed countries in the most "modernized" areas where pockets of service economies have developed. The effect is a monopolization of these areas, leaving nationalized firms to locate in less lucrative zones (Cunningham 1981). In terms of corporate organization, many of these rapidly industrializing countries remain in a subsidiary position to the advanced

economies, suffering many of the problems associated with a branch plant syndrome (Watts 1981).

Corporate organization and the level of technological production play a dynamic role in defining regional economic change within a national as well as in an international context. These different scales of analysis are on the one hand, discrete; on the other hand, they are inextricably related because nations, comprising regional systems, interact within a world system. The sectoral transformation from agriculture to manufacturing that is occurring in many nations has created a more competitive world market, impinging, thus, on the productive systems within countries as exogenous aggregate demand decreases. In this regard, the northeastern and southern United States have been affected negatively and positively, respectively, as production reorganization strategies react both to world recession conditions and to increasing international competition, resulting in industrial strategies such as relocation and cutbacks in manufacturing employment (see Massey and Meegan 1982).

The dynamics of regional economic change that are empirically examined in this dissertation are set within the framework of the United States. Nevertheless, the concepts and methods that are forwarded here are general and intended to be applicable to a variety of scales of analysis. Given the striking similarity of circumstances between less developed regions within advanced economies and less developed nations within a world system, a generalized understanding of regional economic change is required. The goal of this research is to clarify the complex process of regional economic change. Actually, two types of change are pertinent: **absolute changes** that occur within regions, and **relative changes**, or the change in the overall

status of one region relative to another. Absolute and relative changes are popularly referred to as "**growth**" and "**development**", respectively. The critical point here is that these two types of change often are confused, and thus definitions are ambiguous. Conclusions about changes within the United States and in an international context reflect these dichotomous viewpoints and highlight the tendency to infer relative change on the basis of absolute indicators within regions, thus confusing growth, or absolute change, and development, or relative change. What is required, then, is an explicit redefinition of regional economic change that is linked to a methodology that can empirically identify types of change.

1.3 Outline of Research

The remainder of this dissertation is divided into five chapters. Chapter 2 elaborates on the problems associated with the study of regional economic change, and critically discusses the evolution of thought concerning this subject. The study of regional economic change is broken down into two competitive viewpoints — growth, characterized by a quantitative orientation, and development, characterized by a qualitative orientation. On the one hand, the growth orientation focuses on material resource development, measuring positive changes in terms of indicators such as net manufacturing output, manufacturing employment, and per capita income. On the other hand, the development orientation focuses on the development of human resources, and perceives positive change as a structural alteration of socio-economic circumstances, discussed in terms of system-wide parameters (Stohr and Todtling 1978, 1982). Chapter 2 concludes with a presentation of ideas that coordinates human and material resource

development, drawing upon a synthesis of the growth and development perspectives. Chapter 3 formally presents an alternative conceptualization of regional economic change. First, the terms 'growth' and 'development' are rejected and replaced by a more explicit classification of types of change to better reflect the differences between relative and absolute changes. Secondly, a regional index is developed, enabling types of change to be identified empirically.

Whereas chapters 2 and 3 essentially develop an alternative paradigm, chapters 4 and 5 give empirical content to the proposed concepts and methods, using the United States as a case study. In chapter 4, data sources are discussed with regard to the empirical application of a proposed regional index (specified in chapter 3), and the index is operationalized for the United States in 1962 and 1980 for the four Census Regions and the nine Census Divisions in the United States. Chapter 5 discusses the basis of regional differentiation. The data employed in the regional index are disaggregated using a discriminant analysis in order to ascertain the variables that best separate or discriminate regions. Chapter 6 recapitulates the fundamental ideas expressed in this dissertation and discusses future avenues of investigation.

Notes to Chapter 1

1. Fuchs also cites increasing output capabilities of manufacturing industries as a cause for the rise of the service sector because this increasing productive capacity means that less labor is required, and therefore, more labor will be available for tertiary or service employment. This author's viewpoint is that the relationship between an increasing output capability of manufacturing and the rise of service employment is probably one of correlation rather than causation.

2. Jusenius and Ledebur (1977) note that the population increases in the Sunbelt throughout much of the 1970s were more a function of natural increase than North-South migration. A glib interpretation of increasing population numbers in the Sunbelt is that manufacturing labor has migrated from the North to the South in response to decentralization of manufacturing production. Although North-South labor movements have occurred, migration has prevailed mostly in the last few years in response to crisis conditions precipitated by the recession of the early 1980s. In the midst of economic evaluations, it becomes easy to forget relevant lessons from history — in this case, with regard to the demographic and social conditions surrounding the industrial revolution in western Europe. In effect, the onset of industrialization and manufacturing production in western Europe positively affected population increase, and concomitantly, family structure (Wrigley 1969). Indeed, Burns and van Ness (1981) have commented that the development of manufacturing production in the Sunbelt has positively affected population increase and that the decline of manufacturing in the Northeast has negatively affected population numbers. Burns and van Ness are careful to point out that demographic and economic variables are not, however, uniformly correlated because although the Northeast has witnessed declines in population numbers, it simultaneously has experienced increases in per capita income. Income in the Sunbelt, on the other hand, has not increased, despite positive increases in manufacturing employment (Stamas 1981).

3. With respect to the body of literature surrounding industrial location, considerations of the relatively efficient infrastructure of our modern world have generated much criticism of analyses descended from Weber's (1929) classical model of industrial location that viewed the location of plants as constrained by transportation costs (see Czamanski 1981; Hekman 1980a; Norcliffe 1975; Tornqvist 1978). Furthermore, these considerations and their implications for changing corporate organization have prompted many to criticize conventional neoclassical perceptions of the firm that revolve around optimization strategies for profit maximization. Indeed, given the multi-locational character of the modern industrial enterprise, allocation and satisficer strategies combined with competitive product and process innovation strategies more accurately characterize corporate organization in the post World War II economy (Bailey and Friedlaender 1982; Hakanson

1979; Marris and Mueller 1980; Nelson and Winter 1982; Williamson 1981).

4. Indeed, even though many new businesses currently are locating in non-metropolitan areas due to the high costs associated with metropolitan environments, core areas will continue to grow because they remain the primary locations of headquarters (Business Week 1980).

5. Cunningham (1983) agrees that the production of high technology in developed countries far outweighs the production of high technology in rapidly industrializing countries. She is, however, careful to point out the positive changes that have occurred (with particular emphasis on Brazil) in the less developed world within the realm of "minor inventive activity".

Chapter 2

A Critical Synthesis of Perspectives on Regional Economic Change

Regional economic change, expressed in the previous chapter as the absolute and relative changes among regions, is conventionally addressed either as "regional growth" or "regional development". Each of these terms denotes positive economic change in regions, but each is associated with distinct connotations. "Growth" tends to be equated with increases in quantitative indicators such as employment or population numbers, income, manufacturing output, and so forth. Growth is tangible— the evidence can be seen in numbers. "Development", on the other hand, is far less tangible; it is often difficult to identify, and even more difficult to measure. Positive changes in educational systems and standards of living, and greater upward social and occupational mobility are some of the more frequently cited indications of "development". Despite their different connotations, growth and development were not distinguished until the 1970s, yet the terms continue to be used interchangeably, as they were in the past.

The ideas entrenched in the early literature on regional growth and development have had a profound influence on current thinking. Although these ideas represent the origins of contemporary regional science, they have nevertheless been largely forgotton. Certainly, reviews of this early literature exist (e.g. Arndt 1981; Brookfield 1975; Higgins 1959; Streeten

1979a; Sunkel 1977), but the connection rarely is made between early ideas and current analytical trends. Although much of the early literature on growth and development was written in association with Third World problems, the Third World and western literatures currently exist as relatively discrete entities. Increasingly, analogies are suggested between less developed countries and less developed regions within advanced economies, but often, the insights developed in the Third World literature are ignored, especially by growth-oriented researchers.

This chapter is divided into three major sections. The first section, divided into seven subsections, presents an overview of general trends in regional science/development that emerged after World War II and characterized this new field of study until the 1970s. The first subsection discusses the conditions surrounding the emergence of regional science as a field of study after World War II. At this time, world events stimulated concern about prospects for the impoverished, less developed nations. Fundamentally, ideas about change were based either on optimistic or pessimistic assumptions regarding the future of these countries. The following four subsections elaborate, first, on optimistic perspectives that prevailed among western scholars; second, on pessimistic perspectives emanating from the West. Subsequently, the generally pessimistic views of Third World scholars are discussed. The final subsection discusses similar sets of circumstances in less developed regions in advanced economies and less developed countries in a world system.

The second major section of this chapter, which presents a critique of trends in the 1970s and into the 1980's in regional science and regional development is divided into five subsections. The distinction between growth

and development is discussed, together with the confusion surrounding these concepts. Subsequently, the growth orientation is critiqued, followed by a critical review of the fundamental ideas that define the development orientation. To date, these two schools of thought have developed profound differences, which are subsequently discussed. The contention, here, is that the growth and development orientations represent different ramifications of a broad set of phenomena that constitute regional economic change, and that the different sets of observations associated with these two orientations should be integrated.

The final section of this chapter outlines an alternative means for assessing the ramifications of regional economic change, drawing from both the growth and development orientations. The general conceptualization of regional economic change that is outlined in this section is placed in an operational framework in Chapter 3.

2.1 The Evolution of Thought about Regional Growth and Development

Considering the time depth of many disciplines, the study of regional growth and development is virtually a novelty. Indeed, regional science, drawing principally from economics and geography, began as recently as the 1950s. It is to some extent the spatial component of regional science — that is, the examination of the status of one region relative to another — that distinguishes this new discipline from traditional studies of economic growth and development. This comparative element emerged following World War II, when many colonial territories around the world became politically independent states.

2.1.1 Conditions surrounding the emergence of regional science

At the end of World War II, the disparities between the newly independent states and the advanced economies of the world were readily apparent and were expressed in terms of a North-South dichotomy — the "North" representing developed countries, and the "South" representing less developed countries (Helleiner 1981). Many international organizations were formed that were designed to assure all nations an equal opportunity in the world system, particularly in the world market. In effect, a new consciousness developed among the world's leading economic nations: a recognition of the "Third World", and an understanding that these less fortunate, less developed countries required aid in establishing themselves as independent units in a world political economy. This new consciousness of the advanced economies was not, however, wholly altruistic. To a large extent, it represented a reflex to the demands of the less developed countries, which had begun to abandon a passive role in international relations. The willingness to recognize Third World nations as newly independent states within the world system was spurred by the advanced economies' vital economic interests in these countries. Indeed, the unprecedented number of multinational corporations that developed in the aftermath of World War II attests to these interests (Hamilton 1981; Linge and Hamilton 1981). The spatial extensions of corporate divisions of labor to the less developed world via multinational corporations has led many scholars to conclude that multinational corporate activity has assumed the form of "neo-colonialism", in which the advanced economies reap the benefits of human and natural resources in the less developed world at the expense of the host countries (Dos Santos 1970; Kularatnam 1972; Radice 1975).

In general, asymmetrical relationships between newly developed Third

World nations and advanced economies prevailed after World War II. Brookfield (1975, pp.24-25) cites an example of uneven institutional arrangements between western Europe and its former African colonies known as the "Eur-Africa" movement of the late 1940s and early 1950s, which "lingered through the French **loi cadre** of 1956 into the Yaounde Agreement between France and its former colonies, and so into the present arrangements of many dependent economies with the EEC" (Brookfield 1975, p.25). The Eur-Africa movement and subsequent arrangements were seen by Europeans as a means to obtain supplies, sell exports, and rebuild foreign trade after the second world war; the African colonies would supply primary (agricultural) products and would buy the products of rebuilt European industries. This institutional setting echoes Ricardian theory of comparative advantage (Ricardo 1962), whereby efficiency in the world market is attained through national specialization in production. However, such western arrangements have received much criticism, particularly from Third World economists (e.g. Amin 1974) and from western social scientists who sympathize with Third World circumstances (e.g. Kaldor 1981). These critics have pointed out that the fundamental problem with the repercussions of western-induced specialization is that the less developed world becomes locked into the production of low cost, low skilled commodities. Furthermore, these countries become technologically dependent upon the advanced economies (Muller 1973).

With the evolving footlooseness of many manufacturing industries in advanced economies, the low skilled, low wage end of manufacturing divisions of labor in the advanced economies has spread to less developed nations (Aydalot 1981). Simply stated, less developed countries, once specializing in

types of commodities (especially agricultural products), now specialize in types of labor — predominantly low skilled, whether in manufacturing or in agricultural industries (Streeten 1973). The net effect of commodity and labor specialization for these less developed countries is similar: these countries are economically, and implicitly politically, dependent upon advanced economies because they must import high technology goods, services, and intermediate inputs that are required to establish and maintain non-agricultural industries.

The problem of technological dependence is acute, because in addition to being locked into reliance on other nations, less developed countries often import technology that is not adapted to their environments (Goulet 1978; Thomas 1976). Multinational corporations that locate in less developed countries often employ low skilled, low wage labor in tasks that tend to utilize capital intensive technology that was originally developed for use in advanced economies. The transfer of technology directly from advanced economies to less developed countries without alteration is insensitive to the problems of labor markets in less developed countries. Furthermore, technology is often transferred to large scale industries that generally are controlled by multinationals and often are spatially concentrated, thus providing little stimulus or aid to indigenous small businesses that may be less capital intensive. Indeed, multinational corporations locate in less developed countries that provide resources and export markets; rarely are multinational corporations motivated by the development needs of the host countries. Finally, although new products and processes are diffused through local markets of host countries, the know-how associated with such products and processes often remains with the multinational corporations (Rush 1981).

After World War II and in the context of uneven institutional arrangements, Third World countries increasingly voiced dissatisfaction with world market circumstances. The tariff profile that placed lower tariffs on agricultural products and higher tariffs on manufactured products, irrespective of the country, was seen as an impediment to the establishment of nationalized processing industries in the less developed world. Moreover, reliance on agricultural products was seen as precarious due to fluctuating world market prices and the inability of less developed countries to alter the composition of their exports (Griffin 1969). Thus, world attention increasingly focused on international market arrangements. By the end of the 1960s, the "First United Nations Development Decade", positive changes occurred and growth indicators such as per capita income and GNP increased in less developed countries. Nevertheless, income inequality, unemployment, and severe poverty persisted. Despite some positive increases in growth indicators, overall wealth, GNP, per capita income and so forth remained substantially below levels attained by the advanced economies. Brookfield (1975, p.50) has noted that:

> At constant 1960 prices, the total GNP of all Latin America is not much above one-half that of the United States in the 1920s; currently the aggregate product of the economy of the State of California alone exceeds that of the whole Latin American region. There is no question of 'catching up' at present rates of progress; even to raise productivity and income levels in the rest of the region to the more modest relative 'affluence' of Argentina involves 'growth' on a scale enormously larger than anything achieved to this time.

Evaluating the situation at 1970 prices, Sauvant (1980, p.16) notes that per capita income rose in the developed market economies from $2000 to $3000 from 1960 to 1975 and rose in the less developed countries from $169 to $260. Sauvant comments that:

> ... it appeared that the international and regional development efforts, or, more generally, the mechanisms of the international economic system, had failed to contain, let alone eliminate, absolute poverty. This was all the more disappointing since the DMEs (Developed Market Economies) had experienced unparalleled growth during the 1960s.

Conspicuously absent from general theories of economic growth and development was a conceptual framework for understanding how the less developed nations could change positively, **relative** to the status of the advanced economies. Indeed, by the end of World War II, conventional macroeconomic theories of economic growth and development emanated principally from the advanced economies of the western world and assumed many antecedent conditions that were absent in the less developed world. Keynesian theory (Keynes 1936), for example, holds that endogenous investment is a catalyst to economic growth; according to Schumpeterian theory (Schumpeter 1934), innovations and increasing organizational capacity (notably in firms) are the keys to economic growth. However, as the less developed countries attained their political independence, few nationalized firms existed and endogenous investment potential was extremely low. Technological dependence on advanced economies meant that little financial capital was available for local investment because this capital was needed to import advanced technology for industry as well as luxury manufactured goods for the elite (Wilber and Weaver 1975). Poor education also contributed to this situation because the technological and managerial knowledge required to indigenously develop technology and industry was also absent.

The 1950s and 1960s thus witnessed the emergence of a variety of viewpoints concerned with how to set macroeconomic processes of growth and development in motion in areas where conditions differed from those in advanced economies. With some exceptions, western social scientists

generally were optimistic about the future of the less developed world. It was recognized that Third World nations faced distressing circumstances, that were, however, surmountable. In sum, many of the early theories of growth and development were based on an optimistic assumption about the future prospects of less developed countries.

2.1.2 Western optimism: stage theories of growth and development

The trajectory of Third World countries often was seen as analogous to the progress that had been achieved in the developed countries. According to this conceptualization, the less developed countries were at a lower developmental stage than the advanced economies, but processes would inevitably imitate those in the developed world, allowing Third World nations to "catch up". This presumes a process of unilineal evolution and expresses a theory of development for Third World countries by way of analogy to the advanced economies. In this regard, the setting in motion of growth and development is not a problem because growth and development are inevitable.

In 1960, W.W. Rostow (1967) wrote a book that popularized this stage theory of development. This book was an effort to come to grips with the mechanisms that induce successive stages of economic growth, based on the experience of advanced western countries. At the same time, Rostow's book represents an effort to present an empirically based alternative to the Marxist trajectory of societal evolution, whereby capitalism would evolve into socialism, and ultimately into communism. Unlike Marx's (1888) scheme, Rostow's stages of growth culminate in a successful and efficient capitalist economy, characterized by high mass consumption. Emphasizing aggregate growth measures, Rostow viewed the "take-off" stage that was to lead to

sustained growth as contingent upon a doubling of investment levels (from 5% to 10% or more of the national income). Concomitantly, new industries would emerge, new resources would be exploited, income that is transformed into further investment would increase among the elite, and an entrepreneurial class would emerge. According to Rostow, these successive processes characterized the history of western nations, and would surely occur similarly in the less developed nations that were only beginning their evolutionary path in the modern world.

The dual concepts of unilineal evolution and development based on analogy with western civilization became popular and were expressed demographically as well as in the economic context that was popularized by Rostow. In demographic terms, the Third World was distinguished from the advanced economies by high fertility rates. Given that low fertility rates and "economic development" generally are positively correlated, low fertility became desirable because it signifies small population growth relative to a fixed amount of agricultural land supporting a population. The corollary of this argument is that high fertility causes high population growth which would exceed the carrying capacity of the land. The expression of these relationships stems from the classical writings of Malthus in 1798 (Malthus 1970) and Ricardo in 1817 (Ricardo 1962). Both Malthus and Ricardo assumed that high fertility would persist as standards of living increase. However, the demographic history of developed nations reveals opposite processes: namely, a significant decline in fertility following the industrialization of these countries. Thus, retaining the idea that high fertility causes food shortages, but rejecting the pessimistic view that high fertility is a persistent phenomenon, scholars optimistically perceived Third World nations as

representing a lower stage of (pre-industrial) development, correlated with high fertility rates (Stolnitz 1957; United Nations 1953). Accordingly, it was assumed that as these nations industrialized, fertility rates would eventually decline, as they did in western nations. Thus it was argued that until full industrialization occurred, policy should be directed towards curtailing population increases through family planning (Lord Ritchie-Calder 1974).

However, the process of the Third World "catching up" with the western world was occurring slowly. The central problem with the optimistic stage theories of growth is that the question is never raised as to whether processes among western nations and former colonial territories are analogous. For example, the industrialization of the less developed world has been governed by multinational rather than national corporations, and indigenous populations played a minor role in industrialization process. Rostow viewed economic history as a sequence of aggregate growth measures without considering qualitative historical distinctions among regions of the world[1]. He did not consider, for example, how national investment levels would double in the context of a non-nationalized industrial movement.

In a similar vein, the demographic stage model predicts low fertility rates in association with economic development and industrialization, but ignores the disproportionate external inputs into the industrial process. Furthermore, the demographic model assumes, in accordance with traditional Malthusian theory, that high fertility is causally linked to food shortages. However, several considerations that have been ignored by the Malthusian viewpoint cast doubt on this presumed relationship between food shortages and high fertility rates. First, food shortages occur primarily among the poor; the wealthy, by contrast, often over-consume, thus attesting to the

uneven nature of distribution systems and weakening the argument that there exists an insufficient supply of agricultural products relative to population numbers (Harvey 1974; Suyin 1974). This argument in regard to uneven distributive processes is strengthened by the fact that significant percentages of agricultural output are exported from producing regions and sold either on the world market or in another region within a less developed nation where prices are relatively high (Fitt et al. 1980, p. 29; Lo and Salih 1981, p. 147). Second, although agricultural land may be fixed or even diminishing as urbanization processes are set in motion, the supply of agricultural products is not necessarily fixed, given technological change and the possibility of agricultural intensification to ensure greater yields[2]. Third, it is questionable as to whether large families are inappropriate in societies characterized by extreme poverty, since large numbers of children are often economic necessities among families confronted by conditions of underemployment (White 1975). In general, the Malthusian argument does not account for factors such as class polarization and unequal access to resources. Indeed, the financial capital gained from purchases of agricultural products accrue to firms controlled by the elite in urbanized regions or to multinational corporations, meaning that few benefits of production are filtered down to the large rural populations.

2.1.3 More western optimism: filter-down, growth pole theory, and modifications

The geographical problem of "filter-down" was initially ignored, but later addressed through a modification of growth pole theory, developed initially by Perroux (1950). Perroux approached economic growth and development directly in terms of industrial processes. Emphasizing the Schumpeterian principle of entrepreneurialism and inter-industry interaction[3],

Perroux stated that economic progress is contingent upon the development of a spatially concentrated cluster of interacting industries. Despite this spatial concentration of industrial "poles of growth", the economic space of an industrial complex was seen by Perroux as extending, in the abstract, beyond national boundaries. Hirschman (1958) developed this idea of inter-industry interaction within an international context, placing emphasis on the development of export industries in less developed nations. Hirschman also elaborated upon Perroux's discussion of industrial interaction by labelling these relations "linkages". He specifically termed the sale of output from one firm to another a "forward" linkage. From the point of view of the buyer firm using another firm's output as input, the relationship is a "backward" linkage. The works of Hirschman and Perroux stand as seminal contributions that have greatly influenced later concepts and methods in regional science. In particular, Perroux's concept of industrial clusters and Hirschman's enhancement of that idea with the concept of linkages are precursors of current research trends that focus on the relationships among corporate organization, regional growth and development, and industrial location in a world system[4]. Contemporary "export base theory" is actually a mathematical version of Hirschman's early discussion about export activity as a strategy of economic development (see Isserman 1980; Lewis 1976; Richardson 1978).

Just as the optimistic stage theories fell short of empirical realities, so too did growth pole theory and Hirschman's early version of export base theory. Hirschman's ideas about export industries were really more of an optimistic prediction about future possibilities based on current activities than a strategy posed for immediate implementation. Indeed, in the wake of

World War II most of the industries in less developed countries were owned and controlled by multinational corporations that imported into these countries the inputs to production and exported the output. Little or no inter-industry interaction transpired among local, indigenous firms. Industry was not being "filtered-down" from the advanced economies to the less developed countries, nor were the benefits of multinational industrialization in these countries being spread to the bulk of the indigenous populations (Hinderink and Sterkenburg 1978; Lefeber 1981; Lo and Salih 1981; Myrdal 1966; Santos 1979). The asymmetrical relationship between less developed nations and advanced economies also prevailed in the form of intra-national regional disparities within less developed nations. When colonial regimes physically departed from their territories with the advent of political independence, they left behind them a local elite that has since managed to funnel wealth and resources into spatially concentrated areas, principally surrounding the capital cities where exports to the advanced economies are managed (Baran 1952; Santos 1979).

"Filter-down" became a concern in the latter half of the 1960s. From the point of view of the history of the social sciences, this period and the associated concerns are significant because it was at this time that several discrete bodies of literature began to intersect. Specifically, from the point of view of geography, it was at this time that geographical expertise became inextricably linked to development studies as the spatial component in regional development received increasing attention. In 1966 Boudeville (1966) wrote a book that transformed Perroux's growth pole theory into an explicitly spatial concept, meshing concerns of innovation diffusion, urban hierarchies, and economic growth and development. This spatially oriented growth pole

theory, sometimes called "growth center theory", now focused on the diffusion of innovations, industrialization, and overall modernization throughout an urban hierarchy within a region. Economic growth and development were now visualized through strategies and policies of spatial reordering of settlements within a region. Christaller's (1966) top-down model of settlement distributions (developed in 1933) was perceived as the paragon of economically efficient regional urban hierarchies (Boudeville 1974, pp.62-63)[5]. In order to achieve such a system, modernization and industrialization would have to be established in a major urban center or growth pole — the prediction being that modern innovations and industry would inevitably spread proportionately to the various smaller settlements within the hinterland of the largest central place. Hermansen (1972), drawing from Hagerstrand's (1967) work on innovation diffusion, suggested that the spread of the modern economy would occur in a hierarchical fashion, diffusing first to the largest centers and subsequently to smaller settlements. Other approaches recognized the typically primate city size distributions of less developed countries and focused on the infusion of a modern, industrial economy in all settlements of all sizes simultaneously (Johnson 1970).

The literature on growth pole (or center) theory became voluminous. Darwent (1969), in particular, provides an excellent critical review of this body of thought (see also Kuklinski 1981). The modification of Perroux's ideas into a spatial concept is significant as one of the first policy-oriented theories of development. In practice, however, the results fell short of the optimistic predictions. One of the shortcomings of growth pole theory is the neglect of behavioral processes. More specifically, elite individuals and

organizations (which tend to be spatially concentrated) share few of the benefits they reap with economically lagging areas. In concrete terms, this uneven situation is manifest in the spatial concentration of electricity, health facilities, and transportation and communication systems in the central urban areas in contrast to the relative absence of these amenities in the hinterlands. The anticipated benefits of using the top-down approach that bridges central place theory and innovation diffusion studies have not materialized. Approaches that sought to develop the entire urban hierarchy (i.e. all settlements of all sizes simultaneously) also have been problematic because industrialization occurred through multinational corporations at the expense of the rural, agricultural sector (Lo and Salih 1981). Generally, investments by multinationals in less developed countries either focused on low wage, low skilled manufacturing in the large urban areas or they developed agricultural production in which commodities were exported out of the source region. Markets for both manufactured and agricultural products were poorly established in hinterland areas as a consequence of 1) export production and 2) marginal incomes that were insufficient to develop effective consumer demand. Essentially, growth pole theory did not account for the dynamics of regional disparities, and policies of spatial reordering of activities were frustrated by complex social and behavioral processes.

Many of the above-stated regional disparities that frustrated growth pole policies were recognized explicitly by Friedmann and Alonso (1964). Drawing upon the concept of a dominance/dependence relationship between core or central areas and peripheral or lagging areas (Prebisch 1962), Friedmann and Alonso found that central urban areas acted as suction pumps for the dynamic, growth propelling elements of a regional system, leaving

hinterland areas dry of innovative potential and economic well-being. The concept of polarization effects had been developed earlier by Friedmann (1966) in a stage model of growth that in certain respects echoes Rostow's optimism. Friedmann's reckoning of processes included a pre-industrial stage, a period of incipient industrialization, a transitional stage, and a stage characterized by a well integrated and developed urban hierarchy. Unlike other stage theorists, Friedmann's stages revolved around a gradual erosion of polarization effects, reflected by the distribution of city sizes in a regional hierarchy. Also in contrast to the conclusions of scholars such as Rostow, the optimistic outcome envisioned by Friedmann is contingent upon conscientious policy formulation that strategically develops urban centers of various sizes to achieve a central place hierarchy. Friedmann's optimism was not, however, complete because he acknowledged the disruptive effects of socio-political structures that tend to work primarily for the benefits of the elite. Still, the recognition of such disruptive, disequilibriating effects are not the central focus of Friedmann's generally optimistic model. Indeed, those who emphasize these negative effects tended to be pessimistic about the future of less developed countries.

2.1.4 Western pessimism: the contribution of Gunnar Myrdal

Gunnar Myrdal (1957) focused on the uneven and disparate circumstances of the center and periphery, noting the possibility of "spread" effects from the center to the periphery, but also considering the strong "backwash" effects of unidirectional rural to urban migration, capital movements, trade, and social relations. In this regard, Myrdal's focus on uneven growth and disequilibrium stands as a significant counterpoint to the traditional emphasis of economic theory on the existence or eventuality of

stable equilibrium. Hirschman (1958) also considered disequilibriating tendencies, although, in contrast to Myrdal, Hirschman's outlook on the prospects of less developed countries was optimistic. Unlike most of his contemporaries, Myrdal also considered the different processes that had occurred in less developed and advanced countries, suggesting that spread (positive) and backwash (negative) effects exist in both contexts, but that in less developed countries, backwash effects outweigh spread effects. These different processes indicate that a theory of development by way of analogy to advanced economies is inappropriate. Furthermore, the simple diffusion of material traits of modernization such as roads, electricity, and so forth, do not necessarily indicate or reflect economic development, because disequilibrating tendencies and uneven growth negatively affect the potential for the spread of privileges enjoyed by elite groups in spatially concentrated zones. This pessimistic opinion in regard to inherent disadvantages of Third World countries was expressed by Myrdal as a process of "circular and cumulative causation" that creates political and economic dependency of Third World countries with respect to developed nations. Myrdal found that less developed regions of the world were drained of potential for capital accumulation and investment because products and financial capital flowed out of the regions in order to import technology and manufactured luxury goods that could not be produced endogenously due to a relative absence of managerial and technical knowledge and market volume. Interregional disparities have persisted in these nations because export channels typically occur in association with primate, capital cities (that were originally established as export centers in colonial times to furnish supplies to growing urban proletariats in the mother countries).

2.1.5 Western pessimism: the idea of inherent cultural backwardness

Myrdal's pessimism represented a minority opinion among social scientists from the western world. Still, other pessimistic views were forwarded, but these views expressed fundamentally different sentiments than those forwarded by Mrydal. Another breed of western pessimism grew out of particular branches of anthropology. McClelland's (1967) psychological anthropology held that the need to achieve change or progress is inherently lower among peoples in less developed countries, and that these cultures are backward by nature. Foster (1965, 1967), using an approach centered on general ideology, suggested that the economic system among cultures in less developed regions pivoted around an image of limited goods, thus rendering the possibilities of increased prosperity, capital accumulation, and investments far-sighted goals. Pyschological and ideological explanations of the plight of peasant societies and less developed nations in general were compatible with the concept of dualism developed by economists in the opening decades of the twentieth century (see Boeke 1953; Chayanov 1966). Dualism meant that two sectors of society exist — one, an industrial, urban component; the other, an agricultural, rural component. According to the dualism concept, the ideology, the culture, the economics, the politics, and the social mores of these two sectors dramatically differ and serve to characterize and explain the progressiveness of the industrial sector and the backwardness of the agricultural sector (see de Silva 1982 for a critique of the dualism concept). The anthropologist Redfield (1960) characterized this dichotomous situation as a folk-urban continuum, represented on the one hand by the "little community" (the rural sector), and on the other hand, by the "big community" (the urban sector).

The idea of inherent "backwardness" of less developed regions had

some influence on conservative western economists, notably Dalton (see Dalton 1974a). Both Foster and Dalton reacted fervently to Marxist trends in economics as well as in anthropology (see Wolf 1966) that emerged both in the Third World and western literatures. Foster, the anthropologist, and Dalton, the economist, rebuked Marxist claims that less developed nations were being exploited by multinational corporations and capitalist institutions in general. Foster and Dalton argued similarly in regard to exploitation of rural peasants by elite organizations in capital cities and regional economic systems of less developed nations: peasants were not being exploited — they simply represented superfluous labor. Later, in a rebuttal to Gunder Frank's (1970) statements about dominance and dependence relationships in the world system, Dalton (1974b, p. 197) wrote that "... traditional attributes of culture and social organization... will count more than capitalist or socialist institutions in determining the success or failure of Third World nations to industrialize and develop". This western attitude is significant because the idea that socio-cultural institutions are barriers to growth and development often becomes the explanation for failures of policy. Many Westerners believe, for example, that the failure of programs to curb fertility rates and thus reduce poverty are rooted in Third World familial and social institutions.

Western pessimism about the future of less developed nations either took the form of cultural ethnocentrism, whereby these nations were viewed as inherently inferior to western countries (Dalton 1974a, 1974b; Foster 1967; McClelland 1967), or it revolved around an appreciation of the different set of historical conditions surrounding Third World and developed nations (Myrdal 1957). In the 1950s and 1960s this latter type of pessimism as expressed by

Myrdal (1957) and to some extent by Friedmann (1966), represented a minority opinion among scholars in capitalist countries. In the Third world, Marxist explanations for differences between countries of the world predominated, and were decidedly pessimistic.

2.1.6 The Third World perspective

Most Marxists focused on core-periphery dominance and dependence relationships, and they were generally pessimistic about the prospects for the Third World, given the dynamics of zthe capitalist system. Whereas Myrdal (1957, p.82) saw investment as a catalyst to economic development, the Third World Marxist economists looked to revolution and the demise of capitalism as the sure way to overcome the problems confronting their nations (Gunder Frank 1969). Rather than defining problems in terms of aggregate growth measures (as scholars such as Rostow characteristically proceeded to do), Marxist economists emphasized the qualitatively different historical processes that had occurred among western nations and former colonial territories, and they perceived Third World industrialization in terms of political and economic dependency on western nations. This perspective saw Third World nations as undergoing a process of "underdevelopment" rather than "development" (Gunder Frank 1967). The transformation of the Third World from a bastion of colonial territories to a set of independent political states was seen as little more than a technical detail as colonialism evolved into neo-colonialism under the aegis of multinational corporations. The dependence of underdeveloped nations on the advanced economies for technology, manufactured goods, and technical and managerial knowledge was seen as a persistent problem because the profit-seeking multinational organizations exploited human and natural resources overseas, with few if any

efforts to share the benefits of production.

The Latin American contingent of Marxist economists became particularly prominent, developing in the 1960s and 1970s what has become known as the "dependency" or "**dependencia**" school of thought. Dependency theory originated during the late 1940s and the 1950s, particularly in association with the United Nations Economic Commission for Latin America (ECLA). In 1949 the terms "core" and "periphery", which are conceptually central to the dependency perspective, were introduced into the literature by Prebisch (1962) in a report for ECLA. The principal tenet of the dependency perspective — that underdeveloped countries must be understood in a historical context relative to the dynamics of an international system — subsequently emerged in the 1960s. Initially, eminent dependency theorists, such as Furtado (1954), focused on world market circumstances and national industrialization in conjunction with ECLA. Later, as the barriers to national industrialization became clear, and as world market regulations began to be viewed as one small element among a much larger set of problems, ECLA's efforts were perceived as insignificant by Marxist scholars (see Furtado 1964). Although many dependency theorists focused on the external relations of underdeveloped countries with the advanced economies (e.g. Gunder Frank 1967), others, notably Amin (1974), emphasized the relationship between internal interregional disparities and external dependency. Despite the capitalist baseline of Myrdal's work, it is on this point — the interaction of internal disequilibrium (spread and backwash) and external relations (expressed as a process of circular and cumulative causation) that Myrdal and many dependency theorists share common ground. Although several concepts developed by Marxists and scholars in capitalist countries are quite similar,

these two schools of thought developed independently and remain relatively discrete. Irrespective of the similar problems associated with underdeveloped nations and underdeveloped regions within advanced economies, political ideology formed a barrier to a cross-fertilization of ideas.

2.1.7 Similar circumstances and different perspectives in less developed countries and advanced economies

Clearly, the historical processes surrounding developed countries differ significantly from processes of underdevelopment in Third World nations, but the set of circumstances associated with less developed regions within advanced economies are similar. In their initial efforts, Boudeville (1966) and Friedmann and Alonso (1964), in particular, developed the growth pole model as a spatial theory in recognition of regional disparities within western nations. In the United States, for example, many agricultural regions, such as the Great Plains, are viewed as prepared poorly for industrial development because they have inferior infrastructures, they lack high skilled technological and managerial knowledge, and they necessarily depend on other regions for industrial goods and physical capital (Hansen 1981a). As in underdeveloped nations, rural hinterland areas within advanced economies reap few of the benefits that commonly occur in metropolitan areas. Furthermore, the process of circular and cumulative causation is reflected in these hinterland areas in import/export figures. Klimasewski's (1978) analysis of Appalachia indicates that the establishment of branch manufacturing plants has had a negligible effect on overall change regarding the indigenous population. Inputs to production are imported into Appalachia either because these commodities are absent or because it is more lucrative for the corporations to secure the inputs from their other plants in other regions. The output is then exported. Final products reach their markets outside Appalachia, and

inter-industry interaction among endogenous, independent manufacturing firms remains absent. The net result is a continuing dependency on other regions through the dynamics of a corporate organization that is controlled from outside the Appalachian region.

The disparities existing in countries such as the United States between rural and metropolitan areas received attention, especially in the 1960s, in the form of growth pole (or center) policies. And just as the allegedly inevitable spread effects failed to materialize in underdeveloped nations, they also have failed in advanced economies. Much of the regional policy that has existed in the United States has revolved around the spatial aspect of growth pole theory (e.g. Ryan 1970) — a framework that empirically unsubstantiated (Morrill 1974)[6]. Policies that have been designed to draw hinterland areas into a more integrated system principally have emphasized infrastructural programs in the United States (Choguill 1977) that in practice have benefitted primarily the branch plants of large corporations.

It is this tendency to develop material rather than human resources that frustrates "development". The Marxists aptly explained this predicament and increasing numbers of social scientists from capitalist countries have begun to forward similar arguments. Yet these insights have had a negligible effect on much of the mathematical work that describes but does not explain empirical realities. Indeed, much of current regional science provides techniques for measuring growth based on quantitative indicators, but it does not account for antecedent social structural conditions of a region that necessarily affect investment potential and capital accumulation.

The focus on quantitative indicators has led researchers to notice increases in such factors as manufacturing output among many "rapidly

industrializing nations", but the persistence of strong socio-economic disparities and a polarization of the agricultural and industrial sectors are ignored. The disenchantment of Third World scholars with development efforts following World War II has failed to arouse concern. The increases during the early 1960s in quantitative indicators in the less developed world, when juxtaposed against the large gap between these countries and the advanced economies, stimulated research that constitutes the beginnings of regional science. From Marxists working for ECLA to conservative capitalist economic historians such as Rostow, scholars sought to explain interregional disparities and tried to identify the mechanisms that could alter the poverty and underemployment of human resources that characterized Third World nations. It is possible, today, to review the historical antecedents of current trends and identify the successes and failures of concepts and methods that emerged in reaction to empirical problems. Particularly in light of history, it should be possible to discern the important differences between absolute and relative changes. For example, an increase in manufacturing output may signify little or no positive change for the indigenous population of a region relative to general circumstances in other regions. If output is exported, if the means of production are externally controlled, if profits flow out of a region, and if inter-industry interaction is stifled by the importation of inputs to production, then an absolute change may be measured by numbers of output, but the socio-economic structure of the region may not change positively relative to the region that has both the human and material resources necessary to own and control production across large distances.

In fact, the distinction between **growth** (based on quantitative indicators) and **development** (based on evidence for structural, qualitative

change) is often ignored. If growth and development are perceived as synonymous, then how can we distinguish these two importantly different types of change — absolute and relative change? Following World War II, when regional science became a focus of study, the terms "growth" and "development" generally were used interchangeably. The distinctions amongst bodies of literature were manifest primarily in political ideology, notably in terms of capitalist versus Marxist perspectives. However, the literature is not nearly as explicitly political as it was in the past. Of course, the Marxists remain oriented to the eventuality of a non-capitalist system. Nevertheless, increasing numbers of western capitalist scholars employ concepts derived from the early Marxist-oriented Third World literature — concepts such as dominance and dependence and the ramifications of corporate organization within a world system. This adoption of Marxist concepts is not surprising, given the recognition of similarities between less developed regions in advanced economies and less developed nations within the world system (Brown and O'Leary 1979; Cohen 1977; Cooke 1982). In effect, capitalist thought has evolved into fundamentally different camps that mirror early Marxist/capitalist distinctions, minus the debate over the future of the capitalist system. Perhaps the most important distinction, now, between fundamentally different perspectives, is the style of language and presentation of ideas[7]. The following section critically reviews this distinction.

2.2 A Critique of Current Trends in Regional Science: Growth and Development

Towards the end of the 1970s a number of articles emerged that sought first to define the relatively ambiguous terms, growth and

development and second, to identify a clear distinction between the two (Arndt 1981; Flammang 1979). Whereas development connotes qualitative, structural change in system-wide parameters, growth connotes quantitatively assessable changes in particular variables in terms of absolute increases in such factors as infrastructural improvements, increases in employment or population numbers, increases in industrial output, per capita income, and so forth. In effect, these distinctions between growth and development parallel the distinction between absolute and relative changes. Despite these clear conceptual differences between growth and absolute changes on the one hand, and development and relative changes on the other hand, growth and development continue to be used interchangeably in practice and often are perceived as synonymous. The reason for this confusion stems from assumptions underlying mainstream economic thought in regional science that often escape scrutiny. Although the concepts of growth and development are derived from different sets of ideas, growth models often fade into development notions, at least in part, because the predicted regional convergence and equilibrium that form the paradigm behind many growth models.

2.2.1 The confusion between growth and development: assumptions underlying the growth perspective

Fundamentally, regional growth models can be classified either as supply or demand driven (Vaughan 1977, pp. 27-46). Supply-side models explicitly embrace the neoclassical vision of equilibrium, focusing on interregional trade and factor movements (Borts and Stein 1964). According to this conceptualization, regional growth is contingent upon supplies of factors from other sectors or regions. Richardson (1978, p. 137) summarizes this logic: wages are a function of capital/labor ratios such that high wage

regions produce low returns to capital and low wage regions produce high returns to capital. Thus, labor will flow from low wage to high wage regions and capital flows in the reverse direction. This process continues until factor returns among regions are equal and regional per capita incomes converge.

Whereas the traditional supply-side neoclassical model assumes that regional demand curves are infinitely elastic, demand driven models assume that a region's supply curve is infinitely elastic. Demand models consider regional growth as a function of exogenous demand for a region's output (commonly defined in terms of agriculture or manufacturing), and derive from Keynesian economics and the general theory of export-led development that was earlier developed in the 1950s by scholars such as Hirschman (1958). In effect, regional growth is determined by exogenous aggregate demand that requires greater production output in a region, in turn, requiring greater labor inputs and effecting an increase in a region's income level. Demand, then, directly influences both employment and income.

Unlike supply-side models, the demand models (principally variations on export base theory), do not embrace the concept of equilibrium explicitly. However, based on the idea that growth can spread to other sectors of an economy, equilibrium is at least on possible conclusion. The demand driven, export-led development models also differ from the neoclassical factor price equalization models because they tend to examine multiplier effects within, rather than among, regions. Although export-led development models consider interregional processes by virtue of the exogenous demand upon which growth depends, the focus of analysis is upon the development of inter-industry interaction within a region. Despite the absence of an explicit

prediction of interregional equilibrium in these demand based models, the consideration of multiplier effects can be compatible with the idea of a less developed region "catching up" with more advanced regions. Indeed, this idea of "catching up" formed the basis of Hirschman's optimism about disparities in the world system. Although in theory either a pessimistic or an optimistic outcome can be predicted on the basis of demand driven analyses, results are, in practice, generally perceived in the context of development connotations. In effect, increases in export production and, concomitantly, increases in employment and regional income levels, commonly are perceived as reflecting development or overall structural change that would allow a region to change positively relative to other regions. Indeed, the concept of interregional interdependence, as opposed to dominance and dependence, underlies the demand driven approach (e.g. see Beyers 1974, 1978; Lever 1980).

Thus, the practical application of export-led development and the theoretical underpinnings of neoclassical factor price equalization models means that results of analyses based on growth indicators often are perceived as connoting development. It is argued here, however, that growth indicators do not necessarily signify qualitative, structural change in a region.

2.2.2. A critique of the growth orientation

Neither the neoclassical nor the neo-Keynesian approaches consider qualitative variables, such as skill levels of a region's population. In regard to demand driven models, absolute increases in employment, and concomitantly in income, cannot signify structural change in a region if the type of employment that is increasing is primarily low or unskilled. In ignoring skill levels and types of labor pools, the supply-side models also are

seriously flawed because the potential for mobility differs among different divisions in the labor force (Clark and Gertler 1983). There is little concern in factor price equalization models for the development of human resources, either intra- or interregionally.

Furthermore, the conventional approaches to growth neglect the qualitative distinction between locally produced and imported inputs to production. Nor do these approaches account for the deleterious effects of an economy oriented almost completely towards export production. Factor price equalization approaches entirely ignore import-export flows of commodities; export-led development approaches, in contrast, emphasize exportation as a positive feature of a regional economy. However, these demand driven approaches generally focus on multiplier effects between sectors of a regional economy, disregarding the potential negative effects on inter-industry interaction within a particular sector. Typically, export-oriented ("basic") manufacturing facilities are established as branch plants in a region and stimulate the growth of local service sector ("non-basic") activities to accommodate increasing service demands. Thus, employment in manufacturing multiplies employment in services. However, the type of occupations that are multiplied in the service sector are low skilled. In addition, often minimal inter-industry interaction is stimulated among local manufacturing firms because imports to production often are imported and output is exported rather than funnelled into other industries as inputs.

This absence of inter-industry interaction also is overlooked by the conventional perspective that views regional economic progress in terms of the development of broad industrial mix. According to this

conceptualization, low industry mix is taken to signify overspecialization, a negative feature of a regional economy (Berentsen 1978). Broad industry mix, on the other hand, is taken to signify the economic maturity of a regional system because endogenous organizations can export a variety of commodities and do not have to depend upon fluctuating market prices for a small range of commodities. This argument has been forwarded particularly in regard to many Third World nations that produce primarily agricultural commodities for export. Under these circumstances, a significant drop in sugar prices on the world market would have serious consequences for a non-diversified economy specializing in the production of sugar cane. The industry mix concept appropriately points to the precariousness of overspecialization, but it is incomplete because 1) it does not consider qualitative differences between exogenously controlled branch plant operations and local, independent firms, and 2) it attributes equal importance to a high incidence of branch plants of a particular industry as it does a high incidence of administrative or research functions. In other words, the industry mix concept is a checklist, presence/absence approach to types of industries within a region that does not account for differences in types of activities and associated skill levels in a region.

As an alternative to the concept of industry mix, an activity mix approach in accordance with a product cycle framework is suggested here. The idea of product cycles was originally developed by Schumpeter (1943) and has been recalled into the economic literature as a practical approach to the coordination of the broad range of activities associated with multinational corporations (Vernon 1966, 1974, 1979). This approach considers an ordering of activities ranging from high skilled research and administrative

tasks to low or unskilled manufacturing production. The underpinnings of this approach include a dynamic conceptualization of production, whereby a product passes through a continuous cycle of hierarchically ordered economic activities (Nelson and Norman 1977). Stage 1 represents high skilled and high wage activities that are responsible for developing innovations. Administrative decisions, information processing, R&D, financial services, and sophisticated corporate services, in general, all contribute to the set of activities associated with stage 1. Should an innovation be considered worthy of commercialization and further design, stage 2 follows. This stage often involves an economically mixed labor force, and is represented by R&D facilities that are spatially and productively associated with small manufacturing facilities. The third stage represents the mature stage of a product, which is standardized and mass produced by low or unskilled labor in relatively low wage manufacturing jobs. As firms confront competitive pressure from other firms producing similar or identical products, the product undergoes modification, or a new innovation is developed, and the cycle repeats. The placement of the product cycle approach in a spatial dimension provides insights into processes of regional differentiation and disparities (Cole 1981; Dicken 1976; Hekman 1980b; Krumme and Hayter 1975; Malecki 1981a; Norton 1979; Rees 1979). Indeed, particular regions tend to specialize in activities that cross-cut a broad range of industries. In short, certain regions tend to house innovative activities and large pools of skilled labor while other regions become the repositories of mass-production facilities and large pools of low and unskilled labor (van Duijn and Lambooy 1982; Oakey et al. 1982; Taylor 1975; Thwaites 1982). The issue of "catching up", in this context, centers on whether or not core regions that have an initial

advantage can maintain their position in a spatial division of labor[8].

The spatial division of corporate labor in national and international systems is central to the problem of regional differentiation but often is neglected by conventional growth approaches. The set of linkages that hierarchically connect economic activities among regions represents one of the less visible, qualitative aspects of a multiregional system that cannot be accounted for by traditional quantitative approaches. These linkages are based on a system of power and control (Clark 1981) and are hierarchical, reflecting patterns of dominance and dependence (Bassand 1981; Ettlinger 1984b; Taylor and Thrift 1982a, 1982b). Pred (1976) and Lasuen (1973) are largely responsible for integrating linkages as elements of corporate organization with regional development issues. To some extent, linkages are identified and accounted for by many demand based growth analyses (e.g. Beyers 1974, 1978; Lever 1980), but these research efforts rarely account for the qualitative, hierarchical nature of linkages. As linkages connect dominant and dependent activities, often across large distances, they may themselves be expressed in terms of dominance and dependence. Dependent linkages emanate from regions that have a relatively high percentage of low order economic activities, such as subsidiary corporations, manufacturing branch plants, and retail outlets. These low order activities often are externally controlled by multi-locational corporations that have headquarters and associated high order activities in dominant regions (Erickson 1974; Firn 1975; Thirlwall 1974; Watts 1981). The relatively small percentage of small, locally owned firms that exist in dependent regions often are restricted to sales within their local region[9], or upon subcontracts to branches of large multi-locational firms. More commonly, however, large firms supply inputs

to their branches over long distances, thus contributing little to local demand for products supplied by independent firms endogenous to the dependent region (Grunwald 1982; Klimasewski 1978). High order activities certainly occur in dependent regions, but the percentage of these activities is often low; furthermore, such activities tend to be spatially concentrated in a few areas, or polarized, and high echelon employment opportunities are inaccessible to the bulk of the population (Cromley and Leinbach 1981; Santos 1979; Serow and Poston 1982). In addition, many of these high order activities in less developed regions rely on financial and legal services from dominant regions (Cohen 1977; Nabudere 1979), or they are staffed and maintained by personnel that are drawn from the non-local population (Gray 1969; Leigh and North 1978; Peno 1977).

An appreciation of corporate organization as it relates to processes of regional differentiation requires the understanding that growth models measure interregional flows or transfers of commodities, labor, and liquid and physical capital, but they do not qualify the hierarchical nature of these flows. In effect, growth models account neither for situations where polarized growth has occurred, nor for dominant and dependent interregional linkages that indicate transfers of the factors that growth models measure. Furthermore, growth models generally disregard the fact that significantly different types of economic activities exist.

Examples of misspecifications that arise from growth analyses are widespread. Recent changes in the American Sunbelt that have been identified by growth measurements often are interpreted as a signal of increasing power or competitive economic leverage with respect to the Northeast, but polarized growth, dependent linkages, and a predominance of

low order manufacturing activities all suggest otherwise (Cohen 1977; Hekman 1980b; Rees 1979). Similarly, industrial growth in Third World nations has been interpreted as a signal of rising power and leverage with respect to core nations such as the United States, but again, polarized growth, dependent linkages with multinational corporations, and a predominance of low order economic activities suggest the opposite, at least in relative terms (Kinzer 1979; Streeten 1973, p.289)[10]. Indeed, even where competition from less developed countries does confront core nations, it tends to be confined to low technology industries — a reflection of the relatively underutilized human resource base in these nations. In general, then, statements regarding relative regional economic changes that are based exclusively on growth indicators are seriously hampered by a disregard for such factors as the distribution of types of economic activities in a region, and interregional linkages that may reflect greater dependence even while growth indicators are positively changing. As Negandhi (1980, pp.275-276) points out with respect to the presence of multinational corporations in less developed countries,

> ...growth itself may not be enough. What is needed is growth plus distribution policies, which could form a large middle class to sustain growth and prosperity in a given country... the MNCs must assume the responsibilities to share their resources and knowledge in a more enlightening manner, rather than concentrating on achieving higher operational efficiency and return on their investments.

In effect, to infer development or positive, qualitative changes from growth indicators such as increased output, and so forth, is to confuse absolute and relative change. In practice, regional economic change has escaped classification, and thus, one type of change assumes the form of another.

2.2.3 Problems with the growth perspective: the development response

Problems associated with the growth orientation stimulated Third World countries to formulate the New International Economic Order (NIEO) in 1974 at the United Nations. The set of documents associated with the NIEO recognize the inability of conventional growth policies (based on growth indicators, particularly aggregate measures) to alleviate problems of economic disparities among nations (Annell and Nygren 1980; Moghbel 1981; Sauvant 1981). This current of discontent contributed to a concern with development, as distinct from growth. The voluminous development literature is fundamentally divided between dependence oriented research, referring to nations' external relations, and dependency oriented research, referring to processes that give rise to patterns of dependence (Caporaso and Zare 1981). Whereas dependence approaches tend to be static and describe unequal relations (especially in trade and economic exchange in general) among nations within the world system (e.g. Seers 1979; Wallerstein 1974, 1980), dependency approaches explain the dynamics of these unequal relations with reference to antecedent conditions. The dependency camp may be further divided into two fundamental orientations. Gunder Frank's work (1967) represents an orientation that focuses on nations' external relations, almost to the exclusion of internal disparities. Gunder Frank, although emphasizing external linkages, nevertheless is classified as a dependency theorist because he focuses on explanation of international relations with reference to historical conditions. Dependence approaches, in contrast, tend to provide primarily static analyses. The orientation that is represented by Gunder Frank historically pre-dates the second dependency orientation which focuses on the articulation of nations' internal disparities with unequal external relations (e.g. Amin 1974; Rogerson 1980; Slater 1974). In Ettema's (1979)

view, the former orientation, focusing almost exclusively on external affairs, represents an immature or less sophisticated version of the dependency school. Although underdevelopment often is created by external factors, it is maintained by both exogenous and endogenous individuals and organizations. For instance, barriers to spatial spread effects are clearly associated with imbalances within the nation under study, as resources in hinterland areas move centripetally toward capiatl cities in dominant regions through a pull effected by the efforts of elite organizations and individuals (Myrdal 1957).

The principles associated with the NIEO were set forth with an understanding of the severe internal problems that characterized Third World nations, but the actual program that was written and presented at the United Nations exclusively focused on relations among nations rather than within nations. In practical terms, this focus was necessary to insure a non-intervention policy. The idea behind the recommendations of the NIEO was that internal problems could more easily be handled if external constraints of the world market and multinational corporations were reduced. Today it is an open question whether the goals of the NIEO have been approximated. Many development theorists would look askance at the achievements of this last decade. Even Hirschman (1981) has become disillusioned with the state of development economics as it relates to empirical realities. Regardless of the particular approach — whether dependence or dependency oriented — the development paradigm has fallen short of effective and operational prescriptive measures.

This is not to say, however, that the development literature is devoid of policy recommendations. Samir Amin (Business Week 1981), for example, has called for greater interaction among Third World nations and less

interaction between those nations and advanced economies as a means to stimulate industrial development. This train of thought, aiming at Third World self-reliance, typifies many Marxist reactions to the complex problems surrounding multinational corporate activity in the less developed world. In effect, the direct policy implication is a strategy of import substitution as a replacement for export promotion. Export promotion generally is encouraged by the advanced economies and is supported by the World Bank and the International Monetary Fund (see Havrylshyn and Wolf 1982). Krueger (1983) has characterized export promotion in terms of exchange rates that 1) encourage export; 2) help to reduce balance of payments problems; and 3) are consistent with the needs of less developed countries to import intermediate inputs to manufacturing. Furthermore, export promotion tends to involve large, labor-intensive plants that are compatible with the needs of less developed countries regarding the employment of primarily low or unskilled labor. Krueger holds that import substitution, by contrast, tends to involve small, capital intensive operations, and moreover, often involves high levels of protection and overvalued exchange rates with associated disincentives for exporting. These characterizations of export promotion and import substitution are not, however, universally accepted. Bhalla (1973), for example, sees smaller scale industries as more labor intensive than large scale industries, and encourages the development of local small industries that are labor intensive as a means to achieve an appropriate transfer of technology (see also Marsden 1981).

Krueger's encouragement of export promotion is based on empirical findings regarding a strong relationship between growth in gross domestic product (GDP) and export promotion strategies. In effect, Krueger's approach

addresses immediate short-term problems such as employment absorption and increases in aggregate growth indicators. Import substitution, by contrast, speaks more to the issue of long-term structural change that would facilitate a reduction of dependent linkages between less developed nations and advanced economies. Indeed, the export promotion strategy tends to ignore the problem of how to stimulate local inter-industry interaction so that ties to advanced economies for intermediate inputs can be reduced. On the other hand, the import substitution strategy does not clearly outline how to effectively implement procedures that would generate enough local investments to enable import substitution without draining hinterland areas of their assets and without creating serious short-term problems of unemployment[11].

In general, much of the development literature provides insightful description and explanation of problems confronting underdeveloped nations or regions, but it has not been a strong baseline for immediate and effective policy. In part, the Marxist bias of this overall literature has limited the constructive potential of the development paradigm within our current capitalist world system[12] because solutions are seen in terms of the demise of the capitalist system (Marcussen and Torp 1982). This explanation for the relative absence of effective and prescriptive policy in the development literature does not, however, hold in all cases, particularly given the increasing numbers of non-Marxist western scholars who have contributed to this literature in regard to both underdeveloped regions within advanced economies and Third World nations. The common thread of the development literature, whether or not contributors are Marxist, is a concern for historical processes and qualitative observations that shed light on spatial

divisions of labor and dominance and dependence relationships among and/or within regions. Indeed, the similarity of experiences between underdeveloped nations and underdeveloped regions within advanced economies has facilitated a coalition of scholars from different political ideologies. To a large extent, proponents of the development literature have purposefully lashed out against the growth literature, questioning the inferences about development based on growth indicators. The thrust of the development literature primarily has been to critically react to the growth orientation and to explain empirical realities, more than to forward prescriptive policy.

2.2.4 Growth and development: a stalemate

The unfortunate aspect of the growth/development debate is that differences of opinions and approaches appear irresolvable because minimal if any cross-fertilization of ideas has occurred. Ironically, differing political ideologies no longer form the barrier between these fundamentally different viewpoints; rather, the barrier to communication is found in the style of languages and the forms of presentation. Whereas the growth perspective is quantitative, seeking support for statements in numbers, the development perspective is qualitative, basing conclusions on non-quantitative observations. To reiterate, growth and development approaches are based on entirely different considerations, yet both offer inferences about the same phenomena. Growth describes absolute increases in quantitatively assessabable indicators; development is oriented towards identifying and explaining differences among regions in terms of their relative statuses. The development orientation largely evolved as a critrical reaction to the growth orientation, seriously questioning inferences about relative change based on absolute indicators. The growth orientation evolved in reaction to changing

empirical realities, and tends to ignore development considerations. The strength of the growth orientation is that it involves techniques that accurately identify absolute indicators and thus, absolute changes within regions; moreover, the indications of growth analyses are replicable by virtue of the quantitative, positivist approach. The tenuous aspect of this orientation is the tendency to draw inferences about relative change based on a set of considerations that are too narrow to achieve this task competently. It is in this regard that the development orientation offers substantial insights. However, without statistical support and replicability, statements emanating from the development literature often are disregarded by growth-oriented scholars. From the perspective of the growth orientation, development theorists have failed to clarify the **extent** to which qualitative variables affect quantitative indicators remains unclear. By the same token, the results of growth oriented analyses generally are disregarded by development theorists because these quantitative works ignore qualitative considerations that are central to the development perspective; to many scholars, these growth oriented analyses represent numbers without meaning. Interestingly, both the growth and development approaches recognize interregional disparities, although the supply-side growth models explicitly (and demand driven models, implicitly) predict ultimate regional convergence. The question then becomes how best to conceptualize disparities and change in such a way that different types of variables, reflecting various ramifications of change, can be integrated.

2.3 The Ramifications of Regional Economic Change: An Argument

In approaching the topic of regional economic change, it is first

necessary to address whether "equity" exists or can exist. "Equity" refers to the reduction of disparities in indices such as welfare and income, and the promotion of interregional equity has been the traditional justification for regional policy (Richardson 1978, pp. 226-229). Thus, a consideration of equity is pertinent because it is central (implicitly or explicitly) to any perspective on regional economic change. The view adopted here is that the divisions of labor that are required by the world capitalist system preclude a total elimination of disparities (Massey 1979). Indeed, as industrializing nations take steps toward achieving the complexity of post-industrial societies, disparities increase as socio-economic diversification develops and the number of individuals in middle and upper socio-economic levels increases (Weaver and Jameson 1981). In effect, inequalities become diversified. Whereas polarization in underdeveloped nations is characterized by disparities along a rural-urban continuum (Riddell 1981, p. 295), polarization in advanced economies is characterized by a wide range of disparities — rural/urban, inner city/suburbs and exurbs, white majority/ethnic minorities, large corporations/small firms, and so forth. The comparative basis of polarization and diversification is most appropriately conceptualized along a continuum that ranges from a small to a wide domain of socio-economic activities. Such a continuum does not imply, however, an elimination of disparities as diversification is approached; rather, shifts in the direction of growing diversification result in a reduction of class polarization as the division of labor expands and becomes more complex. More types of disparities exist in this case, yet concurrently, more opportunities become available to more individuals and more socio-economic classes in general.

The goal of equity may thus be inconsistent with the diversification

that is necessarily, but only implicitly, associated with development schemes. As a critical reaction to the concept of equity, a "basic needs" strategy has been forwarded in association with the World Bank that seeks to alleviate problems of hunger, health, unemployment and other undesirable aspects of life that are visibly discernible (Streeten 1979). Practically, however, the basic needs strategy is little more than earlier growth oriented modernization programs in new garb, and many of the less visible features of a regional economy, such as dependent linkages and class polarization, tend to minimize the benefits of these programs (Hirschman 1981; Lee 1981; Riddell 1981; Valenzuela and Valenzuela 1981)[13]. Generally, growth strategies that strive to positively change material standards of living fall under the heading of "equity" approaches. The term "equity" is probably a poor one for its purpose, given the problems posed to equity by the capitalist system; nevertheless, it stands in the literature as a general approach to policy.

Other growth strategies focus more on the diffusion of industry than on basic needs of life. The importance attached to industrial growth is understandable because growth entails efficient production — an integral element of a development process. Growth oriented strategies, however, represent a superficial approach to production because they concentrate on productive facilities over and above the human element. Conventional industrial growth programs tend to ignore such factors as the source of ownership and control, and therefore they often advocate the establishment of externally owned and controlled branch plants that may provide only temporary, unstable employment without skill upgrading programs. The establishment of branch plants in locations such as Appalachia in the United States or in core regions in Third World countries has resulted in efficient

production for the corporations that own and control these facilities, but has had few consequences for the indigenous populations of these regions in terms of long-term benefits. This "efficiency" oriented strategy is considered to be competitive with "equity" approaches (Alonso 1980; Walker 1981; Williamson 1965).

The equity vs efficiency issue parallels the "people vs place prosperity" argument (see Richardson 1978 for a review of these strategies/policies). Whereas "people prosperity" strategies focus on the standards of living of a population in terms of income, nutrition, housing, and so forth, "place prosperity" strategies emphasize the development of material resources in a region. The arguments levelled against multinational corporate activity in underdeveloped nations exemplify the two sides of this people/place prosperity coin. The multinational corporations, embracing the place prosperity perspective, argue that they help host countries because, in addition to supplying employment, they bring with them technology and resources into regions that lack these assets. Critics, following a people prosperity stance, take issue with the logic of the multinational corporations, arguing that the implantation of technology in a region is meaningless for the local population if technological and managerial knowledge are not spread to the indigenous population. Furthermore, critics argue that large sums of capital leave the host countries, with negligible spread effects within these regions (see Biersteker 1978 for a thorough review of both sides of this issue). Generally, people prosperity concepts are concerned with relative equity and commonly follow a development orientation; place prosperity concepts tend to focus on increased efficiency of industrial structures and generally follow a traditional growth orientation.

Strategies of regional economic change revolve around either equity and people prosperity concepts or around efficiency and place prosperity concepts. To date, these two strategies are considered competitive and mutually exclusive. This research seeks to reorient the concept of place prosperity so that it is consistent with, rather than competitive, with people prosperity. This reorientation posits that an improved regional industrial structure must entail the dispersion of a wide range of activities, such that people and place prosperity converge to tap local human resources. It is suggested here that the diversification of types of activities across a range of industries is that factor that facilitates efficient local production. In this regard, underdevelopment within a region is surmountable on the condition that productive opportunities are spatially dispersed and accessible to the bulk of the population (Boisier 1978; Stohr 1981). If a broad range of opportunities is dispersed, then presumably, the range of incomes is also dispersed, and the spatial spread of incomes would then increase consumption and effective consumer demand for a wide range of goods and services (Knight and Moran 1981). The element of efficient production draws from considerations integral to the growth orientation; the consideration of local and endogenously developed efficient production, together with the element of spatial dispersal of diversified productive opportunities in a region, draws from the development orientation. It is suggested, then, that **if economic opportunities are both diversified and spatially dispersed in a region, then dependent linkages to other regions can significantly be reduced since human, financial, and physical resources could be produced locally through a locally generated industrial and activity mix.** This approach is offered here as an alternative to conventional strategies that tend to be ineffective in achieving

desired relative changes.

In order to assess those factors that enable relative change to occur, it may be instructive to examine examples of this type of change. Two empirical examples of positive relative change include a national case, Japan, which is recognized widely, and a sub-national case, California, which has largely been ignored, principally because California is often included in the Sunbelt, a less developed region within an advanced economy (Miernyk 1980). California is nevertheless as much a milestone in the changing division of labor in the United States as Japan is to the international system.

The conditions that characterize Japan's and California's high ranking and competitive status include broad industry and activity mix, the presence and relative dispersal of innovative and entrepreneurial activities, and the local generation of capital investments. These factors are the mechanisms by which dominant rather than dependent linkages prevail. Less developed regions have generated policies oriented toward the achievement of these ends, but the persistence of dependent linkages is still apparent. In general, policies of less developed countries have sought to solve technological problems, because technological inferiority is a major ingredient of dependent linkages. Similarly, regions such as the Southeast in the United States have sought to develop agglomeration economies and high technology sectors in order to institute positive relative changes in the region (Bedwell 1982; Koch et al. 1983). Technological problems are not, however, directly resolved by changes in the factors of production. Fundamental to the directed institution of structural change is not the imitation of present conditions of model regions, but the attempt to emulate historical, antecedent conditions that have enabled and induced the current dominance of core regions (Fodella

1981; Hill 1982; Mitsuo 1982).

The positive changes achieved by California and Japan were both predicated upon the existence of a diversified social structure that included an entrepreneurial pool of skilled and professional labor. The achievement of California's competitive status with the Northeast following World War I is traceable to processes that occurred in the mid-nineteenth century. The California Gold Rush stimulated a wave of migration to California, largely from the Northeast, and particularly from New York. This inmigration generated an entrepreneurial, skilled and professional labor class by 1850 (Hornbeck and Tucey 1977; see also Jackson 1980, pp.75-76; Lavender 1972, p.166) that was capable of generating investments and innovative activity[14]. Similarly, Japan emerged in the nineteenth century from the feudal period as a highly stratified society that was already capable of import substitution and adaptation of western technologies to local circumstances[15]. The Meiji Restoration was a case of indirect rule in an economically and socially diversified environment that facilitated the development of indigenous industrial enterprises.

The socio-economic diversification that enabled an early generation of local investments and industrial enterprises are the key factors that distinguish the Japanese and Californian experiences from less developed or underdeveloped regions today. Class polarization and the predominance of an export sector in underdeveloped regions were early prevented in Japan by the government's encouragement of industrial endeavors within the traditional rural sector (Kunio 1979; Shishido 1982). The export sector in Third World nations, by contrast, is typically generated by the elite, modernized sector, and the bulk of the population is relegated to the rural peasantry or urban

slums (Hay 1977; Wolf 1966). In Japan, while the traditional sector concentrated on export industries, the upper strata were able to concentrate their efforts on technological adaptation of foreign products and processes, laying the foundation for innovative process technology that was to dominate such international industries as electronics and automobiles in the latter part of the twentieth century (Fox 1980; Thurow 1980, p.95). California's situation was dissimilar to Japan's in that export and innovative industry were largely controlled by the upper strata of society (Hornbeck and Tucey 1977). On the other hand, small companies were numerous and well dispersed across the state. The fact that late nineteenth/early twentieth century private sector enterprises in California such as produce, petroleum, and banking were both indigenously generated and successfully operated signified a competitive leverage for California and a means by which dependent backward linkages could be avoided.

Diversification of social structure is clearly an essential component of regional economic change, and is structural in nature. It is an enabling factor — a necessary, but not, however, a sufficient condition for the achievement of structural change. California, for example, had not assumed the competitive status it currently holds by 1920. The "push" was made possible by public sector subsidies and close private-public sector interaction following World War I (Lotchin 1979)[16]. Japan's relative change was similarly at least partially contingent on close public-private sector interaction, and particularly, the ability of the government to direct the private sector as well as protect it from multinational corporations by means of restrictive measures[17]. Were the conditions of Japan and California not characterized by socio-economic diversity and technological innovativeness at the time that

public sector action was influential, the effects would have been quite dissimilar (see Clayton 1967).

A variety of factors are often cited as being responsible for high competitive status. Examples of such factors for California typically include the presence of venture capital and agglomeration economies (Franson 1979; Rothwell 1982; Silver 1980); examples of such factors for the Japanese situation include the incentive and employment systems, technological imitative and adaptive strategies, responsiveness to external markets, intense public-private sector interaction, and the development of capital intensive and automated industry (Brown 1980; Gerstenfeld and Wortzel 1977; Fox 1980; Marsh 1980; Nakagawa 1980; Peck and Goto 1981; Thurow 1980). These factors that are related to California's and Japan's successes are, however, results or effects; they are not causes or partial causes. This suggests that effective imitation of the changes achieved by California and Japan by so-called developing countries is a matter of imitating the internal dynamics of model regions that occurred as antecedent conditions to later inputs in the system. Effective agglomeration economies, import substitution, export promotion, and indigenous technological endeavors with few dependent backward linkages are difficult achievements for regions that are characterized by class polarization, poor education, and limited opportunities for the bulk of the populations. Strategies aimed at socio-economic diversification and the development of professional and skilled classes are appropriate prerequisites or at least complements to the above stated strategies (oriented to the establishment of agglomeration economies, trade strategies, and so forth). Controversy over strategies such as export promotion or import substitution may have little relevance to desired relative

changes if the consequences of these strategies are not related directly to potential social structural changes.

Less developed or "underdeveloped" regions typically are characterized by a low or unskilled population, meaning that the endogenous pool of human resources is not sufficiently varied, and therefore, dependent linkages accumulate. Diversification must entail not only industrial variation but also a variation among types of economic activity and skill associated with each industry. Industry mix, when manifest in the form of a wide variety of branch plants, provides jobs for primarily low or unskilled labor, and may thus have little positive impact on a region's external relations. Increases in high order, high skilled activities in a region may have little overall impact if such opportunities are polarized and inaccessible to the bulk of the population.

With respect to the initiation of structural change, the important question to be asked is not whether a region has historically maintained relative independence, but whether such a position may be possible to achieve in the future. Indeed, it is tempting to cite Japan's exemption from long-term colonial domination in the past as the reason for its ability to achieve high economic status in the world system, but the changes achieved by Japan would therefore be inconceivable for Third World nations. (Furthermore, this explanation also falls short of accounting for the relatively low international status of such countries as Thailand and Singapore, which also were historically exempt from colonial domination). Clearly, absolute economic self-reliance or independence is inconceivable in a world system that is dominated by multinational and increasingly transnational enterprises (Linge and Hamilton 1981; Sunkel 1977). On the other hand, the capability of

import substitution with few dependent backward linkages and the ability to choose what to produce are major determinants of the degree of dependence or dependency that characterizes a region (Ettlinger 1984b). Dependence and dependency are ambiguous terms relative to world system dynamics, and perhaps should be considered in comparison to trade. In this sense, a region that imports a resource may not be "dependent" on this resource (and upon the region from which the resource is imported), if import substitution without dependent backward linkages for intermediate inputs is a viable alternative. Should importation be a lucrative but unnecessary procedure, the term "trade" might best characterize the transaction since it is devoid of the negative connotations associated with dependence or dependency. In this regard, the changes that are now occurring in the "rapidly industrializing countries" are not really representative of a transition from dependence (or process of dependency) status to trading status because multinational corporate activity remains dominant, and furthermore, nationalized industries are heavily dependent upon dependent backward linkages to advanced economies for intermediate inputs. Extensive trade rather than dependent linkages characterizes both California and Japan, but this situation occurred after internal developments had been achieved. Such internal dynamics included a diversified social structure and the generation of a spatially dispersed set of diversified industrial activities.

The emphasis on diversification here is neither wholly optimistic nor pessimistic. It is acknowledged that some changes are impossible within the context of the capitalist system, such as complete regional convergence or a shift towards literal equity among or within regions. Nevertheless, a reduction of disparities between regions is considered possible; in other

words, the relative status of a region is considered capable of change.

This perspective encompasses growth and modernization because diversification would entail the generation of efficient production in a range of industries and activities that would reduce dependence on external sources for inputs to production. **A region's external relations can thus be altered by a reduction in dependent linkages on the condition that internal dynamics change in the direction of growing socio-economic diversification throughout a region.** Broad industrial mix, in this framework, must necessarily include a wide array of activities associated with each type of industry if efficient local production is to be achieved. This approach is distinguished from an orientation based solely on growth because here, the aim of instituting growth is directly related to a reduction in dependent linkages. Second, this approach underscores the importance of a spatial dimension so as to qualify diversification by a dispersion of the total range of opportunities. This spatial factor is more of a prediction than a qualification in most growth models, although empirical findings have indicated that spatial spread effects from growth centers are far from inevitable (Aydalot 1981; Darwent 1969; Richardson 1981). This approach is distinguished from an orientation based solely on development because 1) it considers efficient production; 2) it consciously is concerned with positive changes within the capitalist system; and finally, 3) it is amenable to a quantitative, replicatable analysis. Thisecessarily include a wide array of activities associated with each type of industry if efficient local production is to be achieved. This approach is distinguished from an orientation based solely on growth because here, the aim of instituting growth is directly related to a reduction in dependent linkages. Second, this approach underscores the importance of a spatial

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Notes to Chapter 2

1. Also, Kuznets (1959) casts doubt on the validity of Rostow's figures on increases in investment in advanced economies, which form the basis of Rostow's argument.

2. Studies of complex prehistoric civilizations, in particular, have illuminated the significance of technological change relative to the Malthusian carrying capacity argument (Turner 1974). Perhaps such studies may appropriately be considered as 'lessons from prehistory'.

3. Perroux disagreed, however, with Schumpeter's claim that inter-industry interaction would result in competitive oligopolies.

4. During the 1970s a large body of literature developed that emphasized linkages among elements of corporate structure as dynamic elements in technological change (Lasuen 1973) and as critical explanatory variables in regional differentiation (Gilmour 1975; Goddard 1975; Goddard and Smith 1978; Gudgin et al. 1979, Pred 1976), and interregional interdependence (Beyers 1974, 1978; Lever 1980).

5. The statistical distribution of the central place pattern is represented by a rank-size pattern (see Beckmann and McPherson 1970 for a mathematical discussion of the relationship between the central place and rank-size patterns). Particularly during the 1960s, analyses were undertaken to test the hypothesis that economic efficiency, growth, and general economic advancement are positively correlated with a rank-size pattern (see Dziewonski 1972; Ettlinger 1981, 1984a; Rosing 1966; Sheppard 1982 for critical reviews of this literature).

6. Despite the practical failures of growth pole theory, integrated with central place theory and innovation diffusion studies, this body of thought nevertheless continued to receive positive attention (Berry 1970). Hansen (1981b) critically reviews this framework, remaining, however, sympathetic to its basic principles.

7. This is not to say that the Marxist vision of the eventual demise of the capitalist system does not provide grounds for distinction. It is the similarity, more than the differences, that are considered here to be striking (with respect to Marxist thought and capitalist perspectives that have adopted many concepts of the Marxist framework).

8. Pred (1976, 1977), in particular, emphasized the concept of "initial advantage", whereby core regions that traditionally house innovative, high skilled activities will maintain their high ranks because they have an initial advantage. Peripheral regions, traditionally housing low skilled, low order activities cannot realistically hope to "catch up" with core regions because they begin with a disadvantageous set of circumstances. To some extent,

this pessimistic and perhaps fatalistic viewpoint shares common ground with the pessimism of Myrdal and the Third World Marxist scholars.

9. The extent of local consumer demand in dependent regions within advanced economies differs considerably, however, from the extent of local demand in dependent regions within dependent or peripheral nations. In the latter case, effective consumer demand is negligible because incomes are low and conditions of unemployment and underemployment are severe. This is not to say that conditions are not problematic in dependent regions within advanced economies, but as a matter of degrees, these conditions are better (i.e. the local population is integrated to a greater extent in the industrial process, albeit within the context, often, of a branch plant economy). In dependent regions within peripheral nations, populations are predominantly agricultural.

10. The asymmetry between less developed countries and advanced economies as expressed in the relationship between multinational corporations and host countries is a general phenomenon. However, from case to case, conditions do differ, not in kind, but as a matter of degrees. For instance, many countries have improved their bargaining positions by developing more stringent regulations regarding multinational activities (Bath and James 1979; Negandhi 1980). Also, Third World countries tend to be more sympathetic to the attitudes and problems of the host countries than their counterparts from advanced economies (Kumar 1982).

11. Knight and Moran (1981), writing for the World Bank, recommend tax and financial reforms to help finance the extension of basic public services and the production of basic wage goods by the private sector. However, in order for such recommendations to be effectively implemented, the behavior of the political, social, and economic elite in less developed countries must be amenable to chanelling taxes into such productive directions. Often, this is not the case. Marsden (1983) cites the opposite case predicted by Knight and Moran: a positive correlation between high taxes and low growth; he concludes that tax cuts are not, however, a "quick fix" for a sick economy.

12. Smith (1982) defends this concept of a world system -- as opposed to a world with several systems classified on the basis of political ideology.

13. Bhalla (1979), however, departs from the conventional basic needs approach, meshing the basic needs strategy with procedures to ensure the appropriate transfer of technology to less developed countries.

14. After 1850 economic pursuits in California rapidly diversified in each county (Hornbeck and Tucey 1977). The skilled sector of the population was crucial to the development and adaptation of technology to the environment. The wheat and fruit industries that had earlier been initiated by the Jesuits and Franciscans (Bancroft 1884) witnessed numerous innovations prior to 1900 (Nash 1972). Petroleum, though poor in quality, became a major Californian industry by 1900 through the efforts of petroleum scientists in refining techniques (White 1970). The oil industry up to World War II represented a significant stride in import substitution, since coal would otherwise have had to be imported (A. Johnson 1970). High transportation costs and barriers of distance functioned to insulate the oil

industry from the rest of the nation (A. Johnson 1970; White 1970), but sales to British companies were commonplace in the first quarter of the twentieth century (White 1970). Regional insulation of the economic system in general was maintained until World War II times through the development of a California based banking and branch banking system (Nash 1972) — a mechanism that allowed California to avoid the competition and hierarchical formation associated with capital flows at the national scale (Conzen 1977).

15. Import substitution was initiated in Japan as far back as the eighteenth century, during the Tokugawa period. "Dutch Learning" refers to a Japanese tradition in which printed Dutch materials on subjects such as military science, medicine, astronomy, and technology were imported by Japan and adapted to local circumstances (Allen 1981, p.25; Kunio 1979, p.134). This tradition laid the foundation for the sophisticated import substitution with few backward linkages that has prevailed in post World War II times.

16. At the end of the second decade of the twentieth century both metropolitan California and the U.S. Navy were confronted by problems — metropolitan California recognized its nationally non-competitive status, and the U.S. Navy budget and overall strength had been called into question. The year 1919 saw the relocation of the Navy to the Pacific coast, primarily to California. At this point, public and private sector interaction prevailed. Defense spending through the private sector stimulated and reinforced California's industrial structure (Lotchin 1979). Such public-private sector interaction has continued to the present (Malecki 1981b).

17. Model factories and the importation and adaptation of Western technologies were directed by the Japanese government in the early Meiji era, and the manufacture of iron, steel, and armaments were institutionalized by the turn of the twentieth century with the aid of government subsidies to the private sector (Kunio 1979). Moreover, the government assumed an active role in forming policy that would limit western nations' control over the local economy in the cases of foreign investment programs (Holden 1980; Kunio 1979). Private industry was dependent on the government, but it was independent of direct foreign investment in the early years of the twentieth century.

Chapter 3

A Formal Specification of an Alternative Conceptualization of Regional Economic Change

In recognition of the ambiguity surrounding processes of regional economic change and the confusion that results from the use of the terms "growth" and "development", this chapter first reclassifies regional economic change. Second, a formal specification of this alternative conceptualization is presented.

3.1 An Alternative Classification of Regional Economic Change

The previous chapter has made a case for the integration of qualitative and quantitative observations so that considerations of human and material resource development (to date, considered mutually exclusive) can be coordinated. Efforts to combine these types of data have been suggested by some critics of conventional techniques, but primarily in the form of non-operational, conceptual models (von Boventer 1975; Johannisson 1982; Stohr and Todtling 1982), or hypothetical simulation (Siebert 1969) that do not account for problems of data inaccessibility. Operational procedures based on quantitative and qualitative observations have not been forwarded to date, perhaps in part because disaggregated data are often difficult to obtain or are prohibitively expensive. Models and discussions in the development/underdevelopment literature also use aggregate statistics,

particularly import/export data, and more frequently employ qualitative historical data that are not placed within a rigorous framework. Thus, statements about development are often made on the basis of growth indicators, and the common result is that types of economic change are often confounded.

To reiterate, growth models are misleading because they generally do not account for interregional linkages that may indicate external sources of ownership or control; they do not account for the types of economic activities that may be growing; and finally, they do not acknowledge the influence of spatial factors. Statements about development that often are made on the basis of growth indicators lead to the same conceptual pitfalls because these qualitative considerations are not accounted for. Despite attempts to distinguish between types of change, confusion persists. It is appropriate, then, that a more explicit classification of regional economic change be considered so that the morphology of change can be accurately assessed.

Let us identify the positive change in a region's relative position in a multiregional hierarchy as **vertical change,** in reference to the upward shift of a region in a multiregional hierarchy as a consequence of an increase in the ratio of dominant to dependent linkages. This type of change may be infrequent, although Japan as a national case and California as a regional, sub-national case are possibly examples of this type of change. Negative vertical change, then, would represent the downward shift of a region's relative status. Great Britain as a national case perhaps represents this latter case as a consequence of its apparent failure to generate new competitive industries in a changing modern environment (Gallagher-Daggit

1982; see also Katrak 1982; Schott 1981; Thorns 1982).

Let us identify **functional change** as the incorporation of new activities in a regional economy via diversification, although the level and dispersal of diversified industry may not be sufficient to induce a vertical change (FIGURE 3.1). Negative functional change may occur when economic activity is reduced through plant closings or relocations. Vertical and functional change are analogous to development and growth, respectively, in that vertical change generally encompasses functional change just as development is said to encompass growth, although the converse situation does not necessarily hold. Positive functional change entails the addition of absolute changes in a regional economy, whereas positive vertical change reflects relative change. These qualitative changes pertain to a region's external relations, contingent upon some reduction of intraregional disparities. The accumulation of a number of functional changes in a region may thus be insufficient to induce a positive vertical change, particularly if changes do not include such factors as the dispersal of diversified activities throughout a region.

The American Sunbelt's position relative to the Northeast or the position of the "rapidly industrializing" countries relative to the advanced economies remains an empirical question. In order to distinguish vertical and functional changes empirically, we need a regional index that can establish relative regional ranks, and simultaneously, absolute differences among regions. Time series data using such an index would allow for the identification of types of changes, such that a change in regional rank would indicate a vertical shift, and a change in the relative distance between stable regional ranks would indicate functional changes. The following

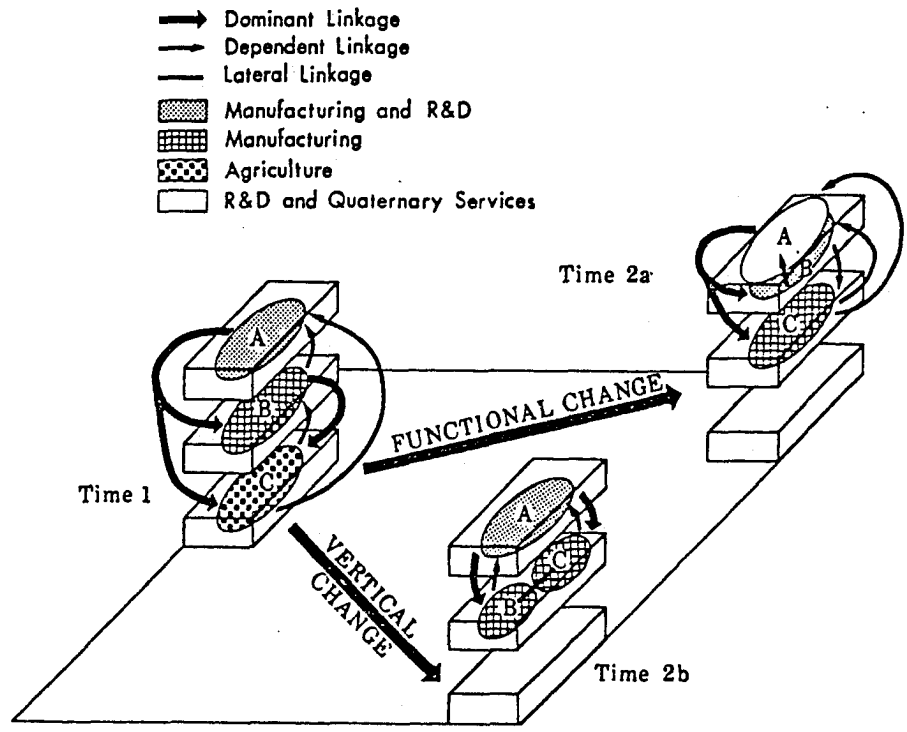


FIGURE 3.1 Hypothetical Example of Vertical and Functional Changes for Regions A, B, and C

section proposes an operational procedure that can establish the relative ranks of regions, both statically and longitudinally.

3.2 An Operational Procedure for the Measurement of Regional Economic Change: A Regional Index

The regional index to be discussed in this chapter is formally specified in FIGURE 3.2 and conceptualized in FIGURE 3.3. As shown in these figures, "R" represents the relative status of region x that is defined by a linear additive combination of variables. The variables "a" and "d", as qualifiers of "e", account for the spatial distribution of types of activities in region x, so that the level of economic diversity can be placed in a spatial dimension in order to ascertain polarization effects relative to each type of activity. The variable "p" is then included so that regions can be compared without introducing bias towards regions with large populations. This index accounts for the interaction of a region in a multiregional system, since employment is specified both within the region, "e", and outside the region, "o". The variable "o" is included in the case that economic activity generated within region x is located outside region x (in any region "y") in accordance with decentralization policies. The values assigned to "c" control for interregional linkages with respect to employment within region x, by specifying endogenous or exogenous control/ownership of facilities within region x. (The variable "a" exclusively qualifies "o" because "d" and "c" are irrelevant to "R_x" since "o" refers to employment outside region x that has headquarters in region x). The variable "t" in FIGURE 3.3 incorporates considerations of long term sectoral changes into the analysis, measuring the absorptive capacity of tertiary sector employment, relative to the declining manufacturing sector in post-industrial society. Finally, "s", an urbanization

$$R_x = \sum_{a=1}^{10}((ae_{ax}/p_x)\cdot d_{ax}) + b_1\left(\sum_{a=1}^{10} e_{ax}\cdot c_{ax}/p_y\right) + b_2\left(\sum_{a=1}^{10}\sum_{y=1}^{n} ao_{ay}/p_y\right)$$

$$+ b_3\left[(tx_{time2}/(tx_{time2}+mx_{time2})) - (tx_{time1}/(tx_{time1}+mx_{time1}))\right]$$

$$+ b_4(s_x/p_x)$$

R_x = rank of region x
x = a particular region; y = a region other than x
e = employment numbers in a particular activity
a = activity index [a = 1...10]
p = population numbers
d = dispersion index
c = source of ownership/control of an establishment
[c = 1 if owned/controlled from outside region x;
c = 2 if owned/controlled from within region x]
o = employment numbers in a particular activity outside region x, controlled from within region x
t = tertiary employment
m = manufacturing employment
s = number of persons in SMSAs
b_1-b_4 = weights

FIGURE 3.2 Formal Specification of a Regional Index

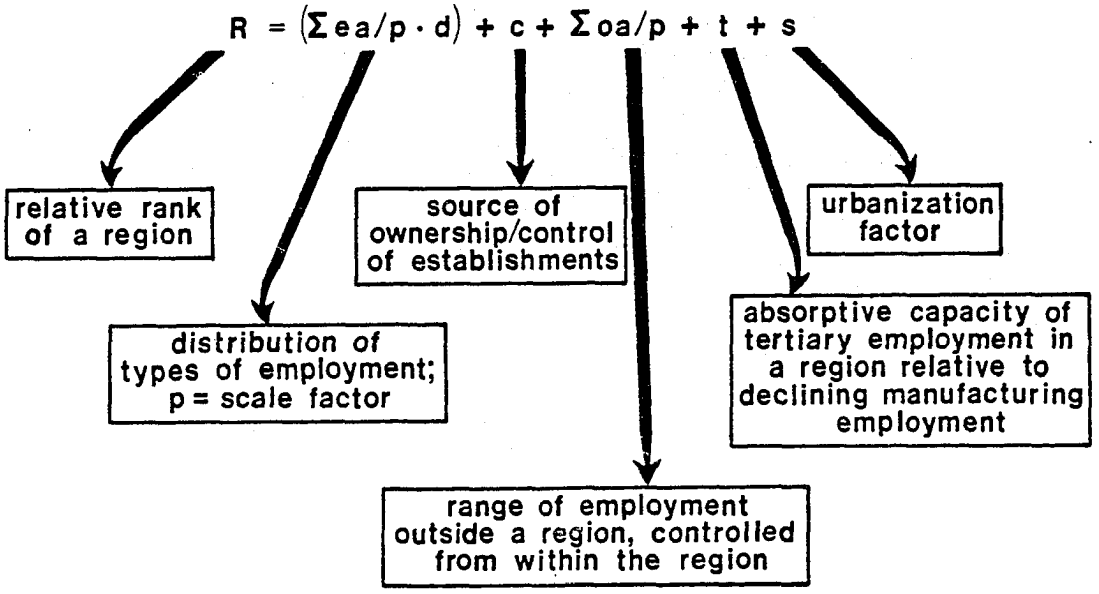


FIGURE 3.3 Conceptualization of a Regional Index

factor, is included in order to account for potential differences among regions with regard to levels of modernization and presence or absence of agglomeration economies (since these factors tend to occur in or near urban centers). The following subsections account for each of the variables that are employed in the analysis.

3.2.1 Employment

Employment numbers (let us call this variable "e") are among the conventional growth indicators that are both accessible and relevant to divisions of labor in corporate organization. However, employment, alone, is misleading indicator if a goal of the analysis is to shed light on divisions of labor. For example, employment as a variable does not provide insights into the types of labor pools that exist in regions relative to levels of skill and technological inputs to production.

3.2.2 Types of facilities: the range of economic activities

The type of facility, such as R&D or manufacturing, is an appropriate qualifier of employment since different facilities indicate different types of activities, and thus, divisions of labor. The task, then, is to decide on an appropriate way to classify facilities in a region.

Watts (1980, pp. 53-54) provides a review of three possible approaches for classifying an industrial enterprise's facilities: the product cycle approach, the best-practice approach, and the functional mix approach. The product cycle approach, as discussed in the previous chapter, focuses on the life-cycle of products, from the innovation stage through the growth stage and finally to the mature mass-production stage. When this framework is placed in a spatial dimension, it provides insights into regional specialization in terms of particular types of activities that occur in particular types of

facilities. The adaptation of the product cycle approach to questions of regional differentiation and spatial divisions of labor actually incorporates salient features of the best-practice and functional mix approaches. The best-practice approach focuses on techniques of production in terms of technological level and degree of efficiency in production (see Grosse 1953, p.264; Le Heron 1976; Salter 1966, p.26). The functional mix approach emphasizes the hierarchy of types of activities in a corporation according to function — from control or administration activities through different types of manufacturing activities, from low to high value-added operations (Norcliffe 1975; Tornqvist 1968). In effect, the first and second stages of the product cycle are generally correlated with high technological levels in high skilled activities, including administration, information processing and innovation tasks. The mature stage of the product cycle, when sub-classified into levels of technology, is correlated with low to high value-added types of operations.

In addition to the three taxonomies reviewed by Watts, industries have been classified by sectors, namely the primary (agriculture, fishing, forestry, mining), secondary (manufacturing, construction, utilities), and tertiary (commerce, transportation, communications services) sectors. This classification scheme has become known as the "Clark-Fisher model", which was actually developed independently by Fisher (1935) and Clark (1940). Clark and Fisher conceived this scheme within the context of economic development thinking — the postulate being that economic progress is achieved as employment shifts from the primary to the secondary and finally to the tertiary sectors, concomitantly with increases in productivity and per capita income. The Clark-Fisher thesis has been criticized on several

grounds. First, the evolution of economic processes does not necessarily proceed unilinearly from an emphasis on the primary sector, then on the secondary sector, and finally on the tertiary sector (Oshima 1971). Second, increases in per capita income are not necessarily correlated with proportionate increases in the tertiary sector (see Fuchs 1968, p.30). Third, it is problematic to view economic advancement in terms of proportionate increases in the tertiary sector because this sector is so heterogeneous (Bauer and Young 1951). Singleman (1978, p.24) points out that the United Nations (1958), in response to this latter criticism, developed a nine industry group classification as an expansion of the Clark-Fisher tripartite scheme[1]. However, in this scheme, as in most others (e.g. Katouzian 1970; Singer 1971; United Nations 1958), the level of aggregation of the tertiary sector is quite high. Browning and Singleman (1975) have combined Katouzian's, Singer's, and the United Nations' classification schemes, integrating industries and sectors in order to provide a relatively disaggregate framework that is amenable to an analysis of sectoral transformation in terms of the sectors' component parts. They have also proposed an integration of industries and sectors to provide a relatively disaggregate framework for analyzing sectoral transformations in terms of the sectors' components. Currently, the standard industrial classification employed by the U.S. government (see Statistical Policy Division 1972) includes ten sectors that are subdivided according to industries[2], amenable to the types of analytical considerations outlined by Browning and Singleman (1975).

The importance of this sectoral classification of industries cannot be overstated, particularly with respect to the United States, because researchers are often dependent upon government data sources. Thus,

academic research is perhaps inadvertently affected by the organizational form of government data. It is crucial, then, that we recognize the limitations of this allocation scheme so that we can properly evaluate the significance and limitations of our results. The principal criticism of the government classification of industries by sectors, as forwarded here, is that this scheme is rooted in a tripartite framework (including the primary, secondary, and tertiary sectors), when in fact, the contemporary world has experienced in the last two decades the emergence of a fourth sector, the quaternary sector (Cohen 1981). The primary distinction between the tertiary and quaternary sectors is one of skill — the tertiary sector is low skilled; the quaternary sector is high skilled and caters to the needs of corporate enterprises. Yet the distinctions made by the U.S. government as well as by Browning and Singleman, Katouzian, Singer, Clark and Fisher pertain to general functions of industries in relation to the production of goods and services. Business services, for example, include tasks ranging from janitorial services to computer programming, without any provision for distinguishing among different levels of skill.

A rank order of types of facilities is suggested here that incorporates elements of product cycle, best-practice, functional mix, and sectoral approaches. Accordingly, types of activities assume values of 1 through 10, depending upon the type of facility that houses a particular type of activity. Thus,

a =

1, if low technology manufacturing

2, if medium technology manufacturing

3, if high technology manufacturing

4, if low technology R&D associated with manufacturing

5, if medium technology R&D associated with manufacturing

6, if high technology R&D associated with manufacturing

7, if low technology, low skilled quaternary sector

8, if medium technology, medium skilled quaternary sector

9, if high technology, high skilled quaternary sector

10, if headquarters,

where "a" represents types of activities and a=1 represents the lowest order of economic activity and a=10 represents the highest order activity[3]. In this scheme, a=1-3 reflects the third or mature stage of the product cycle represented by the secondary sector functions broken down into technological levels. The next three ranks, a=4-6, reflect the second stage of the product cycle, again broken down into technological levels. Ranks 7-9 reflect the first stage of the product cycle, sub-classified by levels of technology and skill. The highest rank, a=10, represents a particular activity within the quaternary sector, administration, and is ranked highest because headquarters are the loci of decision making activities that affect all other types of activities.

With respect to quaternary sector activities, generally, technological levels are correlated with skill and educational training. Within the secondary (manufacturing) sector, this correlation between technological and skill levels holds primarily when research and development activities associated with physical capital (process technology) occur within the region under study (see Utterback and Abernathy 1975). When technology is standardized, the level of technology associated with the manufacturing process is high, but labor skills may be low and technological inputs to production are likely to be imported[3]. Indeed, high technology, capital

intensive operations combined with low cost, low skilled labor are a major complaint of critics of multinational corporations in the Third World addressing problems of inappropriate technology transfer. Given the general conceptual framework of this research that emphasizes skill levels, why then should manufacturing be sub-classified if endogenous research and development associated with process technology are the significant ingredients of a regional economy that has few dependent backward linkages? The logic in subclassifying manufacturing industries is as follows: if labor in manufacturing is generally low skilled and low cost, then, incorporating considerations of the best practice approach, low cost, low skilled labor is ranked higher if technological inputs are higher because production is more efficient. The overall emphasis on skill and the "human element" is preserved here because manufacturing, as a low skilled activity, is ranked lowest (a=1-3) in the hierarchy of activities (a=1-10) at the same time that the growth oriented element of efficiency is incorporated into the analysis internally to the low skilled manufacturing sector. (See APPENDIX A for a discussion of the sub-classifications of manufacturing and quaternary activities; the identification of the tertiary sector is also included in this appendix).

Primary sector employment (principally agricultural) is not considered here because it has become a relatively unimportant component of employment in post-industrial, advanced economies (Singleman 1978) which will be the empirical focus of this study. Tertiary sector employment (in retail, wholesale, and low order non-professional services) is also not included at this point because the relative rank of this type of activity is unclear relative to the production process; tertiary activity is, however, incorporated

into the analysis as an additional variable later in the text.

The set of activities, ranked 1 through 10, is proposed as a qualification of employment numbers. Thus, if "e" represents employment numbers and "a" represents type of activity, then the sum of employment in a region "x", "R_x", can thus be qualified by the range of economic activities in R_x if the employment numbers in each facility are multiplied by the appropriate "a" value[4]. The range of activities in R_x may then be expressed by the following equation:

(1) $R_x = a_1e_x + \ldots a_{10}e_x$ or

(2) $R_x = \sum_{a=1}^{10} ae_{ax}$.

The purpose here is to modify employment by a qualitative observation so as to incorporate considerations of human resource development. Skill levels are measured in the case of quaternary activity. In the case of manufacturing activity, skill levels are not implied since high technology manufacturing may involve capital intensive process technology and low skilled, low cost labor. However, if a large amount of research and development activity occurs within a region, then it may be assumed that high technology components of manufacturing are produced endogenously by high skilled labor rather than received as standardized products. In effect, equations (1) and (2) are proposed as a means by which to measure the diversity of economic activities or the activity mix in a region. Thus, the greater the technological and skill levels, the higher the value of region x. The logic here is as follows: the greater the skill and technological levels in a region, the more likely it is that few dependent linkages with other regions will exist because the importation of intermediate inputs is not necessary since high order goods, services, and technology can be produced

endogenously.

3.2.3 Scale adjustment

In order to compare regions, it is necessary to include a scale adjustment factor, so that the values attributed to regions are not biased towards regions that have large populations. We further modify the index such that:

$$(3)\quad R_x = \sum_{a=1}^{10} ae_{ax}/p_x,$$

where "p" represents population numbers in a region. In this way, we can compare regions of different sizes with respect to population numbers. Still, the activity mix of a region, qualified by a scale adjustment factor is probably insufficient to adequately modify employment because the degree of dispersion of each type of activity has not been considered.

3.2.4 Spatial distribution of types of activities

The range of activities in a region may be qualified by the degree of dispersion of each type of facility (a=1-7) in region x. If "d" represents a dispersion value, then a value for "d" may be calculated for each type of facility in a region. Each "d" value can be multiplied by the sum of "a" values for each type of facility, so as to represent the distribution of the range of economic activities in a region. The expression for the range of activities in region x can be revised so as to include a spatial dimension, such that:

$$(4)\quad R_x = \sum_{a=1}^{10} ((ae_{ax}/p_x) \cdot d_{ax}).$$

The "d" value may be derived by determining the mean distance deviation for the sum of facilities of each type in a region (see Neft (1966, pp. 58-59); see Taylor (1977) regarding the range of "d" values from 0 to 2.149 as maximum dispersion is approached[5]). Low dispersion, or spatial

concentration, of a type of facility would indicate polarization of a particular type of activity, and high dispersion would indicate a balanced spatial distribution of an activity in region x. Values of dispersion should be derived for each type of facility, since the distribution of high order activities often differs significantly from the distribution of low order activities. In effect, the incorporation of "d" into the analysis allows for the discernment of polarization effects, relative to each type of activity. As discussed in the final section of Chapter 2, the dispersal of activities throughout a region is required if efficient local production is to occur, and if dependent linkages are to be reduced.

3.2.5 Source of ownership/control of facilities

The source of ownership/control of a facility that may be endogenous or exogenous to a region must also be considered because dispersion values alone may be misleading. For example, high dispersion values for manufacturing activities may not necessarily reflect a positive balance of this type of activity in a region if the majority of these facilities are branch plants that are owned or controlled from outside the region. As McGranahan (1982) has pointed out, branch plant employment is often unstable and precarious. On the other hand, a balanced dispersion of locally owned, staffed, and controlled manufacturing facilities in a region may be a positive feature of a regional economy. Even high order activities may be owned or controlled from outside the region, and in such cases, human, financial, and physical flows through interregional linkages could significantly detract from what may superficially appear as absolute positive advantages to a regional economy. If "c" represents the source of ownership/control of a facility (indicated by headquarters locations), then a rank order may be constructed

such that:

c = 1, if control/ownership is non-local (exogenous)

c = 2, if control/ownership is local (endogenous).

Employment numbers, modified by the distribution of the range of activities in a region, adjusted to scale, can be further modified by incorporating "c" values into the analysis, such that:

$$(5)\quad R_x = \sum_{a=1}^{10}((ae_{ax}/p_x)\cdot d_{ax}) + \sum_{a=1}^{10} e_{ax}\cdot c_{ax}/p_x.$$

3.2.6 Activities outside region x that are controlled from within

A high number of facilities in a region that are endogenously owned or controlled (i.e. c=2) indicates a positive feature of a regional economy, since outward flows of profits, economic leakage, is minimal. Furthermore, endogenous ownership and control of facilities means that staffing of high echelon positions is likely to be drawn from the local population. Since decentralization and the development of multiplant enterprises are pertinent considerations in our contemporary economic system, the specification of employment within a region that may be controlled either from within or outside a region is an important consideration. Furthermore, the specification of employment that is controlled from within a region but is located outside the region is also appropriate if the participation of a region in a multiregional system is to be fully appreciated. If "e" represents employment in facilities in region x, then let "o" represent employment in facilities that are located in any region "y" that is not "x", but has headquarters and control functions in region x. We can thus incorporate into the analysis "o" and the range of activities associated with "o", adjusted to scale, as follows:

$$(6)\quad R_x = \sum_{a=1}^{10}((ae_{ax}/p_x)\cdot d_{ax}) + \sum_{a=1}^{10} e_{ax}\cdot c_{ax}/p_x + \sum_{a=1}^{10}\sum_{y=1}^{n} ao_{ay}/p_y,$$

where "n" represents the total number of regions.

3.2.7 Tertiary sector employment

The regional index, as developed thus far, excludes tertiary employment because the weight of tertiary activities relative to secondary and quaternary activities is unknown. Nevertheless, the tertiary sector is an important consideration, particularly as post-industrial society evolves in the United States and around the world[6]. Marx and Engels in 1891 (see Marx 1978) predicted that the capitalist system would collapse with the advent of structural unemployment and the displacement of laborers by increasingly capital intensive technologies because effective consumer demand would decrease to the point where there would be too few consumers to pay for industrial supplies. Indeed, current levels of secondary sector unemployment compounded with conditions surrounding the world-wide recesssion of the early 1980s would seem to lend support to this prediction. However, Marx and Engels did not consider the potential absorptive capacity of the tertiary sector relative to manufacturing employment, which is the critical ingredient of the capitalist structure that can overcome the potential obstacles to the ongoing success of the present system[7]. Therefore, in order to account for long term sectoral trends, we incorporate into the analysis the absorptive capacity of the tertiary sector relative to the manufacturing sector. Thus,

$$(7)\ R_x = \sum_{a=1}^{10}((ae_{ax}/p_x)\cdot d_{ax}) + \sum_{a=1}^{10} e_{ax}\cdot c_{ax}/p_x + \sum_{a=1}^{10}\sum_{y=1}^{n} ao_{ay}/p_y) + [(tx_{time2}/(tx_{time2}+mx_{time2}))-(tx_{time1}/(tx_{time1}+mx_{time1}))],$$

where "t" represents tertiary employment and "m" represents manufacturing employment. We can expect that the absorptive capacity of the tertiary sector relative to manufacturing will increase in the coming years if Gershuny's (1978) prediction of a capital intensive self-service economy that

displaces tertiary employment is proven invalid. At the present time, the absorptive capacity of the tertiary sector relative to the manufacturing sector probably registers as not significant because the transition from industrial to post-industrial society has been far from smooth (Freeman 1981).

3.2.8 Urbanization factor

Finally, we incorporate the variable "s" into the index, in reference to the percentage of region x's population that lives in metropolitan areas. This variable is an urbanization factor that may not be significant in advanced economies that are heavily urbanized in most regions; in the case of less developed countries that have large rural hinterlands and are characterized by primate settlement distributions, the urbanization factor would most likely be significant. We include "s" in the index, as follows:

$$(8)\ R_x = \sum_{a=1}^{10}((ae_{ax}/p_x)\cdot d_{ax}) + \sum_{a=1}^{10} e_{ax}\cdot c_{ax}/p_x + \sum_{a=1}^{10}\sum_{y=1}^{n} ao_{ay}/p_y) + [(tx_{time2}/(tx_{time2}+mx_{time2}))-(tx_{time1}/(tx_{time1}+mx_{time1}))] + s_x/p_x.$$

3.2.9 Inclusion of weights

An empirical application of this index requires the incorporation of weights. Thus, if "b" refers to a weight, then we modify equation (8) such that:

$$(9)\ R_x = \sum_{a=1}^{10}((ae_{ax}/p_x)\cdot d_{ax}) + b_1(\sum_{a=1}^{10} e_{ax}\cdot c_{ax}/p_x) + b_2(\sum_{a=1}^{10}\sum_{y=1}^{n} ao_{ay}/p_y) + b_3[(tx_{time2}/(tx_{time2}+mx_{time2}))-(tx_{time1}/(tx_{time1}+mx_{time1}))] + b_4(s_x/p_x).$$

In equation (9), all variables are automatically assigned a weight of 1. Since this index, and the particular combination of variables, are unconventional, it is appropriate to consider whether some variables should be weighted differentially. (Note that the first expression, representing the

distribution of the range of activities in a region, is not assigned a weight. This is because the other variables are weighted relative to this expression since divisions of labor represent the principal focus of this analysis. This variable is, however, internally weighted).

The estimation of values for "b_1", "b_2", and "b_3" presents a methodological problem. Conventional multivariate statistical techniques provide weights, but this approach cannot be employed here because the dependent variable, "R_x", is defined by the independent variables. Thus, weights are required prior to the use of a multivariate statistical technique. There are two ways to approach the estimation of weights without multivariate statistics. First, weights can be assigned to the variables based on a knowledge of the existing relationships. For example, if there exists a sound empirical basis for inferring that one variable is twice as significant as another, then the weights can be assigned **a priori**. However, since the relationships among the variables forwarded in this analysis are not well understood, this first approach is inappropriate. A second approach, which is employed here, estimates the weights by using a sensitivity analysis. This type of analysis tests for stability among parameters in order to assess the sensitivity of parameters to different weighting schemes (see Oppenheim (1980); for examples of the variety of contexts in which sensitivity analysis has been employed see Fesenmaier, 1984; Goodchild 1976; Malecki 1980; Nordbeck 1971). This procedure involves a selection of values that serve as weights for particular variables, followed by an examination of a series of combinations of differently weighted variables. Weights are chosen such that the "R" values generated are the most stable or consistent values.

3.3 The Measurement of Regional Economic Changes

The regional index is useful in the following ways. First, comparisons of "R" values in a particular year, translated into ranks, would allow for the identification of regional ranks at one point in time. Thus, the values given by this index are strictly comparative in the sense that "R" values are not assessed against minimum or maximum values. Second, longitudinal usage of this index would allow for an analysis of change, such that changes in relative ranks, vertical changes, can be identified. Third, absolute changes in "R" values (that are not translated into ranks) can measure functional changes that have occurred in regions. Given two hypothetical regions, "x" and "y", if the "R" value of region x remains less than the "R" value of region y from time 1 to time 2, then any changes that may have occurred in region x are functional changes. In this hypothetical example, the sum of functional changes in region x were evidently insufficient to have induced a change in the vertical status of region x relative to region y. Formally, if

$$(10)\quad Rx_{time2} < Ry_{time2} \text{ and}$$

$$(11)\quad Rx_{time1} < Ry_{time1}$$

then the vertical status of the two regions has remained unchanged. Functional changes may nevertheless have occurred in region x despite the stability of regional ranks. Such changes are assessable by examining changes in the relative distance between the "R" values of regions x and region y from time 1 to time 2.

The regional index is valuable for three reasons. First, the method is capable of discerning types of change. The concepts of functional and vertical change can help to identify processes of change, as in the hypothetical example formalized in equations (10) and (11). Second, the method outlined in this section is designed to be applicable to any

multiregional system, although it is recognized that particular settings might raise different questions and require the inclusion of additional variables. For example, no provision has been made for an explanatory variable such as race. In the United States ethnic minorites are relatively spatially dispersed across regions, and the inclusion of a variable pertaining to race is not really required. In certain areas of the world, South Africa, for example, racial discrimination on a regional basis may be an important consideration for questions of regional differentiation. Primary (agricultural) activity is another example of a variable that might be included in particular contexts — especially in the case of underdeveloped nations that have large rural hinterlands. Third, the index provides a **systematic** means for establishing relative regional ranks. The method integrates qualitative and quantitative observations such that employment numbers, a growth indicator, can be qualified by variables that provide information on 1) the spatial structure of types of economic activities within a region, 2) the situation of a region in a multiregional hierarchical system, and 3) the status of a region relative to long term sectoral trends. The "R" values to be calculated for regions represent an aggregation of dimensions that includes corporate organization, the range and distribution of types of economic activities, interregional linkages, and relationships of dominance and dependence. Some hypothetical models have been forwarded that seek to account for these relationships, but empirical applications have remained a far-sighted goal. Chapter 4 presents a discussion of an application of the proposed regional index to the United States in 1962 and 1980.

Notes to Chapter 3

1. The United Nations' (1958) classification includes: 1) agriculture, forestry, hunting, fishing; 2) mining and quarrying; 3) manufacturing; 4) construction; 5) electricity, gas, water, sanitary services; 6) commerce; 7) transportation, storage, communications; 8) services; 9) industries not elsewhere classified.

2. The composition of these sectors does, however, change over time (see Goldstein 1972; Office of Statistical Standards 1958, 1963; United States Department of Commerce 1978).

3. Wages also may be low in high technology manufacturing activities. In fact, wages were initially considered as a means for ordering activities but were later rejected because manufacturing wages are correlated neither with technological nor skill inputs — upon which the conceptualization forwarded here is based. The continuum of low to high manufacturing wages tends to be associated with the particular history of unionization, where high unionization is correlated with relatively high wages and low unionization is correlated with relatively low wages. With respect to U.S. economic history, unionization developed and revolved around what are today low technology industries. An example of the absence of correlation between high technology manufacturing and high wages is seen in the comparison of U.S. average annual wages and salaries in primary metals (a low technology manufacturing industry) and instruments or electronics (high and medium technology manufacturing industries, respectively): the average annual wages and salaries paid to all workers in 1980 in the primary metals industry was $20,382; $17,233 in instruments and $15,519 in electronics. (These figures were obtained from **County Business Patterns,** 1980; see U.S. Department of Commerce 1980). Note that the conceptualization offered here — whereby an ordering of manufacturing activities is derived in terms of technological inputs — runs counter to the traditional neoclassical ordering of activities in terms of income.

4. The product of "e" and "a" means that ordinal scale data related to the activity hierarchy are treated as interval scale data. This situation is regarded as valid because the ordinal scale is monotonically related to the interval scale (Baker et al. 1966; Bohrnstedt and Carter 1971; Labovitz 1967).

5. The use of the mean distance deviation measure overcomes the problem of distortion effects caused by comparisons between different spatial scales. This method averages the mean distance deviation over the whole distribution of points within a region and is independent of the reference point (Neft 1966, p.59). Dispersion values may range from 0 to 2.149 as maximum disperrsion is approached. However, it is not expected that any situation will assume a zero value. As Taylor (1977, p.158) points out: "... in practice, **empirical** examples of point patterns fall somewhere between R=0.33 and R=1.67"; "Even when the dominant process is contagious or competitive, the

resulting pattern may tend toward a limiting position along the R scale". ("R" in Taylor's discussion is equal to "d" in the discussion in this text).

6. Although the term "post-industrial society" conventionally refers to the socio-economic status of advanced economies (which have already reached a mature stage of industrialization), elements of developing, industrializing nations may be characterized as post-industrial. In effect, as multinational corporate activities locate in Third World nations, they require services that are spatially concentrated. Thus, small post-industrial service sectors have emerged in pockets in these less developed nations to meet the needs of corporate enterprises. Evolutionary processes do not proceed simply and unilinearly (from pre-industrial to industrial to post-industrial stages); rather, evolutionary processes in the modern world have been multilinear, in response to the growing erosion of national boundaries in the international system.

7. Gershuny (1978), however, sees the post-industrial service sector as increasingly capital intensive — so much so that it will eventually become a self-service economy, meaning that tertiary sector labor will be displaced much in the same manner as manufacturing labor.

Chapter 4

An Application of the Proposed Regional Index to the United States, 1962 and 1980

The purpose of this chapter is to present the results of an empirical application of the regional index outlined in the previous chapter. A modified version of the index was applied to the United States in 1962 and 1980. This chapter reviews the results obtained with respect to regional rankings in 1962 and 1980, and the vertical and functional changes that occurred between these years. Chapter 5 discusses these changes in terms of variables that discriminate regions.

The first section of this chapter discusses problems of data inaccessibility, and the **County Business Patterns** data used in the empirical study reviewed here. Section 4.2 discusses the procedure involved in operationalizing the modified index, specifically with regard to the estimation of the weights. Section 4.3 then reports on the results obtained from an application of the modified index. "R" values are calculated for the four Census Regions and the nine Census Divisions in 1962 and 1980 and vertical and functional changes are identified. Section 4.4 presents mean rates of change, in order to present a more dynamic understanding of changes in the United States.

4.1 The Data Base, Data Inaccessibility, and a Modification of the Regional Index

A relatively ideal data set, provided by the Dun and Bradstreet Corporation does exist for the proposed regional index discussed in chapter 3 (see Dun's Marketing Services)[1]. These data are unique in the level of disaggregation because the data are recorded at the level of establishments, and thus linkages among corporations can be assessed. The Dun and Bradstreet Corporation sells these data on magnetic tape primarily to large corporations at high cost. Unfortunately, the cost of these data is unusually high for academic research, and few studies have used Dun and Bradstreet data to date. It has been necessary, therefore, to develop a modified index, using a more readily accessible data base, the annual **County Business Patterns** data.

The modified regional index that was used in the present analysis is formally specified in FIGURE 4.1 and conceptualized in FIGURE 4.2. Note that the expression $\sum_{a=1}^{10} ae_{ax}/p_x$ has been changed to $\sum_{a=1}^{7} ae_{ax}/p_x$ in the modified index. The three types of activities associated with the second stage of the product cycle (a=4-6) have been deleted, since data on these activities are not recorded in the **County Business Patterns** data base. As the figures indicate, three other variables in the index presented in Chapter 3 are deleted: "d", the dispersion index; "c", source of ownership/control; and "o", employment outside region x that has headquarters and control functions within region x. These variables have been deleted in accordance with the limitations of the **County Business Patterns** (see U.S. Department of Commerce 1962, 1980a)[2]. The **County Business Patterns** data are used to operationalize the modified regional index for the United States' four Census Regions and the nine Census Divisions (FIGURE 4.3) in 1962 and 1980[3].

$$R_x = \sum_{a=1}^{7} ae_{ax}/p_x + b_1\left[\left(tx_{time2}/\left(tx_{time2}+mx_{time2}\right)\right) - \left(tx_{time1}/\left(tx_{time1}+mx_{time1}\right)\right)\right] + b_2\left(s_x/p_x\right)$$

R_x = rank of region x

x = a particular region

e = employment numbers in a particular activity

a = activity index [a=1...7]

p = population numbers

t = tertiary employment

m = manufacturing employment

s = number of persons in SMSAs

b_1, b_2 = weights

FIGURE 4.1 Formal Specification of the Modified Regional Index

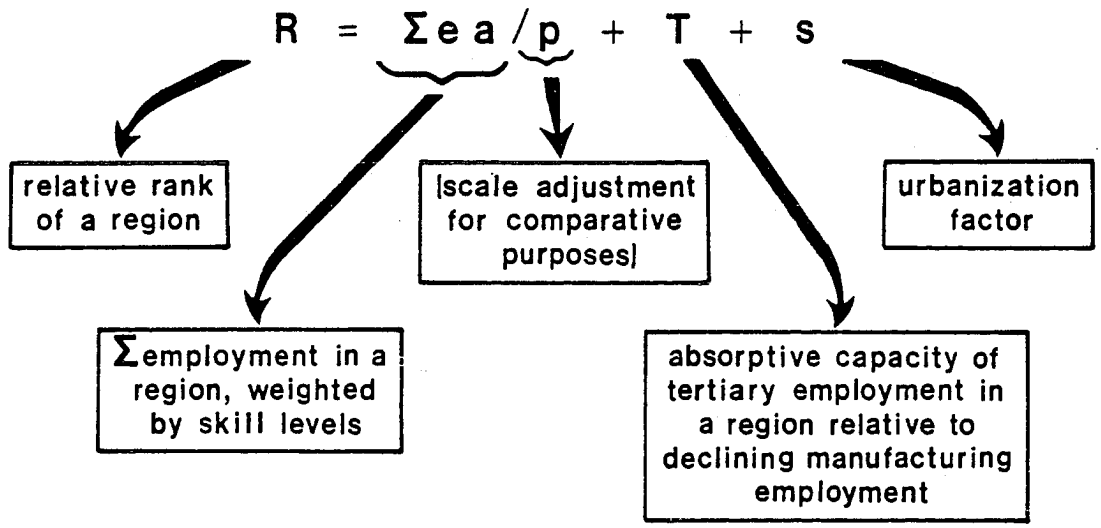
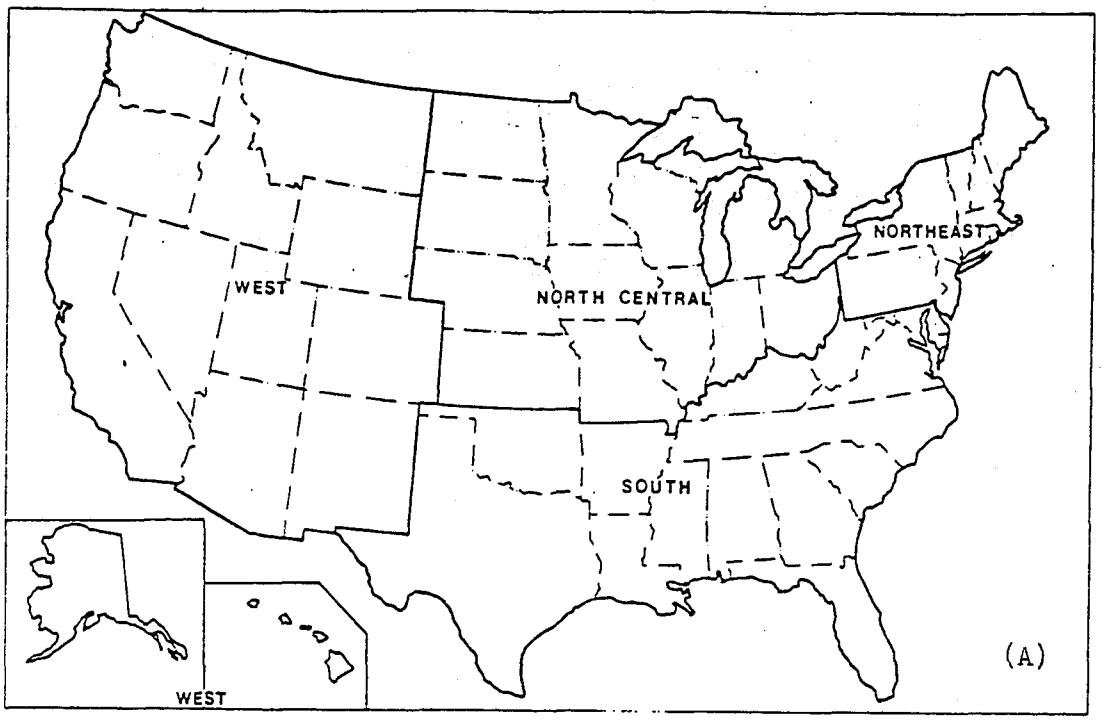


FIGURE 4.2 Conceptualization of the Modified Regional Index



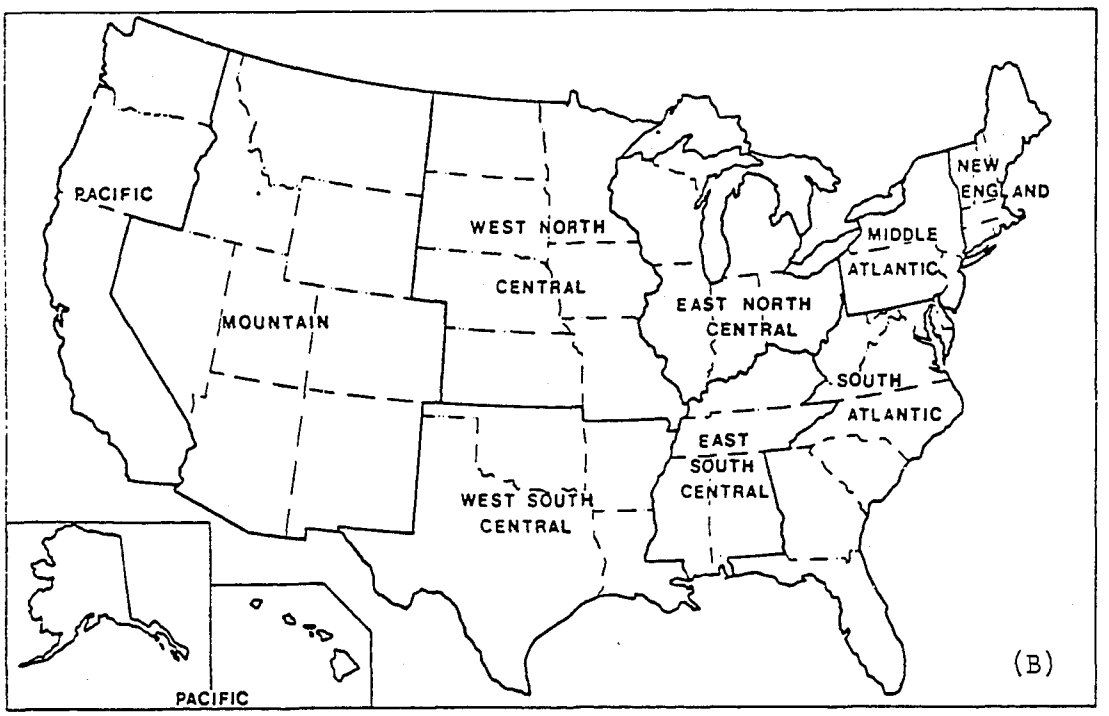


FIGURE 4.3 The 4 Census Regions, (A), and the 9 Census Divisions, (B)

Comparison between these years should register as a comparison between the decades of the 1960s and 1970s. The 1970s seem to represent unprecedented accelerated "growth" in the Sunbelt, which has brought about much controversy (Abbott 1979).

Low through high order economic activities (a=1-7) are well represented by the **County Business Patterns** data. High order activities (a=4-6) are represented by product and process technology R&D (see Utterback 1979), as well as by quaternary service sector activity (refer to APPENDIX A, Table 5). Data for headquarters operations (a=7) were obtained from **Enterprise Statistics on Central Administrative Offices and Auxiliaries** (see United States Department of Commerce 1963, 1977). Low order activity (a=1-3) is represented by manufacturing (refer to APPENDIX A, Tables 1-4, and figures 1 and 2).

This analysis is restricted to private sector data exclusively, since government activity has little relevance for regional change if antecedent conditions do not include a diversified private sector (Clayton 1967). Positive local effects result principally from the presence of agglomeration economies and spin-offs from private R&D activity; public or government sector R&D, in contrast, is a poor source of spin-offs (Cooper 1971). Some degree of indirect intermingling of public and private sector activity does occur, however, since the government often contracts to firms (Malecki 1982).

One limitation of the **County Business Patterns** data is that data are compiled according to industries, as opposed to occupations. In terms of the concept of activity mix and the activity hierarchy incorporated in the present analysis, occupational data would be most appropriate. One data source, **General Social and Economic Characteristics** (see U.S. Department of

Commerce 1983b), does exist that provides occupational data, but this base is available only every ten years and was not released at the time of this study[4]. In this study, it was necessary, therefore, to use industrial data and infer that particular occupations are **primarily** represented by a particular industry. While the food industry, for example, involves activities such as R&D, computer programming, and so forth, it is assumed that low skilled, low technology manufacturing characterizes employment in the food industry. This inference is reasonable; however, following the example of the food industry, it must be made clear that this approach obscures other types of activities within the food industry. With this shortcoming in mind, the modified regional index was operationalized using the **County Business Patterns** data and using **SAS (Statistical Analysis System: Basics)** (see SAS Institute, Inc. 1982). The following section discusses the first procedure that was performed: the estimation of the weights used in the modified regional index.

4.2 The Estimation of Weights

As indicated in chapter 3, the variable weights are estimated by means of a sensitivity analysis. In order to establish the ranges of values for b_1 and b_2 in the modified index, the following procedure was employed. First, mean values were obtained across regions within the 4-way and 9-way regional classifications in 1962 and 1980 for the following expressions:

(1) $E = \sum_{a=1}^{7} ae_{ax}/p_x$

(2) $t = [(tx_{time2}/(tx_{time2}+mx_{time2}))-(tx_{time1}/(tx_{time1}+mx_{time1}))]$ and

(3) $s = s_x/p_x$.

Mean values were used because the goal here is to obtain typical values.

Second, the ranges of values for the weights for "E", "t", and "s" were established such that the lowest values for the weights would set "t" and "s" equal to the lowest value of "E", and the highest values would set "t" and "s" equal to the highest value of "E". (In the case of "t", the b value that would set "t" equal to the lowest mean value of "E" is a negative number for both regional classifications; the low value for b was then set at zero). The logic in setting the upper limits of the ranges for b values is based on the assumption that "t" and "s" are not more significant than "E", since divisions of labor receive primary emphasis here. (This assumption is supported by the results of the discriminant analysis that is discussed in Chapter 5). In brief, the discriminant functions indicated that "t" and "s" were less important regional discriminators than particular types of employment accounted for by the activity index. Third, a single range of values for b_1 and b_2 were established that set the highest values for b_1 and b_2 for both 1962 and 1980, so as to establish a wide range of values. The range of values for b_1 and b_2 were divided into quintiles such that five possible values between the lower and upper limits for b_1 and b_2 would be employed in the sensitivity analysis. (See APPENDIX B for a presentation of the data used in estimating the ranges of values for b_1 and b_2).

Once the ranges of values were set for b_1 and b_2, the modified index was operationalized for each region in the 4-way (four Census Regions) and 9-way (nine Census Divisions) classifications in 1962 and 1980, using five different values for b_1 and b_2 (as indicated in APPENDIX B, III). The values for "R" (relative regional rank) were then transformed into ranks in order to identify the most consistent rank for a region over the twenty-five possibilities that were generated for a particular year. The results show a

consistent ranking obtain in 1962 and 1980 across both regional classifications when b_1 equals 2.68 and b_2 equals .42. (See APPENDIX C for a presentation of the data used in the identification of these b values). The following section reports on the results obtained from the modified regional index using the values of 2.68 for b_1 and .42 for b_2.

4.3 Regional Ranks and the Identification of Functional and Vertical Changes, 1962 to 1980

As FIGURE 4.4 indicates, all four Census Regions witnessed positive functional changes between 1962 and 1980. This figure also shows that the South experienced a negative vertical change, dropping from rank #3 to rank #4, while the West experienced a positive vertical change, rising from rank #4 to rank #3; the ranks of the Northeast (rank #1) and the North Central (rank #2) regions remained stable between 1962 and 1980. Indeed, these vertical changes stand in direct contrast to the popular belief that the South is in the process of superseding the Northeast as the dominant economic region in the United States.

Results of the 9-way regional analysis show that within the Northeast, New England experienced a negative vertical change from 1962 to 1980, dropping from rank #2 to rank #4 while the Middle Atlantic remained stable at rank #1 from 1962 to 1980 (FIGURE 4.5). In the North Central region, the East North Central division remained stable at rank #3 and the West North Central division increased in rank from #7 in 1962 to #6 in 1980. In the South, the South Atlantic dropped from rank #4 to #5; the East South Central remained stable at rank #8, and the West South Central division dropped from rank #6 to rank #7. In the West, the Mountain division remained stable in the lowest rank (#9) while the Pacific division experienced

	R value 1962	R value 1980
Northeast	.797	1.012
North Central	.637	.900
South	.422	.830
West	.381	.719

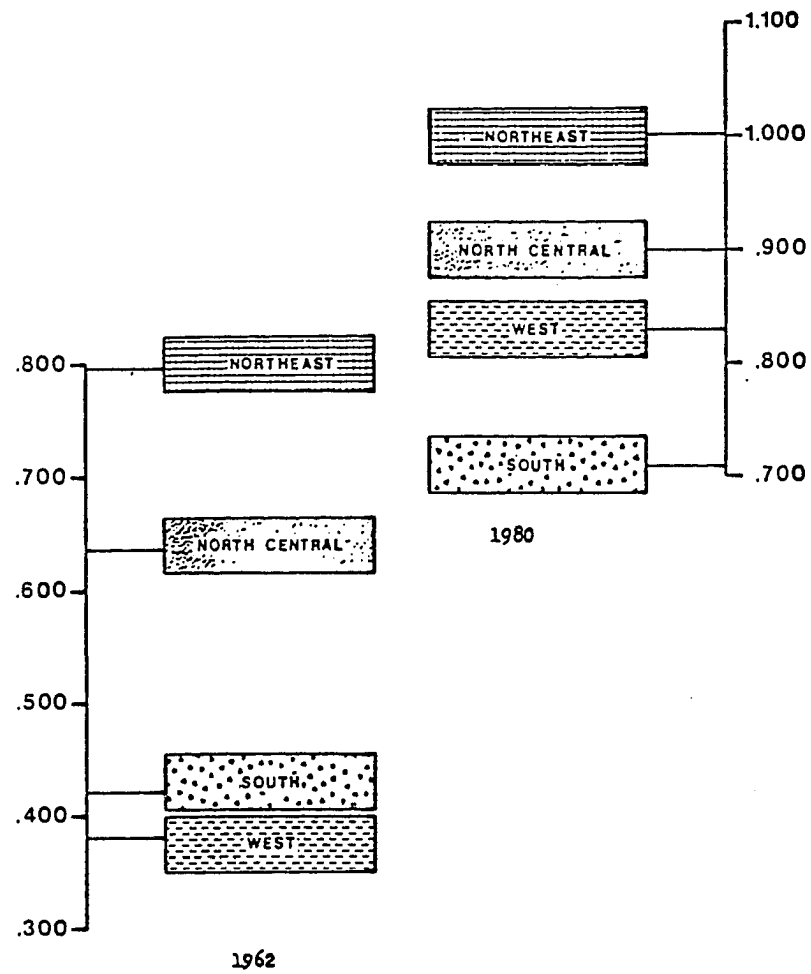


FIGURE 4.4 Graphic Presentation of Regional Ranks for the 4 Census Regions, 1962 and 1980

	R value 1962	R value 1980
New England	.772	.962
Middle Atlantic	.803	1.032
East North Central	.705	.972
West North Central	.328	.654
South Atlantic	.477	.796
East South Central	.321	.593
West South Central	.394	.642
Mountain	.239	.567
Pacific	.424	1.011

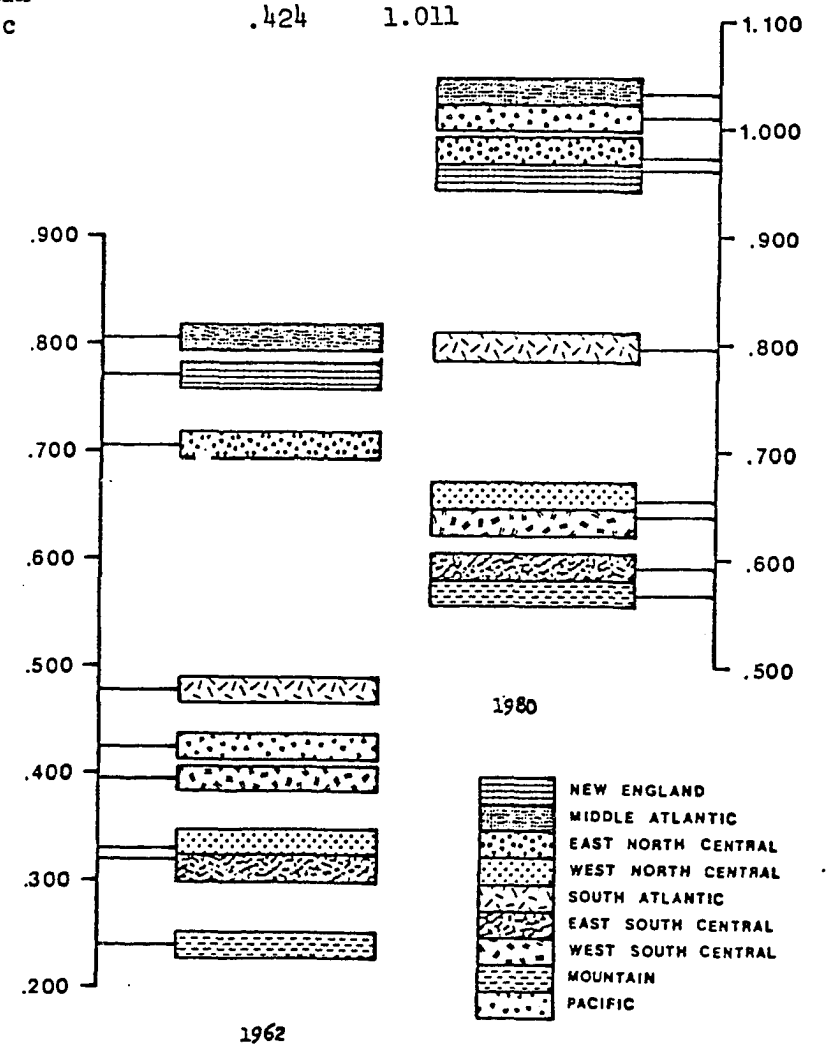


FIGURE 4.5 Graphic Presentation of Regional Ranks for the 9 Census Divisions, 1962 and 1980

a substantial positive vertical change, rising from rank #5 in 1962 to rank #2 in 1980. As in the case of the four Census Regions, all nine Census Divisions experienced positive functional changes.

To better understand these changes, it is useful to disaggregate the sum of all types of employment "E", (E_1-E_7), so that the contribution of each type of activity (a=1-7) can be examined. TABLE 4.1 shows the percentage of the population of each region that is employed in the seven activities defined by the activity hierarchy for each of the four Census Regions in 1962 and 1980. The data clarify why the Northeast's position is ranked #1 in both years. Specifically, the Northeast has the highest percentage of persons employed in highest order activities such as high skilled quaternary activities and administration both in 1962 and 1980; moreover, the Northeast also has high percentages of persons employed in low and medium skilled quaternary activities in both years. Low and high technology manufacturing activities also register quite high in the Northeast, although the North Central region clearly dominates in the field of medium technology manufacturing. Low technology manufacturing is also quite strong in the North Central region, which ranked #2 both in 1962 and 1980. In addition to the apparent specialization in low and medium technology manufacturing, the North Central region has the second highest percentage of persons employed in administration and ties with the West for the second highest percentage of persons employed in high skilled quaternary sector activities in 1962 and in 1980. On the other hand, high technology manufacturing and medium skilled quaternary activities register as relatively low in the North Central region, also in both years.

As indicated in TABLE 4.2, both the Northeast and the North Central

Table 4.1. Percent of Population Employed in the Seven Activities Defined by the Activity Hierarchy for the Four Census Regions, 1962 and 1980

	year	E_1	E_2	E_3	E_4	E_5	E_6	E_7
Northeast	1962	.079	.029	.010	.009	.005	.016	.007
	1980	.062	.027	.010	.010	.010	.024	.008
North Central	1962	.061	.038	.005	.006	.005	.009	.006
	1980	.057	.039	.005	.008	.009	.014	.007
South	1962	.052	.011	.002	.004	.004	.007	.003
	1980	.057	.019	.003	.008	.009	.012	.004
West	1962	.041	.014	.010	.006	.005	.009	.003
	1980	.040	.017	.014	.011	.012	.014	.005

E_1= % employment in low technology manufacturing

E_2= % employment in medium technology manufacturing

E_3= % employment in high technology manufacturing

E_4= % employment in low technology, low skilled quaternary

E_5= % employment in medium technology, medium skilled quaternary

E_6= % employment in high technology, high skilled quaternary

E_7= % employment in administration (headquarters)

Table 4.2. Values for "t" (absorptive capacity of tertiary employment relative to declining manufacturing employment) and "s" (percent of population in SMSAs) for the Four Census Regions, 1962 and 1980

	year	t	s
Northeast	1962	.033	.791
	1980	.079	.849
North Central	1962	.031	.605
	1980	.090	.709
South	1962	.016	.464
	1980	.057	.670
West	1962	-.055	.717
	1980	.051	.825

regions register high and positive scores with respect to "t", absorptive capacity of the tertiary sector relative to declining manufacturing employment in both years, and both regions have high urbanization factors. The Northeast ranks higher than the North Central region in terms of urbanization in 1962 and in 1980, although the North Central region exhibits a higher absorptive capacity of the tertiary sector in 1980 (— the Northeast registering only slightly higher in this regard than the North Central region in 1962). Referring back to FIGURE 4.4, although the Northeast's position is much higher in absolute terms than than the North Central's in 1962, the Northeast and North Central regions, as a group or cluster, score much higher "R" values in 1962 than the South and the West. In 1980, however, clear grouping or clustering is not apparent.

In 1962 the South ranks higher than the West, but these two regions, in absolute terms, are quite similar: the absolute difference between the "R" values for these two regions is small, .111. In 1962 the South has employment in low technology manufacturing 4.1% higher than the West and the same percentage employed in administration; the percentage of persons employed in all other activities in slightly higher in the West than in the South, with the exception of high technology manufacturing which is substantially higher in the West. From TABLE 4.2 it can be inferred that urbanization is much greater in the West than in the South in 1962, but that the absorptive capacity of the tertiary sector relative to manufacturing employment in the South is much greater than in the West. As indicated in TABLE 4.1, although the South's employment in low and medium technology manufacturing is greater in 1980 than the West's, the percentage of the West's population employed in all quaternary sector activities, particularly

high skilled quaternary activities, is greater than in the South. The percentage of the West's population employed in high technology manufacturing also is substantially greater than in the South. The percentage gain between 1962 and 1980 in the West and the South in quaternary sector activities is quite similar — but note that the West registered higher, initially, in these activities in 1962. The values for "t" and "s" (see TABLE 4.2) are also relatively favorable for the West in 1980 — the West has a much higher urbanization factor than the South and registers just slightly lower than the South in terms of the absorptive capacity of the tertiary sector. On balance, the South registered only slightly higher than the West in 1962; however, the relative ranks of these two regions reversed by 1980, and furthermore, the distance between the "R" values of the South and the West increased substantially (distance between "R" values in 1980 equals .041).

The vertical changes experienced by the West and the South between 1962 and 1980 are better understood when the four Census Regions are disaggregated into the nine Census Divisions. With respect to the West, and as indicated in TABLE 4.3, the Mountain division has low scores in low through high order activities in 1962 and 1980 (although scores are average for low and medium skilled quaternary activities). In contrast, the Pacific Division of the West has high scores for high technology manufacturing, as well as for all quaternary activities. As indicated in TABLE 4.4, both the Pacific and Mountain divisions in 1962 exhibit a negative absorptive capacity of the tertiary sector relative to manufacturing employment, but both divisions experienced rather dramatic absolute changes in this regard by 1980 — the Pacific division experiencing a greater positive increase than the

Table 4.3. Percent of Population Employed in the Seven Activities Defined by the Activity Hierarchy for the Nine Census Divisions, 1962 and 1980

	year	E_1	E_2	E_3	E_4	E_5	E_6	E_7
Northeast								
New England	1962	.087	.032	.013	.006	.004	.017	.004
	1980	.070	.032	.018	.082	.009	.028	.006
Middle Atlantic	1962	.077	.028	.008	.009	.005	.016	.008
	1980	.059	.026	.007	.011	.010	.023	.009
North Central								
East North Central	1962	.065	.045	.005	.006	.004	.009	.006
	1980	.062	.045	.004	.008	.009	.014	.007
West North Central	1962	.049	.019	.006	.006	.005	.009	.005
	1980	.047	.025	.007	.008	.009	.014	.006
South								
South Atlantic	1962	.062	.012	.001	.005	.004	.008	.003
	1980	.061	.017	.003	.009	.015	.013	.004
East South Central	1962	.054	.012	.001	.003	.003	.006	.001
	1980	.066	.024	.002	.005	.006	.008	.003
West South Central	1962	.034	.009	.003	.005	.004	.007	.004
	1980	044	.020	.005	.009	.010	.011	.006
West								
Mountain	1962	.026	.006	.004	.005	.005	.006	.002
	1980	.029	.011	.008	.009	.010	.010	.003
Pacific	1962	.046	.016	.012	.007	.005	.010	.004
	1980	.044	.020	.016	.012	.012	.015	.006

E_1= % employment in low technology manufacturing

E_2= % employment in medium technology manufacturing

E_3= % employment in high technology manufacturing

E_4= % employment in low technology, low skilled quaternary

E_5= % employment in medium technology, medium skilled quaternary

E_6= % employment in high technology, high skilled quaternary

E_7= % employment in administration (headquarters)

Table 4.4. Values for "t" (absorptive capacity of tertiary employment relative to declining manufacturing employment) and "s" (percent of population in SMSAs) for the Nine Census Divisions, 1962 and 1980

	year	t	s
Northeast			
New England	1962	.042	.703
	1980	.061	.766
Middle Atlantic	1962	.031	.818
	1980	.087	.877
North Central			
East North Central	1962	.039	.670
	1980	.098	.781
West North Central	1962	-.034	.413
	1980	.042	.533
South			
South Atlantic	1962	.026	.502
	1980	.076	.704
East South Central	1962	.007	.283
	1980	.051	.519
West South Central	1962	.001	.534
	1980	.017	.713
West			
Mountain	1962	-.040	.488
	1980	.020	.631
Pacific	1962	-.060	.791
	1980	.094	.894

Mountain Division. Moreover, the Pacific division has a high urbanization factor, which exhibits a positive increase between 1962 and 1980; the Mountain division has a low urbanization factor in 1962 that increases by 1980 but still remains low relative to urbanization in other divisions.

The **County Business Patterns** data at the state level (TABLE 4.5) reveal that within the Pacific, California dominates in high skilled quaternary and administrative activities and is quite strong with respect to all other activities except low technology manufacturing. High percentages of Hawaii's population are employed in low and medium skilled quaternary activities, which accords well with the policies that have been developed in Honolulu to attract headquarters operations and provide the service base necessitated by offices (Heenan 1977).

Whereas most states within the Pacific division exhibit relatively high scores, states within the Mountain division generally exhibit low scores, (although Colorado has relatively high employment in medium and high skilled quaternary activities and Nevada has relatively high employment in medium skilled quaternary activities). Colorado, Arizona, and Nevada are relatively urbanized, but the other states in the Mountain division exhibit low levels of urbanization. In 1980, both New Mexico and Arizona continue to exhibit negative scores for "t" (absorptive capacity of the tertiary sector relative to declining manufacturing employment), and although positive increases occurred in all states by 1980, values for "t" remain relatively low. Clearly, the changes in the Pacific division "carried" the West in its positive vertical change. The relative changes experienced by the South and the West between 1962 and 1980 are accounted for the positive vertical change of the Pacific division, relative to the negative vertical changes experienced by the

Table 4.5 Percent of Population Employed in the Seven Activities Defined by the Activity Hierarchy and Values for "t" and "s" for the States, 1962 and 1980

E_1= % employment in low technology manufacturing

E_2= % employment in medium technology manufacturing

E_3= % employment in high technology manufacturing

E_4= % employment in low technology, low skilled quaternary

E_5= % employment in medium technology, medium skilled quaternary

E_6= % employment in high technology, high skilled quaternary

E_7= % employment in administration (headquarters)

t= absorptive capacity of the tertiary sector relative to declining manufacturing employment

s= urbanization (% population in SMSAs)

		E_1	E_2	E_3	E_4	E_5	E_6	E_7	t	s
Northeast										
New England	ME 1962	.097	.006	.001	.003	.002	.005	.001	.036	.197
	1980	.083	.011	.002	.004	.004	.009	.002	-.046	.330
	NH 1962	.108	.034	.001	.004	.002	.009	.001	.029	.029
	1980	.071	.036	.015	.006	.006	.018	.002	.121	.507
	VT 1962	.057	.015	.006	.002	.002	.012	.001	.059	0
	1980	.055	.023	.010	.004	.006	.018	0	.070	.223
	MA 1962	.085	.034	.008	.007	.005	.020	.005	.029	.852
	1980	.065	.033	.016	.010	.010	.034	.006	.082	.853
	RI 1962	.109	.026	.003	.006	.004	.010	.002	.084	.862
	1980	.105	.025	.006	.007	.007	.022	.003	.047	.922
	CT 1962	.078	.041	.036	.006	.004	.020	.004	.058	.775
	1980	.064	.040	.032	.009	.009	.030	.010	.100	.883
Middle Atlantic	NY 1962	.071	.024	.011	.014	.006	.021	.010	.021	.855
	1980	.050	.021	.009	.014	.011	.030	.010	.070	.901
	NJ 1962	.073	.045	.009	.005	.004	.012	.005	.067	.789
	1980	.055	.034	.006	.009	.009	.016	.010	.124	.914
	PA 1962	.088	.026	.005	.005	.005	.011	.006	.032	.778
	1980	.075	.026	.006	.007	.010	.017	.008	.100	.819

Table 4.5 continued

			E_1	E_2	E_3	E_4	E_5	E_6	E_7	t	s
North Central											
East	OH	1962	.071	.041	.008	.005	.005	.008	.006	.038	.695
North		1980	.066	.043	.005	.007	.009	.013	.013	.102	.803
Central	IN	1962	.071	.045	.005	.004	.004	.007	.002	.021	.480
		1980	.071	.047	.004	.006	.007	.011	.004	.100	.698
	IL	1962	.068	.039	.005	.009	.005	.013	.008	.033	.769
		1980	.060	.039	.005	.010	.011	.021	.010	.087	.810
	MI	1962	.048	.058	.004	.005	.004	.009	.008	.070	.731
		1980	.048	.052	.002	.007	.009	.010	.008	.114	.827
	WI	1962	.018	.001	0	.005	.004	.003	.002	-.007	0
		1980	.016	.004	0	.007	.009	.004	.001	.050	.153
West	MN	1962	.042	.015	.005	.005	.004	.008	.006	-.020	.513
North		1980	.050	.023	.012	.010	.010	.015	.010	.046	.646
Central	IA	1962	.038	.020	.001	.004	.003	.007	.001	-.028	.332
		1980	.048	.038	.001	.006	.008	.014	.002	.029	.401
	MO	1962	.055	.014	.007	.007	.005	.010	.006	-.004	.578
		1980	.057	.027	.002	.008	.010	.014	.007	.074	.653
	ND	1962	.008	.001	0	.002	.002	.003	0	.020	.106
		1980	.015	.010	.001	.006	.007	.007	.001	-.037	.359
	SD	1962	.017	.001	0	.002	.002	.004	0	-.039	.127
		1980	.026	.009	.004	.005	.005	.008	.001	.017	.159
	NE	1962	.032	.009	.001	.006	.004	.009	.001	-.032	.375
		1980	.040	.018	.004	.008	.009	.017	.003	.016	.442
	KS	1962	.028	.009	.014	.004	.003	.004	.001	-.137	.378
		1980	.040	.024	.021	.007	.008	.010	.003	-.010	.468
South											
South	DE	1962	.054	.022	.002	.006	.004	.021	.020	.155	.688
Atlantic		1980	.042	.023	.006	.008	.007	.010	.021	.119	.670
	MD	1962	.057	.015	.002	.006	.005	.009	.002	.052	.782
		1980	.037	.018	.002	.010	.013	.007	.005	.133	.888
	DC	1962	.045	.002	0	.011	.019	.035	.006	-.038	1.00
		1980	.028	.001	0	.034	.059	.095	.010	.009	1.00
	VA	1962	.055	.013	.001	.004	.003	.006	.002	0	.509
		1980	.057	.017	.001	.007	.009	.013	.004	.757	.696
	WV	1962	.044	.017	0	.003	.003	.004	.002	.028	.309
		1980	.042	.015	.001	.004	.005	.005	.002	.097	.371
	NC	1962	.097	.010	.001	.003	.003	.006	0	.028	.245
		1980	.111	.024	.002	.005	.006	.011	.004	.056	.527
	SC	1962	.076	.023	.001	.003	.003	.005	.001	.021	.322
		1980	.094	.029	.003	.005	.006	.008	.002	.080	.597
	GA	1962	.075	.008	.001	.004	.003	.007	.003	.014	.460
		1980	.078	.013	.002	.008	.009	.011	.005	.083	.600
	FL	1962	.030	.007	.002	.008	.005	.008	.002	-.020	.655
		1980	.029	.012	.005	.012	.011	.012	.002	.035	.879

Table 4.5 continued

			E_1	E_2	E_3	E_4	E_5	E_6	E_7	t	s
East South Central	KY	1962	.038	.016	.001	.002	.003	.005	.002	-.005	.341
		1980	.046	.027	.002	.004	.006	.007	.003	.051	.445
	TN	1962	.066	.018	.001	.004	.003	.008	.002	-.012	.457
		1980	.076	.031	.002	.006	.006	.011	.003	.056	.628
	AL	1962	.060	.006	.002	.003	.003	.006	.001	.046	.455
		1980	.077	.014	.002	.005	.006	.008	.002	.048	.620
	MS	1962	.049	.004	0	.002	.002	.003	.001	-.011	.085
		1980	.063	.019	.001	.004	.005	.006	.001	.042	.271
West South Central	AR	1962	.049	.006	.001	.003	.002	.004	.001	-.041	.190
		1980	.093	.031	.003	.006	.007	.008	.003	.015	.391
	LA	1962	.032	.007	0	.004	.004	.006	.002	.062	.499
		1980	.035	.007	0	.009	.008	.009	.003	.058	.634
	OK	1962	.025	.008	.002	.005	.004	.006	.007	-.040	.439
		1980	.036	.021	.005	.007	.007	.009	.008	-.028	.585
	TX	1962	.034	.010	.004	.005	.004	.008	.004	-.001	.633
		1980	.042	.023	.006	.010	.011	.013	.007	.014	.800
West											
Mountain	MT	1962	.029	0	0	.003	.003	.003	.001	-.019	.225
		1980	.028	.002	0	.007	.008	.007	.001	.077	.240
	ID	1962	.038	.005	0	.003	.003	.004	.001	-.060	0
		1980	.044	.008	.002	.005	.007	.012	.003	.030	.183
	WY	1962	.018	.001	0	.005	.004	.003	.002	-.007	0
		1980	.016	004	0	.007	.009	.004	.001	.050	.153
	CO	1962	.033	.007	.012	.006	.006	.008	.003	-.060	.679
		1980	.036	.012	.013	.013	.014	.015	.005	.011	.809
	NM	1962	.011	.002	0	.005	.004	.004	.001	.038	.275
		1980	.017	.006	.002	.007	.008	.007	.001	-.021	.424
	AZ	1962	.022	.010	.005	.006	.005	.006	.001	-.093	.713
		1980	.024	.017	.010	.010	.010	.010	.003	-.005	.750
	UT	1962	.033	.010	.002	.005	.005	.007	.002	-.064	.674
		1980	.038	.011	.009	.008	.009	.009	.003	.033	.790
	NV	1962	.019	.003	.003	.006	.005	.004	0	.043	.743
		1980	.017	.006	.002	.011	.013	.008	.002	.017	.820
Pacific	WA	1962	.069	.007	.001	.006	.004	.006	.002	-.072	.631
		1980	.046	.009	.020	.009	.011	.012	.003	.805	.804
	OR	1962	.063	.012	.001	.005	.004	.006	.002	.009	.503
		1980	.059	.011	.009	.009	.010	.011	.004	.063	.649
	CA	1962	.041	.020	.016	.007	.005	.011	.004	-.074	.864
		1980	.043	.024	.018	.013	.012	.017	.007	.114	.949
	AK	1962	.022	0	0	.003	.003	.001	0	.023	0
		1980	.014	.001	0	.008	.010	.006	.002	.371	.432
	HI	1962	.037	.001	0	.007	.006	.005	.002	.066	.789
		1980	.025	.001	0	.014	.015	.010	.004	.098	.791

South Atlantic and West South Central divisions.

Despite its overall negative vertical change, the South has witnessed substantial positive changes, particularly in the South Atlantic. Although the South Atlantic, in relative terms, experienced a negative vertical change, in absolute terms it experienced substantial positive changes. Referring back to FIGURE 4.5, two clusters are apparent in 1962: an upper ranked cluster including the Middle Atlantic, New England, and East North Central divisions, and a lower ranked cluster including all six remaining divisions. In 1980, we again can discern upper and lower ranked clusters — the upper ranked cluster comprising the same divisions as in 1962 as well as the Pacific, and the lower ranked division comprising the West North Central, West South Central, East South Central, and Mountain divisions. By 1980, the South Atlantic, however, clearly appears as an intermediate ranked division in a cluster of its own. Thus, despite the negative vertical change experienced by the South Atlantic from 1962 to 1980, the substantial positive, absolute changes experienced by this division nevertheless have altered the structure of the regional (or divisional) hierarchy.

As indicated in TABLE 4.3, the South Atlantic is far below the Northeastern divisions in high skilled quaternary activities; nevertheless, the South Atlantic shows relatively high employment levels in this set of activities. (In 1962 .008 of the South Atlantic's population is employed in high skilled quaternary activities as opposed to .017 and .016 in New England and the Middle Atlantic divisions, respectively; in 1980 employment in these activities increases in the South Atlantic to .013, while employment in these activities increases in New England and the Middle Atlantic divisions to .028 and .023, respectively). Moreover, in 1980 the South Atlantic has the highest

percentage among all divisions of persons employed in medium skilled quaternary sector activities. Washington, D.C. shows particularly high scores in all quaternary activities and in administration; Maryland and Florida also score relatively high in these activities. The relatively high scores for Florida in quaternary sector activities are not surprising, given the growing business milieu in recent years. Despite the fact that businesses increasingly have been attracted to Atlanta, Georgia's scores in quaternary activities are relatively low because Atlanta has remained Georgia's principal if not exclusive attraction to businesses. Florida, on the other hand, has experienced greater decentralization of quaternary activities. In general, however, the South Atlantic has performed quite well in non-manufacturing activities and shows a high absorptive capacity of the tertiary sector relative to declining manufacturing employment in 1962, which increases from .026 to .076 in 1980. In 1962 urbanization is relatively low in the South Atlantic, but a substantial increase is apparent by 1980. West Virginia, Georgia, and the Carolinas have particularly low urbanization; however, all other states in the South Atlantic exhibit relatively high urbanization. In contrast to the set of conditions in the South Atlantic, the East and West South Central divisions have a much lower absorptive capacity of the tertiary sector than the South Atlantic. Furthermore, the East and West South Central divisions both have low percentages of persons employed in high skilled quaternary activities, although Texas is a notable exception. The West South Central scores slightly higher than the South Atlantic in 1962 and 1980 with respect to urbanization, Texas exhibiting the highest level of urbanization. The East North Central division exhibits much less urbanization than both the South Atlantic and West South Central divisions in both years.

The composition of the upper ranked cluster helps to explain the stability of the ranks of the Northeast and North Central regions at ranks #1 and #2, respectively. In the Northeast, although New England dropped in rank from #2 in 1962 to #4 in 1980, it remains in the upper ranked cluster. New England has the highest percentage of persons employed in low and high skilled manufacturing (.087 and .013, respectively), and also has the highest percentage of persons employed in high skilled quaternary activities both in 1962 and 1980 (.017 and .028, respectively). Within New England, Connecticut and Massachusetts clearly are the strongest states with respect to all quaternary sector and administrative activities. The Middle Atlantic division of the Northeast is stable at rank #1, exhibiting the highest percentage of persons employed in administrative activities in 1962 (.008) and 1980 (.009) and relatively high scores in all other types of activities. New York has particularly high percentages of persons employed in quaternary and administrative activities, but New Jersey and Pennsylvania also exhibit relatively high scores. Both New England and the Middle Atlantic show high urbanization in both years, although Maine, New Hampshire, and Vermont in New England are exceptions. Both of the Northeastern divisions also show a high absorptive capacity of the tertiary sector relative to declining manufacturing employment, although Maine drops significantly in this regard between 1962 and 1980.

In the North Central region, the East North Central division essentially maintains the North Central region's stability at rank #2, while the West North Central division remains in the lower ranked cluster, although it does experience a positive vertical change from rank #7 in 1962 to rank #6 in 1980. The East North Central division has the highest percentage of persons

employed in medium technology manufacturing (.045 in 1962 and 1980) and registers relatively high scores in other activities, including high order quaternary activities and administration. Furthermore, this division exhibits relatively high urbanization and absorptive capacity of the tertiary sector in 1962 and 1980. Wisconsin clearly is in a subordinate position to all other states in the East North Central division with respect to all variables. Ohio, Indiana, and Illinois dominate in all manufacturing activities, although Michigan has relatively high percentages of its population employed in all manufacturing activities and has the highest percentage of medium technology manufacturing. Illinois has the highest percentage in the East North Central division of persons employed in all quaternary activities and in administration, but the other states, excluding Wisconsin, are not far behind.

Whereas the East North Central division has particularly high employment in manufacturing activities as well as moderate scores in quaternary activities, the West North Central division has much lower scores in low and medium technology manufacturing (.019 in 1962 and .025 in 1980) and overall, shows relatively low employment in quaternary activities. Minnesota, Iowa, and Missouri are, however, exceptions, exhibiting relatively high scores in manufacturing, particularly low technology manufacturing. (Minnesota has an especially high percentage of its population employed in high technology manufacturing). Indeed, these three states also have the highest scores in quaternary activities — the other states, trailing. Urbanization is relatively low in the West North Central division in both years and across all states. The absorptive capacity of the tertiary sector relative to declining manufacturing employment registers as negative in 1962 and remains negative in 1980 for two states, Kansas and North Dakota.

The above stated general findings confirm that, in the aggregate, the overall changes in the South do not match or override the positive changes experienced in the Northeast, largely because the South has not developed the high order quaternary service base that characterized the Northeast. The overall percentage of the South's population employed in high skilled quaternary activities in 1962 is .007 and in 1980, .012; in the Northeast, .016 of the population is employed in these high order activities in 1962, and .024 in 1980. Areas of the South, such as the South Atlantic, are notable exceptions, but even the South Atlantic has not achieved the overall spatial dispersal of high order activities that has prevailed in the Northeast. Thus, the static indicators outlined in this section support a view of North-South differences in the United States that runs counter to the popular view that the South is in the process of superseding the Northeast. However, an examination of rates of change raises important questions about the short-term trends documented here. As indicated in TABLE 4.6, the South Atlantic experiences a negative vertical change even though the rate of change in the "R" value in the South Atlantic is greater than the rates of change in the Middle Atlantic, New England, East North Central, and West North Central divisions. This situation is also reflected in the more aggregate, 4-way regional classification: the "R" value for the South increases at a greater rate than for the Northeast and North Central regions, although the South experiences a negative vertical change. These results raise two alternative possibilities: 1) the phenomenon of "initial advantage" is being manifested, or 2) the high rate of change of lower ranked regions is indicative of long-term trends that will eventuate in lower ranked regions superseding higher ranked regions. These possibilities, as hypotheses, remain

Table 4.6. Functional and Vertical Changes in the Four Census Regions and Nine Census Divisions, 1962 to 1980

A. 4-Way Classification (regions listed in order of regional ranks, 1962)

region	functional change, 1962 to 1980 (absolute increase in "R" values)	vertical change, 1962 to 1980 (change in relative ranks)
Northeast	+.215	stable, rank #1
North Central	+.263	stable, rank #2
South	+.297	negative, rank #3 to rank #4
West	+.449	positive, rank #4 to rank #3

B. 9-Way Classification (divisions listed in order of division ranks, 1962)

division	functional change, 1962 to 1980 (absolute increase in "R" values)	vertical change, 1962 to 1980 (change in relative ranks)
Middle Atlantic	+.229	stable, rank #1
New England	+.190	negative, rank #2 to rank #4
East North Central	+.267	stable, rank #3
South Atlantic	+.319	negative, rank #4 to rank #5
Pacific	+.587	positive, rank #5 to rank #2
West South Central	+.248	positive, rank #7 to rank #6
West North Central	+.326	negative, rank #6 to rank #7
East South Central	+.272	stable, rank #8
Mountain	+.328	stable, rank #9

to be determined empirically through analyses of regional activity mixes in the future. However, by examining mean rates of change of the variables employed in this analysis, we can, for the present, assess general trends. The following section discusses mean rates of change and considers these two alternative possibilities.

4.4 Rates of Change among Variables in the Regional Index: Changing Trends in the United States?

TABLE 4.7 summarizes the data on the means, standard deviations, and mean rates of change between 1962 and 1980 for the percentage of regions' populations employed in the seven activities and for "t" and "s" for the four Census Regions and the nine Census Divisions. Examining mean rates of change at the level of the four Census Regions, we find that the rates of change in manufacturing activities in the Northeast are quite low, and even negative in the case of low technology manufacturing (-.016). The rate of change in low skilled quaternary activities is also low (.002), and the rate of change in medium skilled quaternary activities registers as zero. Significantly, the rate of change in high skilled quaternary activities (.009) is higher than in any other region. The rate of change in administrative activities in the Northeast is average (.002), the rate of change in "t" is low (.028), and the rate of change in urbanization, "s", is relatively low (.119). Thus, the outstanding dynamic element in the Northeast, relative to other regions, is the high and positive rate of change in the percentage of the population employed in high skilled quaternary sector activities. Not only is the Northeast strong in this set of activities in terms of static indicators, but it is also strongest with respect to rates of change.

The North Central region, ranked #2 in 1962 and 1980, exhibits much

Table 4.7. Means, Standard Deviations, and Mean Rates of Change for Seven Activities, "t", and "s" for the Four Census Regions and Nine Census Divisions, 1962-1980

E_1= % employment in low technology manufacturing

E_2= % employment in medium technology manufacturing

E_3= % employment in high technology manufacturing

E_4= % employment in low technology, low skilled quaternary

E_5= % employment in medium technology, medium skilled quaternary

E_6= % employment in high technology, high skilled quaternary

E_7= % employment in administration (headquarters)

t= absorptive capacity of the tertiary sector relative to declining manufacturing employment

s= urbanization (% population in SMSAs)

		E_1	E_2	E_3	E_4	E_5	E_6	E_7	t	s
Northeast	$\bar{x}$ 1962	.085	.028	.009	.006	.004	.013	.004	.046	.587
	S.D. 1962	.017	.012	.011	.003	.001	.006	.003	.021	.353
	$\bar{x}$ 1980	.069	.028	.011	.008	.004	.022	.006	.074	.706
	S.D. 1980	.017	.009	.009	.003	.001	.147	.004	.052	.276
	$\bar{x}$ rate of change	-.016	0	.002	.002	0	.009	.002	.028	.119
New England	$\bar{x}$ 1962	.089	.026	.009	.005	.003	.013	.002	.349	.477
	S.D. 1962	.020	.013	.013	.002	.001	.006	.002	.022	.393
	$\bar{x}$ 1980	.074	.028	.014	.007	.007	.022	.004	.062	.620
	S.D. 1980	.018	.011	.011	.003	.002	.009	.004	.059	.306
	$\bar{x}$ rate of change	-.015	.002	.005	.002	.004	.009	.002	.013	.143
Middle Atlantic	$\bar{x}$ 1962	.077	.032	.008	.008	.005	.015	.007	.040	.807
	S.D. 1962	.009	.012	.003	.005	.001	.006	.003	.024	.042
	$\bar{x}$ 1980	.060	.027	.007	.010	.010	.021	.009	.098	.878
	S.D. 1980	.013	.007	.002	.004	.001	.008	.001	.027	.052
	$\bar{x}$ rate of change	-.017	-.005	-.001	.002	.005	.006	.002	.058	.071
North Central	$\bar{x}$ 1962	.041	.021	.004	.005	.004	.007	.003	.007	.424
	S.D. 1962	.022	.020	.004	.002	.001	.003	.003	.052	.253
	$\bar{x}$ 1980	.045	.028	.005	.007	.009	.012	.005	.049	.535
	S.D. 1980	.018	.016	.006	.002	.002	.005	.004	.048	.240
	$\bar{x}$ rate of change	.004	.007	.001	.002	.005	.005	.002	.056	.111
East North Central	$\bar{x}$ 1962	.055	.037	.004	.006	.004	.008	.005	.031	.535
	S.D. 1962	.023	.021	.003	.002	.001	.004	.003	.028	.319
	$\bar{x}$ 1980	.052	.037	.003	.007	.009	.012	.007	.091	.658
	S.D. 1980	.022	.019	.002	.002	.001	.006	.005	.025	.287
	$\bar{x}$ rate of change	-.003	0	-.001	.001	.005	.005	.002	.060	.123

Table 4.7 continued

		E_1	E_2	E_3	E_4	E_5	E_6	E_7	t	s
West North Central	$\bar{x}$ 1962	.031	.010	.004	.004	.003	.006	.002	-.053	.344
	S.D. 1962	.016	.007	.005	.002	.001	.003	.003	.049	.178
	$\bar{x}$ 1980	.039	.021	.006	.007	.008	.012	.004	.019	.447
	S.D. 1980	.015	.010	.007	.002	.002	.004	.003	.036	.171
	$\bar{x}$ rate of change	.008	.011	.002	.003	.005	.006	.002	.053	.103
South										
	$\bar{x}$ 1962	.052	.011	.001	.004	.004	.009	.003	.014	.475
	S.D. 1962	.019	.006	.001	.002	.004	.008	.005	.048	.228
	$\bar{x}$ 1980	.058	.019	.003	.008	.011	.014	.005	.096	.624
	S.D. 1980	.026	.008	.002	.007	.013	.021	.005	.175	.194
	$\bar{x}$ rate of change	.006	.008	.002	.004	.007	.005	.002	.082	.149
South Atlantic	$\bar{x}$ 1962	.059	.013	.001	.005	.005	.011	.004	.027	.552
	S.D. 1962	.020	.007	.001	.003	.005	.010	.006	.055	.250
	$\bar{x}$ 1980	.058	.024	.002	.010	.014	.019	.006	.152	.692
	S.D. 1980	.030	.023	.002	.009	.017	.029	.006	.230	.199
	$\bar{x}$ rate of change	-.001	.011	.001	.005	.009	.008	.002	.125	.140
East South Central	$\bar{x}$ 1962	.053	.011	.001	.003	.003	.006	.002	.005	.335
	S.D. 1962	.012	.007	.001	.001	.001	.002	.001	.028	.175
	$\bar{x}$ 1980	.066	.023	.002	.005	.006	.008	.002	.049	.491
	S.D. 1980	.014	.008	.001	.001	.001	.002	.001	.006	.169
	$\bar{x}$ rate of change	.013	.012	.001	.002	.003	.002	0	.044	.156
West South Central	$\bar{x}$ 1962	.035	.018	.002	.004	.004	.006	.004	-.005	.440
	S.D. 1962	.010	.012	.002	.001	.001	.002	.003	.048	.186
	$\bar{x}$ 1980	.052	.021	.004	.008	.008	.010	.005	.015	.603
	S.D. 1980	.028	.010	.003	.002	.002	.002	.003	.035	.168
	$\bar{x}$ rate of change	.017	-.013	.002	.004	.004	.004	.001	.020	.163
West										
	$\bar{x}$ 1962	.033	.006	.003	.005	.004	.005	.002	-.021	.469
	S.D. 1962	.017	.006	.005	.001	.001	.003	.001	.053	.325
	$\bar{x}$ 1980	.031	.009	.007	.009	.010	.010	.003	.126	.800
	S.D. 1980	.014	.007	.007	.003	.002	.004	.002	.227	.276
	$\bar{x}$ rate of change	-.002	.003	.004	.004	.006	.005	.001	.147	.131
Mountain	$\bar{x}$ 1962	.025	.005	.003	.005	.004	.005	.001	-.023	.414
	S.D. 1962	.009	.004	.004	.001	.001	.002	.001	.050	.324
	$\bar{x}$ 1980	.028	.008	.005	.009	.010	.009	.002	.024	.521
	S.D. 1980	.011	.005	.005	.003	.002	.003	.001	.031	.301
	$\bar{x}$ rate of change	.003	.003	.002	.004	.006	.004	.001	.052	.107
Pacific	$\bar{x}$ 1962	.046	.008	.004	.006	.004	.006	.002	-.010	.557
	S.D. 1962	.019	.008	.007	.002	.001	.004	.001	.062	.342
	$\bar{x}$ 1980	.037	.009	.009	.011	.012	.011	.004	.290	.725
	S.D. 1980	.018	.009	.010	.003	.002	.004	.002	.313	.195
	$\bar{x}$ rate of change	-.009	.001	.005	.004	.006	.004	.002	.300	.168

more positive rates of change in low and medium technology manufacturing (.004 and .007, respectively) than the Northeast and a lower rate of change in high technology manufacturing (.005). Low skilled quaternary activities experience the same rate of change in the Northeast and North Central regions, although medium skilled quaternary activities increased .005 in the North Central region as opposed to a zero rate of change in the Northeast. The rate of change in the high skilled quaternary sector in the North Central region is, however, lower than in the Northeast, and the rate of change in administrative activities is identical for these two regions. The absorptive capacity of the tertiary sector relative to declining manufacturing employment increases at a greater rate in the North Central region (.056) than in the Northeast (.028), but the rate of change in urbanization is lower.

Nearly constant rates of change may also have significant implications for the South. Comparing the South with the North Central region, the rates of change in all types of employment (except in high skilled quaternary and administrative activities, which change at the same rate in both regions) are greater in the South; similarly, urbanization and the absorptive capacity of the tertiary sector relative to declining manufacturing employment change at higher rates in the South than in the North Central region. Comparing the South with the Northeast, we find that with the exception of high technology manufacturing and administrative activities, the rate of change in all other types of activities and with respect to "t" and "s" are higher in the South than in the Northeast (— the rates of change in high technology manufacturing and in administration are identical in the Northeast and in the South). Thus, if rates of change remain nearly constant, the South (ranked

lowest in 1980) conceivably could supersede the North Central and perhaps the Northeast. Note also that the rates of change are higher in the West than in the South only with respect to high technology manufacturing and tertiary absorption of manufacturing employment.

Interestingly, the impression arrived at from an examination of regions based on rates of change is essentially the antithesis of the impression arrived at from an examination of regions based on static indicators. Whereas the static indicators support a view that strongly contrasts with popular interpretations of regional changes in the United States, mean rates of change are consistent with this popular view.

The pertinent question to raise here is whether we can expect rates of change to remain nearly constant. With respect to administrative activities, we can probably expect greater regional convergence because headquarter locations are becoming continually dispersed throughout the nation (Semple and Phipps 1982). As the data in TABLES 4.1 and 4.3 indicate, high order quaternary activities are also becoming more dispersed, probably as a function of the decentralization of headquarters operations. To a large extent, this overall decentralization of high skilled, high order activities is directly related to the growing needs of corporations for these types of activities in a post-industrial context. However, as these activities are becoming more dispersed across regions, they tend to be concentrated in large urban centers within each region, resulting in a situation of "concentrated dispersal" (Stephens and Holly 1980, 1981). This concentrated dispersal implies both regional convergence with respect to high order quaternary sector activities and, in the case of less urbanized regions, disparate conditions at the intra-regional level.

The potential repercussions of these dual processes for the South are that rates of change may decline unless high order activities become dispersed among the component divisions and throughout the individual states. In the South Atlantic division, mean rates of change for high order activities are high and mean scores on these activities indicate substantial positive functional changes, yet these activities tend to be spatially centralized in "pockets", although Florida is a notable exception of a state that has experienced decentralization of these activities.

Lagging regions that currently show high rates of change in high order activities but still have relatively low scores in terms of static indicators can "catch up" or even supersede top ranking regions if decentralization of these high order activities develops on an intra-regional basis. To forecast this potential outcome based on rates of change in the 1962-1980 period is statistically possible, but practically precarious. The danger of such a forecast is first, that the trends documented in this study may pertain to short-term rather than long-term phenomena. Second, the achievement of such substantial vertical changes on the part of lagging regions is largely dependent upon the development of policies that recognize and seek to implement decentralization of high order activities. The viewpoint adopted here is that lagging regions may overcome obstacles of "initial advantage" if action in the form of public and private sector policy is taken. Greater private sector action exhibiting "social responsibility" can effect significant changes, and may offset federal budget cuts in social programs. For example, corporate headquarters can locate certain types of activities in economically depressed areas or can provide time for high echelon employees to train unskilled workers. Corporations such as Aetna Life and Casualty,

Arco, Control Data and others recently have pursued policies of "social responsibility", although most corporate decision-makers, to date, look askance as these efforts (Boal 1983).

Notes to Chapter 4

1. Although the Dun and Bradstreet data are ideal for this type of study, they are, of course, imperfect. For example, this data set does not include enough information to incorporate in an analysis the types of activities associated with the second stage of the product cycle. Other shortcomings of the Dun and Bradstreet data have been noted by Birch (1979b), who used these data to assess life-cycles of establishments (Birch 1979a), and by Schmenner (1982) to assess locational strategies of manufacturing companies. Both Schmenner and Birch (1979b) noted that the Dun and Bradstreet data base must be considered a sample rather than a census. This data set underrepresents births of new firms, and often excludes infant firms that die within a couple of years. Migrant firms, or relocating firms, may appear as firm births and deaths. Branch plant age is not provided, and employment in branch plants may be underrepresented. Finally, errors — clerical errors or misleading results from interviews — may have consequences for incorrect SICs (Standard Industrial Classification codes), incorrect employment numbers, data on net worth, and so on. Armington and Odle (1982) have noted that employment figures are incorrect in 49% of the cases. Although the errors in employment numbers have consequences for the usage of this data with respect to the regional index, the other problems noted above are less relevant. First, whereas Schmenner and Birch from somewhat different perspectives explicitly addressed life-cycles of individual establishments, this research will collect data at the establishment level and then aggregate, first to the SMSA level, and then to the regional level. Trajectories of individual establishments are not a principal concern here. Furthermore, problems presented by the data for fine scale time series analyses for two and three year intervals will not affect this research, which is concerned with change over longer periods of time.

2. The **County Business Patterns** data used in this study are preferred over other conventional data sources that do not include as wide a range of information. For example, **Industrial Research Laboratories of the United States** (see Cattell) is an excellent source, but only for R&D and some corporate service activities. The **United States Census of Manufacturers** (see Industry Division of the Bureau of the Census, United States Department of Commerce) and the **State Directories of Manufacturers** (see MacRae's Blue Book, Inc.(a)) are logical sources for manufacturing data, but they exclude all other types of activities. Moreover, Schmenner (1982) notes that confidentiality restrictions limit the value of the **United States Census of Manufacturers.** The **Thomas Register** (see Thomas Publishing Co.) contains manufacturing data, but only for manufacturing companies; i.e. individual establishments are not listed. **MacRae's Industrial Directories** (see MacRae's Blue Book, Inc.(b)) includes information on manufacturing establishments as well as manufacturing establishments associated with R&D (stage 2 of the product cycle), but information on R&D that is associated with finance, administration, and corporate services is excluded. In sum, **County Business Patterns** was chosen for this analysis because it includes the widest range of

information compared to other conventional and accessible data sources.

3. Data from **County Business Patterns** were also used for the years 1947 and 1965 in order to account for time 1 employment in the measurement of the absorptive capacity of the tertiary sector relative to the manufacturing sector from time 1 to time 2. Thus, the absorptive capacity of tertiary employment relative to manufacturing employment is measured between 1947 and 1962, and between 1965 and 1980.

4. Following the project that will operationalize the ideal index using the Dun and Bradstreet data, the occupational data for 1960 and 1980 will be collected and operationalized, and the results of this analysis will be compared with the results using the **County Business Patterns** data and the Dun and Bradstreet data. At present, the extent to which industrial as opposed to occupational data presents a limitation is unclear.

Chapter 5

The Basis of Regional Differentiation: Discriminant Analysis

Whereas the previous chapter focused on the relative contributions of the variables to "R" values and relative regional rank, this chapter focuses on the relative contribution of the variables to regional differentiation — that is, it identifies the variables that best discriminate or separate regions. A discriminant analysis, which forces groups to be as statistically distinct as possible, was performed using SPSS (**Statistical Package of the Social Sciences**) (see Nie et al. 1975). Discriminant analysis then classifies cases (states) with respect to particular groups (regions). This procedure is useful in ascertaining how well the discriminating variables separate regions. If a large percentage of states are classified correctly, then the variables selected for the analysis may be considered pertinent and appropriate. The classification procedure also indicates the degree of homogeneity that characterizes regions. The first section of this chapter discusses the results of the discriminant analysis with respect to regional differentiation first, for the four Census Regions in 1962 and 1980, and subsequently for the nine Census Divisions in these years. The variables employed are the independent variables in the equation representing the modified regional index that was specified in the previous chapter. The second section presents the results of the classification procedure for the four Census Regions and the nine Census Divisions in 1962 and subsequently for both these regional classifications in

1980. The final section discusses the implications of regional homogeneity/heterogeneity indicated by the classification procedure for regional economic change.

5.1 Discriminant Analysis: The Basis of Regional Differentiation

5.1.1 Regional differentiation: the four Census Regions, 1962 and 1980

TABLES 5.1-5.3 provide the results from the discriminant analysis following the direct method for the four Census Regions in 1962. As indicated in TABLE 5.1, only the first two functions are significant, the first function explaining 72.10% of the variance, and the second function explaining 21.01%. TABLE 5.2 provides the coefficients for the variables on the first two functions. The particularly high coefficients for high and medium skilled quaternary activities on the first function indicate that, as a factor, the first function primarily is characterized by these activities. This finding is consistent with the rapid rise of high skilled service activities in post-industrial societies. Administration also has a relatively high coefficient, although not as high as for medium and high skilled quaternary activities. Note that the coefficient for administrative activities has the same sign as the coefficient for medium skilled quaternary activities (negative), indicating that the ratio of high skilled quaternary to medium skilled quaternary and administrative activities discriminates among regions. Low technology manufacturing (having a positive sign) also discriminates regions, although to a lesser extent than quaternary activities.

The outstanding coefficient on the second function is for medium technology manufacturing; low technology manufacturing has the second highest coefficient. Interpreted as a factor, the second function is

REGIONAL DIFFERENTIATION DETERMINED BY THE DISCRIMINANT FUNCTIONS: 4-WAY REGIONAL CLASSIFICATION, 1962

Table 5.1. Canonical Discriminant Functions

function	eigenvalue	% of variance	cumulative %	canonical correlation	after function	chi-squared	significance
					0	90.61	0.00
1	2.63	72.10	72.10	.85	1	34.51	0.00
2	0.77	21.01	93.11	.66	2	9.75	0.20
3	0.25	6.89	100.00	.45			

Table 5.2. Rotated Standardized Canonical Discriminant Function Coefficients

variable	function 1	function 2
low tech. manufacturing	1.57	1.95
medium tech. manufacturing	-0.06	-2.61
high tech. manufacturing	-0.11	0.47
low skilled quaternary	0.24	-0.24
medium skilled quaternary	-4.30	-0.19
high skilled quaternary	4.83	0.10
administration	-2.08	0.06
tertiary/ manufacturing	0.80	0.29
urbanization factor	0.06	0.48

Table 5.3. Canonical Discriminant Functions Evaluated at Group Means (Group Centroids)

region	function 1	function 2
Northeast	2.99	0.49
North Central	-0.38	-1.52
South	0.01	0.54
West	-1.73	0.36

characterized primarily by medium and low technology manufacturing, particularly the former. Again, the two activities that principally characterize the function have opposite signs, indicating a high ratio of low to medium technology manufacturing employment. As indicated in APPENDIX A, figures 1 and 2, manufacturing activities are indeed skewed toward the low technology end.

Relating these functions, interpreted as factors, to the four Census Regions (TABLE 5.3), we see that the Northeast and the West have high group centroids on the first function, characterized by high and medium skilled quaternary, administrative, and low technology manufacturing activities. The Northeast registers as high and positive on the first function and the West registers as high and negative. These findings show a high ratio of high skilled quaternary and low technology manufacturing employment to medium skilled quaternary and administrative employment in the Northeast; in West, this ratio is reversed. The second function, characterized by a high ratio of low to medium technology manufacturing, neatly distinguishes the North Central region — the traditional industrial tier of the United States — as characterized by a high ratio of medium to low technology manufacturing employment.

The results of the discriminant analysis for the four Census Regions in 1980 (TABLES 5.4-5.6) are similar to the 1962 results, except that low technology manufacturing disappears as a discriminating variable. TABLE 5.4 indicates that again, only the first two functions are significant — the first function again explaining most of the variance, although the amount explained is slightly smaller than in 1962. As indicated in TABLE 5.5, the first function, interpreted as a factor, is characterized primarily by medium

Table 5.4. Canonical Discriminant Functions

function	eigenvalue	% of variance	cumulative %	canonical correlation	after function	chi-squared	significance
					0	101.09	0.00
1	2.66	65.58	65.58	.85	1	44.70	0.00
2	0.99	24.44	90.03	.70	2	14.76	0.04
3	0.40	9.97	100.00	.54			

Table 5.5. Rotated Standardized Canonical Discriminant Function Coefficients

variable	function 1	function 2
low tech. manufacturing	0.00	0.61
medium tech. manufacturing	-0.10	-1.36
high tech. manufacturing	-0.03	0.16
low skilled quaternary	0.51	-0.41
medium skilled quaternary	-4.27	0.01
high skilled quaternary	3.75	0.07
administration	-0.22	0.05
tertiary/manufacturing	0.19	0.32
urbanization factor	0.25	0.60

Table 5.6. Canonical Discriminant Functions Evaluated at Group Means (Group Centroids)

region	function 1	function 2
Northeast	2.94	0.13
North Central	-0.11	-1.60
South	-0.41	0.33
West	-1.40	0.96

skilled quaternary activities, and secondarily by high skilled quaternary activities, which again have opposite signs. In 1980, medium skilled quaternary activities have a higher coefficient than high skilled quaternary activities, meaning that the former are a better discriminator among regions. This indicates that high skilled quaternary activities are becoming more dispersed, and thus have less discriminatory power. This finding also is consistent with occupational polarization in post-industrial society, meaning that most jobs are either high skilled and high paying or low skilled and low paying (Stanback and Noyelle 1982). Interestingly, administrative activities do not have a significant coefficient on either function. This decline in the influence of administration as a significant discriminating variable is not surprising because headquarters are becoming much more spatially dispersed. The second function in 1980 is characterized primarily by medium technology manufacturing; low technology manufacturing has a relatively low coefficient. Apparently, lowest order activities — like highest order activities (administration) — are becoming much more dispersed and thus have waned significantly in importance as a regional discriminator.

The group centroids in 1980 (TABLE 5.6) are quite similar to the centroids obtained for the 1962 data. Again, the first function, defined in terms of medium and high skilled quaternary activities separate out the Northeast and the West with high and positive and high and negative group centroids, respectively. Thus, in 1980, as in 1962, the West has a high ratio of medium to high skilled quaternary employment, and conversely, the Northeast has a high ratio of high to medium skilled quaternary employment. In regard to the second function, the North Central again is separated from all other regions. This separation is accounted for by the

dominance of medium technology manufacturing. The West has a relatively high and positive group centroid on this second function, indicating a high ratio of low to medium technology manufacturing.

To summarize, the four Census Regions both in 1962 and 1980 are differentiated primarily on the basis of high order activities, and secondarily, on the basis of low order activities. Two important changes between 1962 and 1980 have occurred. First, although medium and high skilled quaternary activities are both significant on the first function in both years, medium skilled quaternary activities became the more important discriminator in 1980. Second, administration has significant discriminatory power in 1962 but does not have a high coefficient on either function in 1980. This same situation occurs with respect to low technology manufacturing. These two changes together signify the growing decentralization and thus the lack of regional discriminating power of lowest and highest order activities, although relatively high order activities (medium and high skilled quaternary) and relatively low order activities (medium technology manufacturing) still function to discriminate the four Census Regions in 1980. Specifically, the Northeast and the West are farthest apart along the dimension defined by quaternary sector activities — the Northeast exhibiting a high ratio of high to medium skilled quaternary employment. The North Central region, the traditional industrial tier of the United States, is clearly separated from all other regions along the dimension defined by manufacturing activities, particularly medium technology manufacturing. In 1980, the West has a higher ratio of low to medium technology manufacturing than either the South or the Northeast. Interestingly, the results of the discriminant analysis operationalized for the nine Census Divisions largely repeat the results

obtained for the four Census Regions in 1962, but the results in 1980 are quite different.

5.1.2 Regional differentiation: the nine Census Divisions, 1962 and 1980

TABLES 5.7-5.9 provide the results of the discriminant analysis for the nine Census Divisions in 1962. As indicated in TABLE 5.7, only the first two functions are significant. TABLE 5.8 shows that the dimensions revealed by these two functions are quite similar to those for the four Census Regions in 1962. Again, high and medium skilled quaternary activities, particularly the former, have the highest coefficients, again exhibiting opposite signs. As is the case for the four Census Regions, administration also has a relatively high coefficient on the first function, and again it exhibits the same sign as for medium skilled quaternary activities. In 1962, and with respect to the four Census Regions, low technology manufacturing has a higher coefficient on the second function; however, the opposite situation obtains with respect to the nine Census Divisions. Thus, the first function in 1962, interpreted as a factor, includes the same components as in the case of the four Census Regions (high and medium skilled quaternary activities and administration and low technology manufacturing). An examination of the signs associated with all the significant coefficients on the first function for the 9-way classification reveals that medium skilled quaternary and administrative activities have the same sign, as do high skilled quaternary and low technology manufacturing. This indicates that, with respect to these variables, most employment is in high skilled quaternary and low technology manufacturing activities. Once again, the polarization of the labor force is indicated. The second function, interpreted as a factor, is clearly defined in terms of medium technology manufacturing exclusively.

Table 5.7. Canonical Discriminant Functions

function	eigenvalue	% of variance	cumulative %	canonical correlation	after function	chi-squared	significance
					0	154.67	0.00
1	5.10	63.35	63.35	.91	1	80.54	0.02
2	1.91	23.73	87.08	.81	2	36.75	0.70
3	0.50	6.23	93.31	.58	3	20.09	0.91
4	0.27	3.36	96.67	.46	4	10.27	0.96
5	0.19	2.35	99.02	.40	5	3.18	0.99
6	0.05	0.62	99.63	.22	6	1.19	0.98
7	0.03	0.33	99.97	.16	7	0.11	0.95
8	0.00	0.03	100.00	.05			

Table 5.8. Rotated Standardized Canonical Discriminant Function Coefficients

variable	function 1	function 2
low tech. manufacturing	-1.29	1.25
medium tech. manufacturing	0.37	-3.29
high tech. manufacturing	0.43	0.86
low skilled quaternary	-0.77	0.02
medium skilled quaternary	5.48	0.36
high skilled quaternary	-6.42	0.34
administration	2.29	0.43
tertiary/ manufacturing	-0.04	0.20
urbanization factor	0.11	-0.05

Table 5.9. Canonical Discriminant Functions Evaluated at Group Means (Group Centroids)

region	function 1	function 2
New England	-3.46	0.06
Middle Atlantic	-1.66	-0.67
East North Central	0.57	-3.46
West North Central	0.50	-0.03
South Atlantic	-0.43	0.63
East South Central	-0.34	0.30
West South Central	0.79	0.53
Mountain	1.85	0.70
Pacific	1.33	0.91

The group centroids for the nine Census Divisions shown for the two functions in 1962 (TABLE 5.9) indicate strikingly similar results to those for the four Census Regions in this year. With respect to the four Census Regions, the Northeast and the West have the highest group centroids on the first function, in opposite directions. In the case of the nine Census Divisions, both Northeastern divisions (New England and the Middle Atlantic) have the highest group centroids in one direction on the first function, and both divisions of the West (the Pacific and Mountain) have the highest group centroids in the opposite direction. Thus, the western and northeastern divisions are statistically the farthest apart along the dimension defined by medium and high quaternary activities, administration, and low technology manufacturing, suggesting relative homogeneity among the divisions in the Northeast and the West, respectively, regarding this dimension. The North Central region's status as a region dominated by medium technology manufacturing is shown on the the second function in TABLE 5.9 as dependent on the activities in the East North Central division. Both divisions of the West, (the Pacific and Mountain, particularly the former), are again shown to have a higher ratio of low to medium technology manufacturing than any of the other divisions of the Northeast and the South.

Although the results of the discriminant analysis for the nine Census Divisions in 1962 closely match the results for the four Census Regions, the 1980 results for the 9-way classification (TABLES 5.10-5.12) are quite different from the 1980 results for the 4-way classification. TABLE 5.10 indicates that three, rather than two functions are significant. Whereas the first functions for the the nine Census Divisions in 1962 and for the four

REGIONAL DIFFERENTIATION DETERMINED BY THE DISCRIMINANT FUNCTIONS: 9-WAY REGIONAL CLASSIFICATION, 1980

Table 5.10. Canonical Discriminant Functions

function	eigenvalue	% of variance	cumulative %	canonical correlation	after function	chi-squared	significance
					0	185.67	0.00
1	3.89	44.62	44.62	.89	1	120.57	0.00
2	2.38	27.27	71.88	.84	2	70.65	0.00
3	1.52	17.40	89.29	.78	3	32.78	0.33
4	0.53	6.05	95.34	.59	4	15.40	0.75
5	0.24	2.82	98.16	.44	5	6.39	0.89
6	0.08	0.90	99.05	.27	6	3.29	0.77
7	0.06	0.74	99.79	.25	7	0.98	0.69
8	0.02	0.21	100.00	.13			

Table 5.11. Rotated Standardized Canonical Discriminant Function Coefficients

variable	function 1	function 2	function 3
low tech. manufacturing	-0.22	0.11	0.19
medium tech. manufacturing	1.33	0.18	-0.28
high tech. manufacturing	-0.49	0.14	0.29
low skilled quaternary	0.05	-1.01	0.09
medium skilled quaternary	0.08	4.93	0.00
high skilled quaternary	0.17	-3.68	0.01
administration	-0.11	0.11	-0.11
tertiary/manufacturing	-0.09	0.01	1.09
urbanization factor	-0.13	-0.13	0.08

Table 5.12. Canonical Discriminant Functions Evaluated at Group Means (Group Centroids)

region	function 1	function 2	function 3
New England	0.32	-3.01	0.39
Middle Atlantic	0.62	-1.81	0.67
East North Central	3.73	0.54	-0.05
West North Central	0.33	-0.14	-1.20
South Atlantic	-0.40	0.52	0.39
East South Central	0.50	0.16	-0.42
West South Central	0.09	0.45	-1.05
Mountain	-1.55	0.99	-0.59
Pacific	-2.23	1.34	2.28

Census Regions in 1962 and in 1980 primarily represent high order activities, and the second functions, low order activities, the reverse situation obtains in 1980 for the nine Census Divisions. This first function is represented clearly by medium technology manufacturing; the second function, primarily by medium and high skilled quaternary activities and to a lesser extent, low skilled quaternary activities. Note that again, in 1980, medium skilled quaternary activities have a higher coefficient than high skilled quaternary activities, indicating the growing decentralization of these high skilled activities. The representation of quaternary activities on the second as opposed to the the first function in 1980 indicate that the entire quaternary sector (including low, medium, and high skilled activities) has lost much of its discriminatory power as a consequence of the increasing dispersion of quaternary activities in general. Indeed, headquarters are becoming sufficiently spatially dispersed that administration is not significantly represented on any function in 1980 with respect to either the four Census Regions and the nine Census Divisions.

Although the results from the 4-way regional classification indicate the growing dispersal of headquarters by 1980, this classification scheme is apparently too aggregate to reveal the general decentralization of all quaternary activities that is shown for the nine Census Divisions. Furthermore, the 4-way classification does not reveal a third function in 1980 that is indicated for for the 9-way classification. This third function is clearly represented by "t", the absorptive capacity of tertiary employment relative to manufacturing employment. Not surprisingly, this variable does not register as significant until 1980, and then only slightly, since the third function is much less significant than the first two functions.

The group centroids for the nine Census Divisions show that the East North Central division in 1980 again registers high and positive along the dimension defined by medium technology manufacturing. Both the western divisions in 1980, (the Pacific and Mountain), have high and negative group centroids along this dimension, indicating low employment in medium technology manufacturing. On the second function, defined in terms of medium, high, and low skilled quaternary activities, the Pacific has a high and positive group centroid and the northeastern divisions (New England and the Middle Atlantic) have high and negative group centroids. Again, the northeastern and western (at least with respect to the Pacific) divisions are separated from the other regions in opposite directions on the basis of quaternary activities. The Pacific and Mountain divisions show a high ratio of medium skilled quaternary to low and high skilled quaternary employment; conversely, New England and the Middle Atlantic show a high ratio of high and low skilled quaternary to medium skilled quaternary employment. On the third function, the Pacific is clearly separated from all other divisions along the dimension defined by the absorptive capacity of the tertiary sector relative to manufacturing employment. Referring back to TABLE 4.7 in the previous chapter, we find that the Pacific division has the highest score for "t" compared to all other divisions. Both the West North Central and the West South Central divisions have significant group centroids on the third function, in the opposite direction from the group centroid for the Pacific — meaning that these regions have not developed a sufficient tertiary sector to compensate for declining manufacturing employment.

To summarize, the results of the discriminant analysis for the nine Census Divisions indicate that in 1962 high order activities and low

technology manufacturing are the most important discriminators and low order medium technology manufacturing has secondary importance. By 1980 this situation reverses, and low order activities become the most significant discriminator — high order activities assuming secondary importance. In 1980 we also find that a third function is significant and introduces a dimension ("t"), that is directly related to post-industrial processes. The constellation of dimensions in 1980 actually is easily conceptualized in terms of post-industrial, service economy institutions: quaternary sector activities (that are associated with post-industrial society) are sufficiently dispersed across all the divisions in 1980 to render these activities only of secondary importance; instead, low order, medium technology manufacturing activities assume primary importance; and finally, problems of structural unemployment register as a third factor in explaining regional differentiation. The following section discusses the results of the classification procedure performed by the discriminant analysis, which attest to the appropriateness of the selected variables by virtue of the relatively large number of correctly classified cases in the respective regions.

5.2 The Classification Procedure

The classification procedure of the discriminant analysis provides an equation for each group, wherein a classification score for a particular region is determined by a linear combination of the raw scores on the variables weighted by classification coefficients plus a constant. Each case has several scores given by the classification equations — the number determined by the number of groups or regions. Each case is then assigned to a region for which it has the greatest probability of group membership. This

classification procedure is often used deductively in research — that is, the researcher theoretically determines hypothetical groups and uses the classification procedure to confirm or falsify the existence of these groups. In this analysis, the groups are empirically defined regions and the classification procedure is employed to test the appropriateness of the variables that were employed in the overall analysis. If a relatively large percentage of the cases are correctly classified, then the variables may be said to be pertinent to regional differentiation. In this regard, the results of the classification procedure are quite positive: in 1962, 74.5% of the cases (38 of the 51 states, including Washington D.C.) are classified correctly with respect to the four Census Regions and 80.4% (41 states) are correctly classified in 1980. With respect to the nine Census Divisions, 62.7% (32 states) are correctly classified in 1962 and 78.4% (40 states) are correctly classified in 1980. The reader is referred to TABLES 5.13-5.16 for the results of the classification procedure. TABLES 5.13 and 5.14 identify the misclassified cases and the percent of cases correctly classified, respectively, for the four Census Regions in 1962 and 1980; TABLES 5.15 and 5.16 provide the same information for the nine Census Divisions.

In 1962 the percent of correctly classified cases is high for both the four Census Regions and the nine Census Divisions, although when the scale of analysis is reduced from the 4-way to the 9-way classification the percentage declines from 74.5% to 62.7%. In effect, a reduction in the spatial scale of analysis reveals greater heterogeneity. An examination of the misclassified cases in both regional classifications reveals that the majority of of these cases are assigned either to the West or to the South.

When the four Census Regions are disaggregated into their respective

Table 5.13. Misclassified Cases in the Four Census Regions, 1962 and 1980

	1962		1980	
actual region	misclassified case	expected region	misclassified case	expected region
Northeast	Pennsylvania	South	Pennsylvania	South
	Maine	South	Maine	South
			New Jersey	North Central
North Central	Missouri	West	Missouri	South
	Kansas	West	Kansas	West
	North Dakota	West	Minnesota	South
	South Dakota	South		
South	West Virginia	North Central	Florida	West
	Florida	West	Kentucky	North Central
	Kentucky	North Central	Oklahoma	North Central
	Oklahoma	West		
	Texas	West		
West	Oregon	South	Idaho	South
	Washington	South		
	1962: 13 cases misclassified		1980: 10 cases misclassified	

Table 5.14. Percent of Grouped Cases Correctly Classified in the Four Census Regions, 1962 and 1980

		1962	1980
region	total # cases	% cases correctly classified	% cases correctly classified
Northeast	9	77.8 %	66.7 %
North Central	12	66.7 %	75.0 %
South	17	70.6 %	82.4 %
West	13	84.6 %	92.3 %
all regions	51	74.5 %	80.4 %

Table 5.15. Misclassfied Cases in the Nine Census Divisions, 1962 and 1980

actual region	1962 misclassified case	1962 expected region	1980 misclassified case	1980 expected region
New England	Maine	East South Central	Maine	East South Central
Middle Atlantic	Pennsylvania New Jersey	South Atlantic East North Central	Pennsylvania	South Atlantic
East North Central				
West North Central	Missouri Kansas	West South Central Mountain	Missouri Iowa Minnesota	West South Central East North Central West South Central
South Atlantic	Virginia West Virginia Florida North Carolina South Carolina	East South Central East South Central Pacific East South Central East South Central	West Virginia Florida South Carolina	East South Central Mountain East South Central
East South Central	Alabama	South Atlantic	Alabama	South Atlantic
West South Central	Arkansas Louisiana Oklahoma	East South Central Pacific Mountain	Louisiana	Mountain
Mountain	Idaho Montana Nevada Utah	West North Central West North Central Pacific West South Central	Idaho	West North Central
Pacific	Alaska	Mountain		
	1962: 19 cases misclassified		1980: 11 cases misclassified	

Table 5.16. Percent of Grouped Cases Correctly Classified in the Nine Census Divisions, 1962 and 1980

region	total # cases	1962 % cases correctly classified	1980 % cases correctly classified
New England	6	83.3 %	83.3 %
Middle Atlantic	3	33.3 %	66.7 %
East North Central	5	100.0 %	100.0 %
West North Central	7	71.4 %	57.1 %
South Atlantic	9	44.4 %	66.7 %
East South Central	4	75.0 %	75.0 %
West South Central	4	25.0 %	75.0 %
Mountain	8	50.0 %	87.5 %
Pacific	5	80.0 %	100.0 %
all regions	51	62.7 %	78.4 %

divisions, we find that the East South Central division of the South is the region that is assigned the greatest number of misclassified cases — the East South Central division being characterized by a lack of activity specialization (i.e. no activities have high or low ratios to any other). Interestingly, only two misclassified cases are assigned to the North Central region in 1962, West Virginia and Kentucky, both of which adjoin that region. Both of these states have particularly high employment in medium technology manufacturing relative to low technology manufacturing. New Jersey, which has particularly high employment in medium technology manufacturing relative to low technology manufacturing, is the only state that is assigned to the East North Central division.

Not surprisingly, the Northeast region and both its divisions (New England and the Middle Atlantic) are not assigned any misclassified case. This situation occurs because the Northeast in 1962 is the highest ranked region, and, as indicated by the group centroids, is distinct from all other regions. In 1962 the Northeast's component divisions are ranked #1 and #2 and, as indicated by the group centroids, also are separated from all other divisions. This suggests that the higher the rank of a region, the less chance this region has to be assigned a misclassified case. Indeed, the top ranking Northeast and its respective divisions are not assigned any misclassified case; the North Central is assigned only two misclassified cases and its component divisions each are assigned single misclassified cases; and the South and the West are frequently assigned to misclassified cases. The East South Central division, ranked #8 in 1962, is assigned the greatest number of misclassified states; the Mountain division, ranked #9 in 1962, is assigned a fewer number of misclassified states than the East South Central division probably because

few states have as low employment in low technology manufacturing as the Mountain area.

High ranked regions are not, however, necessarily homogeneous, despite the fact that they are assigned few misclassified cases. For example, the Middle Atlantic, comprising only three states, retains only New York in terms of statistical expectations in 1962. This suggests that unless New Jersey and Pennsylvania develop the proportions of high order activities that characterize New York, the Middle Atlantic will become increasingly polarized with respect to its occupational-industrial structure.

In 1980 we find that generally fewer cases are misclassified than in 1962. Overall, 80.4% of the cases are correctly classified with respect to the four Census Regions and 78.4% with respect to the nine Census Divisions. All regions, except for the Northeast, and all divisions, except for the West North Central, have a greater percentage of cases that are correctly classified in 1980. Indeed, the percent of correctly classified cases in the Middle Atlantic rose from 33.3% in 1962 to 66.7% in 1980. As in 1962, most misclassified cases are assigned to the West and the South (particularly the East South Central division), and again, the Northeast, which has retained its top ranking status, is assigned zero misclassified cases.

5.3 Implications of Regional Homogeneity/Heterogeneity for Regional Economic Changes

The results of the classification procedure indicate that, in general, the variables chosen for the analysis are appropriate, given the relatively high percentages of correctly classified cases. The misclassifications, or lack thereof, provide information about regional homogeneity/heterogeneity that, when used in conjunction with data regarding regional ranks, can provide

insights into processes of regional economic change.

The pertinent consideration relative to homogeneity is whether a region is homogeneous in terms of a balanced distribution of all activities, or whether a region is homogenous in terms of specialization in one or a few activities. If most states in a region exhibit high employment in lowest order activities and very low employment in all other activities, then homogeneity is a negative feature of a regional economy. A case in point is the East South Central division (ranked #8 in 1962), the component states of which have relatively high employment in low technology manufacturing, and low employment in all other activities. On the other hand, the East North Central states (ranked #3 in 1962) show high employment in medium technology manufacturing, and also have relatively high employment in administrative and high order quaternary activities. In this case, homogeneity has positive implications for regional ranking and change.

Heterogeneity can also reflect a variety of processes. The pertinent consideration relative to heterogeneity is whether variation among a region's states represents the introduction of new functions in a region that will multiply and decentralize. It may be hypothesized, for example, that the particularly high employment in high skilled quaternary activities in New York in 1962 represents the introduction of post-industrial elements into the Middle Atlantic division and that these elements are initially spatially centralized. If these activities concurrently are introduced into other regions, and if decentralization of these activities occurs across all regions, then the Middle Atlantic will continue to rank highly only if these activities are multiplied and dispersed endogenously. The wide variation within the South Atlantic with respect to high order activities suggests similar

possibilities as for the Middle Atlantic division. On the other hand, if a region is heterogeneous primarily with respect to low order activities, and if employment in all states is low in all high order activities, then the liklihood of positive vertical change is small. This latter set of circumstances is exemplified by the West South Central division.

The 1980 data indicate that the Middle Atlantic has, in fact, become more homogeneous — Pennsylvania is the only misclassified state. In this case, the heterogeneity that characterized the Middle Atlantic in 1962 was based on the introduction and centralization of high order quaternary activities that became more dispersed by 1980. Not surprisingly, the Middle Atlantic retains its top ranking status in 1980. A similar, yet not identical, set of circumstances characterizes the South Atlantic division. Although the substantial functional changes that have occurred in the South Atlantic are obscured in the discriminant function analysis, the data on rates of change discussed in the previous chapter shed light on indications of heterogeneity provided by the classification procedure. The South Atlantic, unlike the Middle Atlantic division, exhibits wide variation among the component states with respect to high order quaternary activities. However, this division overall experiences substantial positive rates of change in the these activities. As indicated in the previous chapter, although the South Atlantic drops in rank from #4 to #5 from 1962 to 1980, the graphic presentation of functional changes show that the South Atlantic rises from its position in a lower ranked cluster in 1962 to an exclusive position as a middle ranked cluster in 1980. Interestingly, the West South Central division, which is quite heterogeneous in 1962 and becomes more homogeneous by 1980, drops in rank from #6 in 1962 to #7 in 1980. The West South Central division experiences

substantial positive rates of change with respect to employment in low technology manufacturing, but a negative rate of change in medium technology manufacturing and positive but low rates of change in quaternary activities. Thus, conditions of heterogeneity characterizing the Middle Atlantic, South Atlantic, and West South Central divisions led to dramatically different conditions by 1980 as a direct consequence of differential changes relative to different types of activities. This finding reinforces the importance of disaggregating employment into types of activities.

A similar dichotomy of circumstances occurs with respect to homogeneous conditions that characterize the East North Central and East South Central divisions in 1962. The East North Central, ranked #3 in 1962, is perfectly homogeneous in statistical terms and characterized by high employment in medium technology manufacturing. In 1980, the East North Central remains stable at rank #3 and is again perfectly homogeneous in statistical terms. It is important to note that although mean scores in quaternary activities in the East North Central division are lower than in the Middle Atlantic, they are at least moderately high. On the other hand, the Pacific division (also perfectly homogeneous in 1980) generally exhibits low employment in low order activities and high employment in high order activities, particularly medium skilled quaternary activities. In effect, the Pacific division, rising to rank #2 in 1980, is a region that specializes in high order activities. The West North Central, in contrast to both the East North Central and Pacific divisions, is relatively homogeneous both in 1962 and in 1980 (75% of the cases are correctly classified in both years), but its rank remains low (#8 in both years). States in the East South Central are relatively homogeneous with respect to a specialization in low order

activities and in low employment in high order activities.

Both the East North Central and East South Central divisions retain their high and low ranks, respectively, as well as the same high percentage of correctly classified cases, indicating homogeneity. Whereas the East North Central division is homogeneous in its overall heterogeneity, even though it is distinctive in one particular activity (medium technology manufacturing), the East South Central is relatively homogeneous with respect to a specialization in low order activities. The Pacific division also is relatively homogeneous with respect to specialization, and is currently the most accurate representation of post-industrial institutions and activity mix that may increasingly characterize all regions in the future. With the exception of the Pacific division circumstances, these findings underscore the importance of the activity mix concept (over the industrial mix concept, as discussed in chapter 2) because it is the broad mix of activities, or heterogeneity, that accounts for the East North Central's high ranking status; it is the the narrow mix of industrial activities, or homogeneity, that accounts for the low ranking status of the East South Central division. Interestingly, both the Pacific division (ranked #2 in 1980) and the East South Central division (ranked #8 in 1980) are homogeneous in terms of activity specialization; the difference in their respective ranks are accounted for by the type of activity specialization. In regard to the Pacific's status in 1980, it is principally the **post-industrial** activity mix that accounts for the Pacific's substantial positive functional and vertical changes. Whereas twenty years ago top ranking regions were all characterized by a relatively balanced distribution of all types of activities, high ranking regions in an emergent post-industrial context may be characterized by activity

specialization in high order quaternary activities. Not surprisingly, this explicitly post-industrial activity mix is best represented by the Pacific, which has never assumed the status of an industrial tier in the United States.

5.3.1 Concluding remarks

In conclusion, the results of the discriminant analyses for the four Census Regions and nine Census Divisions in 1962 and 1980 affirm the importance of differentiating types of employment in order to assess the basis for regional differentiation. We find that higher ranked regions tend to have high employment in high order activities, but that these regions generally also have relatively high employment in lower order activities. Regions that specialize in low ranked activities have low ranks and retain their standing in a lower ranked cluster unless substantial positive changes in high order activities occur. In light of the fact that high order activities are becoming increasingly decentralized, a region that has low employment in these activities is in a disadvantageous situation. Whereas in 1962 we find that high order quaternary activities are the most significant discriminating variables, we find that in 1980, with respect to the nine Census Divisions, these activities have become so dispersed that they no longer assume primary importance as a discriminator among regions.

The difference between the results obtained in this analysis and the results indicated by conventional growth analyses lies in the recognition here of activity rather than industry mix as a pertinent consideration, and operationally, in the differentiation of types of labor in this analysis and the lack thereof in conventional growth analyses. With respect to the 9-way regional classification, the South Atlantic division of the South performs

relatively well and certainly surpasses the other southern divisions in all activities. Generally, the South Atlantic is distinctive in the South by virtue of its broad activity mix. On the other hand, the South Atlantic has not superseded either of the Northeastern divisions, principally because high order activities have not experienced the decentralization in the South that has been experienced elsewhere, notably the Northeast.

In the United States we find that the decentralization of headquarters and quaternary activities in general are accelerating to the point that these activities are only of secondary importance in differentiating regions by 1980. If the index developed in this research is attributed normative significance, then an implication of this analysis is that the "survivability" of regions in a post-industrial context depends on the maintenance or generation of these higher order activities. Regions that have not yet developed this quaternary service base would be in a more advantageous position if they were to develop policies that could stimulate or at least attract indigenous office development. At one point in time, the South, as a region, developed such policies with respect to manufacturing industries (Cobb 1982). Cities as nodal points of regions, recently have begun to develop such policies with respect to service bases (e.g. Honolulu, see Heenan 1977). Certain areas of the South and the West have successfully developed this quaternary service base, but generally, these functions have not decentralized significantly within the South and the West. In the the Northeast, rates of change in high skilled activities are relatively high in New England but low in the Middle Atlantic — indeed much lower than in the South Atlantic. Whether the Northeast and its divisions will remain stable in an upper ranked cluster will largely depend on whether decentralization of a high order service base develops in other

regions, such as the South. If so, and if Southern rates of change begin to match rates of change in high order quaternary activities in the Northeast, then the Northeast's situation may be tenuous.

Chapter 6

Recapitulation and Directions for Research

6.1 Recapitulation

The purposes of this study have been to introduce an alternative conceptualization of regional economic change, and to operationalize this conceptualization, with specific respect to changes that have occurred over the last two decades in the United States. To date, researchers have disagreed about how regional economic change should be defined, identified, and explained. The competing viewpoints on each of these concerns generally can be divided into two groups — a "growth" oriented framework, and a "development" oriented framework. The former conceptualizes regional economic change in terms of quantitatively assessable indicators; the latter, in terms of qualitative, system-wide parameters that often are assessed in light of non-quantitative, historical factors. The proponents of these two viewpoints have interpreted empirical realities dramatically differently. conclusions about empirical realities. For example, many growth oriented scholars contend that increases in population and employment, particularly manufacturing employment, in the the southern United States, indicates that the South may supersede the Northeast as the dominant economic region. Those who argue in accordance with development ideas, contend that the South has experienced increases primarily in low skilled employment, and

cannot keep pace with the Northeast that has developed a large, high order, high skilled service base of quaternary activities.

It was suggested in Chapter 2 that the growth and development frameworks focus on different ramifications of regional economic change, and should be integrated. Towards this end, an alternative conceptualization of regional economic change that emphasizes changes in production techniques as well as changes in divisions of labor has been forwarded. These two emphases are drawn from the growth and development orientations. Productive efficiency is a fundamental aim of growth-oriented strategies, which focus on the improvement of material resources in a region such as facilities, technology, and infrastructure. However, changes in productive efficiency shed little light on changes in a region's socio-economic structure relative to other regional structures — a fundamental focus of the development orientation. Divisions of labor in a region, that reflect socio-economic structure, are emphasized in this analysis by way on an activity index that differentially weights activities or types of labor in accordance with low through high levels of skill and technology.

Viewing regional economic change from this perspective, positive changes entail not only greater productive efficiency, but also greater differentiation in the labor force with respect to skill factors. In this regard, increases in productive efficiency in a region may have little consequence for overall regional change if labor is homogeneous and specialized in low skilled activities. In the relative absence of a highly skilled labor force, organizations in a region are locked into depending upon the skilled labor force in other regions to produce the goods and services required for efficient production. A predominance of exogenously controlled

branch plants that often provide only ephemeral employment for primarily low skilled labor exemplifies some of the repercussions of this dependent status. This set of circumstances holds dim prospects for skill upgrading or independent corporate development in a region, thus reinforcing the process of dependency. On the other hand, if a region's population is socio-economically differentiated and a balanced set of labor divisions prevails, then the propensity for innovation and positive change in the future is high. A crucial ingredient of positive change is homogeneity among the component divisions of a region with respect to heterogeneous labor conditions. If high skilled labor is spatially concentrated, then, despite positive absolute changes, intra-regional disparities may undermine the capability of the region as a whole to change positively relative to other regions that have experienced decentralization or spatial dispersal of a wide range of activities.

In order to distinguish between the type of positive regional change that involves absolute changes in production techniques and the division of labor and the type of change that results in a shift in a region's rank relative to others, a typology of change has been forwarded in Chapter 3. Regional economic changes are considered to be either "functional" or "vertical". Functional change is measured in absolute terms; vertical change, in relative terms. Vertical change generally includes functional changes, however the converse does not necessarily hold. Even large functional changes might not generate vertical change. The distinction between these two types of change is critical in identifying changing empirical realities. Indeed, the lack of this distinction in the current literature is largely responsible for ambiguity surrounding regional change. In particular, lagging

regions that recently have experienced absolute changes often are assumed to have attained a higher status relative to other regions. In fact, this situation does not necessarily obtain.

To identify functional and vertical changes empirically, a regional index has been developed that assigns values to regions based on a combination of qualitative and quantitative observations. In particular, employment is qualified by technological and skill levels to reflect the range of activities in a region in light of labor-related distinctions. These activities are weighted differentially in accordance with the requirements for avoiding dependent linkages — high skilled and high technology activities are weighted high, and low skilled and low technology activities are weighted low. The dispersion of each of these types of employment is then accounted for, so that the spatial division of labor within a region, and thus the degree of homogeneity or heterogeneity among component divisions, can be identified. The source of ownership and control of facilities (indicated by headquarters locations) is also incorporated into the index so that regions can be viewed in the context of corporate organization, and the presence of dependent or dominant linkages can be ascertained. In order to fully express a region's position relative to others in a multiregional corporate structure, the types of employment that occur outside a region but are controlled by headquarters from within the region of analysis, also are accounted for. In addition to these variables representing elements of spatial division of labor and corporate organization, urbanization is considered pertinent because cities are nodal points of regions and tend to be the loci of innovative activity, a diversified service base, and inter-industry interaction. Thus, an urbanization factor is incorporated into the index, measured by the percentage of a

region's population living in SMSAs.

All of the variables mentioned thus far are based on static considerations. One final variable has been considered that incorporates elements of long-term sectoral change. Specifically, the onset of a post-industrial revolution in the United States and around the world has meant that manufacturing labor is becoming displaced increasingly, creating a situation of structural unemployment. Unless the low skilled service or tertiary sector in a region can absorb laid-off blue-collar workers, the region will lag behind others that can better adapt to changing circumstances. Thus, a variable has been incorporated into the index that measures the absorptive capacity of the tertiary sector relative to manufacturing employment. On the basis of the above stated variables, "R" values can be assigned to regions, and, when compared over time, can be used to identify functional changes. These values also are useful for identifying relative, vertical changes on the basis of a translation of "R" values into ranks.

This regional index is intended to have general applicability and is proposed as a means to clarify and precisely identify types of regional economic changes at any spatial scale of analysis and in any empirical context. Since the index was conceived with plans to apply it to the United States, the variables selected for the analysis do not encompass considerations such as employment in the agricultural sector that are appropriate for an analysis of less developed, industrializing regions. In general, however, the fundamental ideas of spatial division of labor, corporate organization, urbanization, and long-terms sectoral trends are applicable to all contexts, even though minor changes are required as the index is differentially applied.

Chapter 4 discusses the index and its application to the United States in 1962 and 1980. The index was modified in accordance with the limitations of the best and most accessible data base, **County Business Patterns.** Specifically, three variables from the ideal equation presented in Chapter 3 were deleted: the dispersion measure, the source of ownership/control of establishments, and employment outside a region that is controlled via headquarters from within the region. Although the two variables relating to corporate organization that would identify linkages were not incorporated into the empirical analysis, administrative activities, signifying headquarters operations were included as an activity type. It was possible, therefore, to indirectly account for regional locations of ownership/control, but not in relation to particular establishments. The deletion of the dispersion measure is probably the most serious handicap to the present analysis, given the importance attached to this consideration in the overall conceptualization of regional economic change. However, dispersion is at least indirectly accounted for by other variables. If one region, for example, shows high employment in high skilled activities, and this employment is spatially concentrated, then the contribution of high skilled employment to the "R" value would be considerably less than in the case of a region that shows high employment in high skilled activities throughout a region.

The modified index, operationalized for the four Census Regions and the nine Census Divisions of the United States produced results that conform well with expectations. In the first two chapters it was noted that many researchers and the public, in general, believe the South to be superseding the Northeast largely due to the South's increasing manufacturing employment and declines thereof in the Northeast. The problem with this growth-oriented

perception is that it recognizes only one division of labor, manufacturing. Moreover, the low "order" of manufacturing as an activity, in terms of skill and technological levels, is ignored. When several divisions of labor are considered, as in this analysis, the South in 1962 and in 1980 remains behind the Northeast, which, unlike the South, is characterized by high order activities that have been added to the traditional manufacturing base that has begun to decline. When the four Census Regions were disaggregated into their component divisions, we found that the East South Central and West South Central divisions had low "R" values and low employment in high order activities, but that the South Atlantic as a whole exhibited relatively high scores. Nevertheless, the vertical changes experienced by the South Atlantic still left it behind the highest ranked divisions, New England and the Middle Atlantic — parts of the traditional industrial core. However, the rates of (functional) change in the South Atlantic have been quite high, suggesting, perhaps, a high propensity for continued positive functional changes in the future. Such functional changes are likely as a function of the spin-off potential inherent in corporate development and quaternary sector activities in general that increasingly characterize the South Atlantic. The South Atlantic, in terms of its component states, is, however, heterogeneous, with a high degree of centralization of high order activities located in geographic "pockets". Thus, if significant positive vertical changes are to occur throughout the entire South Atlantic, decentralization processes would have to accelerate in addition to the multiplication of high order activities in spatially concentrated areas.

The analyses discussed in chapter 5 essentially confirmed, in statistical terms, the conclusions reached above. A discriminant analysis was performed

in order to assess the basis of regional differentiation. A salient finding of this analysis was that in 1962 high order quaternary activities were most important in differentiating regions, but that by 1980 these activities had become so dispersed across the nation that they assumed less importance in separating or discriminating regions. The results of the discriminant analysis indicate that quaternary institutions and low technology manufacturing have emerged in all regions, albeit contributing differentially to regional economies. The 1980 results are striking in that the variable representing the absorptive capacity of the tertiary sector relative to manufacturing employment is a significant discriminating variable, although its level significance is low. In effect, some regions have adapted to the transition from an industrial to a post-industrial environment better than others. In the near future, this variable may assume much greater importance, as non-manufacturing activites become even more widespread across the nation. The sum of these findings suggests that the propensity for positive regional economic change is contingent upon the maintenance, if not acceleration and multiplication of high order activities, in order to keep pace with a changing environment. The dispersal of such activities throughout a region also is especially important, because intra-regional imbalances can hamper the capacity of a region as a whole to change relative to others, even if particular divisions, or "pockets" within divisions, perform well.

Overall, the results of the application of the modified regional index to the United States give empirical content to the proposed concepts and methodology, and underscore the importance of differentiating employment relative to types of activities or divisions of labor. The United States case study shows empirically that levels of skill and technology can be used to

differentiate regions. Moreover, the importance of considering long-term sectoral trends and the problems posed to certain divisions of labor (the manufacturing sector, in particular) is apparent in the results of the discriminant analysis for the nine Census Divisions. What is striking, and what was unexpected, is that the post-industrial quaternary sector is sufficiently dominant to falsify the notion that positive vertical change requires a balanced distribution of **all** types of activities throughout a region. Whereas in 1962 top ranking regions characteristically showed a balanced distribution of all activities, the 1980 data, with respect to the Pacific division (ranked #2), did not bear this out. The experience of the Pacific division demonstrates that by 1980, specialization in certain types of activities, rather than diversification across all activities is sufficient to enable significant vertical changes — **if** this specialization is in high order quaternary activities. The indication here is that we must begin to think about an exclusively post-industrial activity mix as an emergent phenomenon.

6.2 Directions for Research

The regional indexes (modified and unmodified) developed in this study are not conventional. The proposed methodology represents, essentially, a first step in operationalizing an alternative research strategy for measuring regional economic change on the basis of both qualitative and quantitative observations. The case study of United States' four Census Regions and nine Census Divisions gave empirical content to the index, demonstrating that qualitative observations, particularly with respect to **types** of labor, alter the conclusions of conventional growth analyses. Should the proposed index and

the assumptions upon which the index are based be treated as a hypothesis and subjected to empirical testing, the normative significance or prescriptive aspect of the model of regional economic change developed here would be verified. The verification of the prescriptive aspect of this index could be enhanced by the incorporation of a predictive element into the analysis in order to establish a baseline for policy recommendations. Predictions of regional economic changes in the future, based on an appreciation of labor and technological variablility, would require the accurate prediction of locational strategies of corporations. To date, the literature on industrial geography has been primarily inductive, leaving unclear the dynamics of how various social, economic, and political circumstances affect corporate organization and locational strategy, particularly with respect to changing corporate goals and organization at different stages of a corporate life-cycle. Such considerations, if placed in a deductive and predictive framework (Harrington 1984) would allow for the prediction of regional economic changes, since the status of regional economies is inextricably related to corporate decision-making.

Future avenues of investigation should also include refinement of the methodology itself. For example, "R" could be defined in terms of a non-linear combination of variables. Also, the internal weighting of the range of activities could be determined by a sensitivity analysis. A second direction for research on methodological aspects of this study might involve considerations for the inclusion of different variables relative to different applications of the index in different empirical contexts. Although the variables used in this study are pertinent to developed countries such as the United States, alterations should be considered if the index is to be applied

to other contexts. Whereas in the United States the agricultural labor force is extremely small (8% of the U.S. labor force by 1960 (Fuchs 1968)), the agricultural labor force in many less developed countries is relatively large and, thus, should probably be considered. Aside from simply incorporating more variables into the analysis (such as race or agricultural employment), different combinations of variables that measure long-term sectoral trends may have to be employed. The index employed in this study recognizes problems of structural unemployment in the United States that have resulted from the displacement of manufacturing labor by sophisticated process technology and a general decline in manufacturing. Structural unemployment may prevail in less developed countries, but may be a function of different combination of factors.

The overall importance of agricultural labor in less developed countries is, however, an empirical problem, and may not be all that great, particularly as many less developed countries are industrializing at the expense of the agricultural sector. The agricultural labor force in these countries is declining as sophisticated machinery displaces agricultural labor and as policy efforts in general are biased towards the development of industrial enterprises. These industrial enterprises often represent transfers of technology from advanced economies and often are capital intensive — thus providing much fewer jobs than labor-intensive operations. At the same time, the service sector in many less developed countries has grown in regional centers to accommodate the needs of a growing industrial sector as well as corporate offices. As Fuchs (1968) has indicated, manufacturing itself stimulates the growth of the service sector because demands for intermediate inputs to production increase. As the manufacturing sector

grows, and concomitantly, corporate organizational capacity, advanced business services increasingly are required (Cohen 1981). Increasing numbers of less developed countries are experiencing industrialization and post-industrialization concurrently. Both phenomena are related to the spread of economic interests of advanced economies across national boundaries. Thus, to use indexing schemes for less developed countries requires the development of a methodology that measures structural unemployment in different contexts.

Another problem with applying the proposed methodology to less developed countries concerns the classification of manufacturing industries. Although in many cases the transfer of technology from advanced economies to Third World countries often occurs without adaptation of technology to local environments, some "rapidly industrializing countries" (e.g. Brazil, Mexico, Argentina, and to a lesser extent, South Korea, Hong Kong, and Singapore) have developed "minor inventive activity" aimed at import substitution and the adaptation of imported technology to local circumstances (Bath and James 1979; Cunningham 1983; Katz 1982; Kumar 1982). Thus, the manufacturing classification based on the United States context may be applied to other countries only if adaptation procedures are absent. Otherwise, alternative classifications must be developed.

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Appendix A

Technological/Skill Ranking Schemes

Manufacturing industries may be classified into high, medium, and low technology orders by considering values of company R&D funds as a percentage of net sales. This measure can be considered a proxy for research intensity, which represents high skilled, high order inputs to production, where research intensity is low in low technology industries and high in high technology industries (Malecki 1980b). TABLES 1 and 2 present a classification of manufacturing industries in the United States into low, medium and high technology in 1962 and 1979, respectively, representing the temporal focus of this study. FIGURES 1 and 2 present these classifications in the form of bar graphs.

The values for company R&D funds as a percentage of net sales were obtained from three sources (Business Week 1976; National Science Foundation 1962, 1982). (The 1982 report provides values for 1979 but not for 1980). Since the organization of data retrieval procedures frequently changes, the total number of industries recorded in TABLES 1 and 2 and FIGURES 1 and 2 between 1962 and 1979 differ. For example, the leather industry is included in 1979 and excluded in 1962; also, the 1979 data base includes a sub-classification of transportation other than motor vehicles and aircraft and missiles, whereas the 1962 data base does not. In the 1962 classification presented in TABLES 1 and 2 and FIGURES 1 and 2, drugs are

not separated from chemicals (although separate values exist) because the values for research intensity for the various components are quite similar (with the exception of "other chemicals"). Generally, the research intensity values that are recorded in TABLES 1 and 2 and FIGURES 3 and 4 were obtained from the National Science Foundation (N.S.F.) reports. Some research intensity values are not available for certain industries in 1962 and 1979. In such cases, with regard to 1979, values were obtained from Business Week. Since the N.S.F. 1982 report records values from 1957-1979, values for the 1962 classification that were missing from the 1962 report were obtained for the closest year for which data were available in the 1982 report. The value for office machines, 5.1, for 1962 was obtained from Business Week; the N.S.F. 1982 report provides a figure for this industry of 9.1 in 1976 and 9.7 in 1979. This discrepency is interpreted as an overestimation by N.S.F., and Business Week's more conservative figure is used here. TABLES 3 and 4 present comparisons of the three data bases for industries in 1962 and 1979, respectively; note that the values that are starred are those that are employed in FIGURES 1 and 2.

The divisions between high, medium, and low technology manufacturing in 1962 and 1979 are arbitrary insofar as the absence of a normal distribution forces subjectivity. Although the large standard deviation suggests that the mean is an inappropriate tool for the breakdown of categories, the mean is intuitively reasonable. Although the actual breakdown of manufacturing industries into high, medium, and low technology is somewhat unsystematic, the values of R&D as a percentage of net sales (research intensity) at least provide some statistical basis for discerning technological differences among industries.

A classification of the quaternary sector — indeed, even the identification of this sector — is much more ambiguous. TABLE 5 identifies and lists the quaternary sector by high, medium, and low orders, in accordance with technological and skill levels. The most difficult task here is creating a distinction between low order quaternary and tertiary sector activities (see TABLE 6 for the identification of the tertiary sector). Essentially, any professional service is included in the quaternary sector that is not exclusively consumer oriented and requires some skill and education of employees. The quaternary sector classification was intuitively derived and was not based on a statistical analysis.

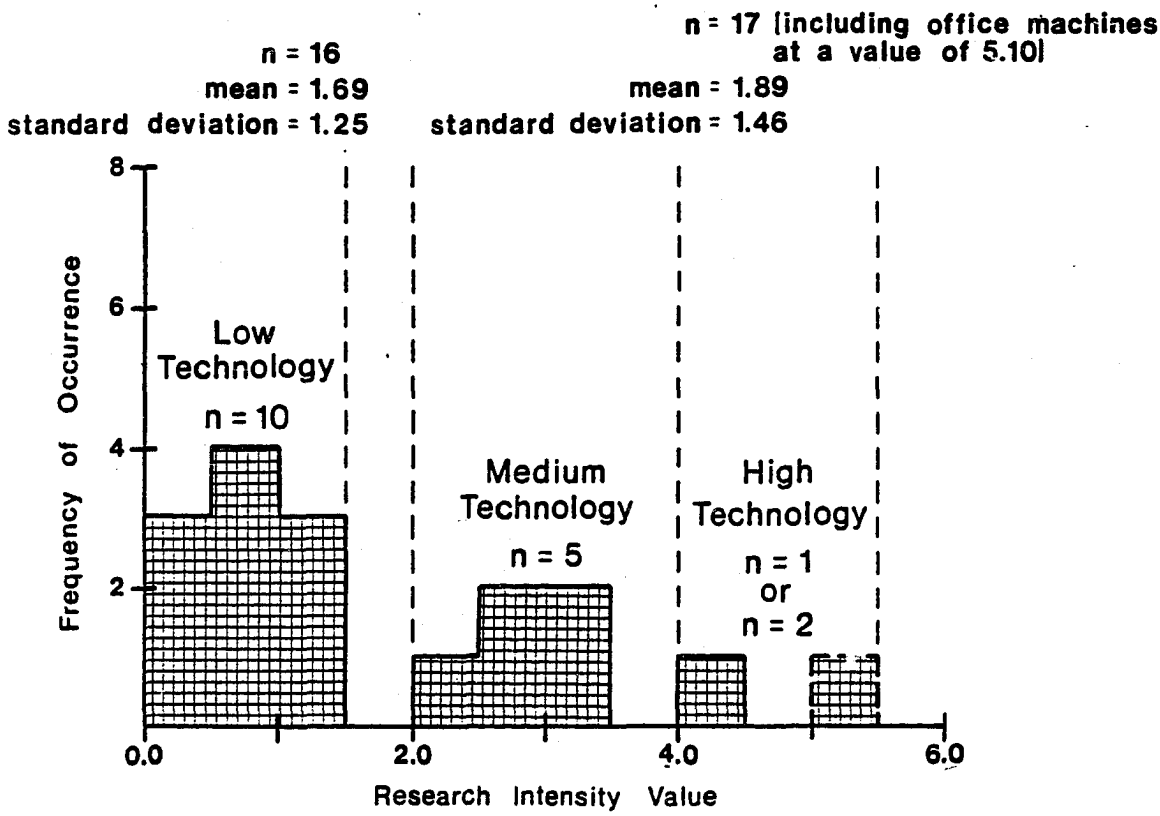

FIGURE 1 Bar Graph of High, Medium, and Low Technology Manufacturing in the United States in 1962

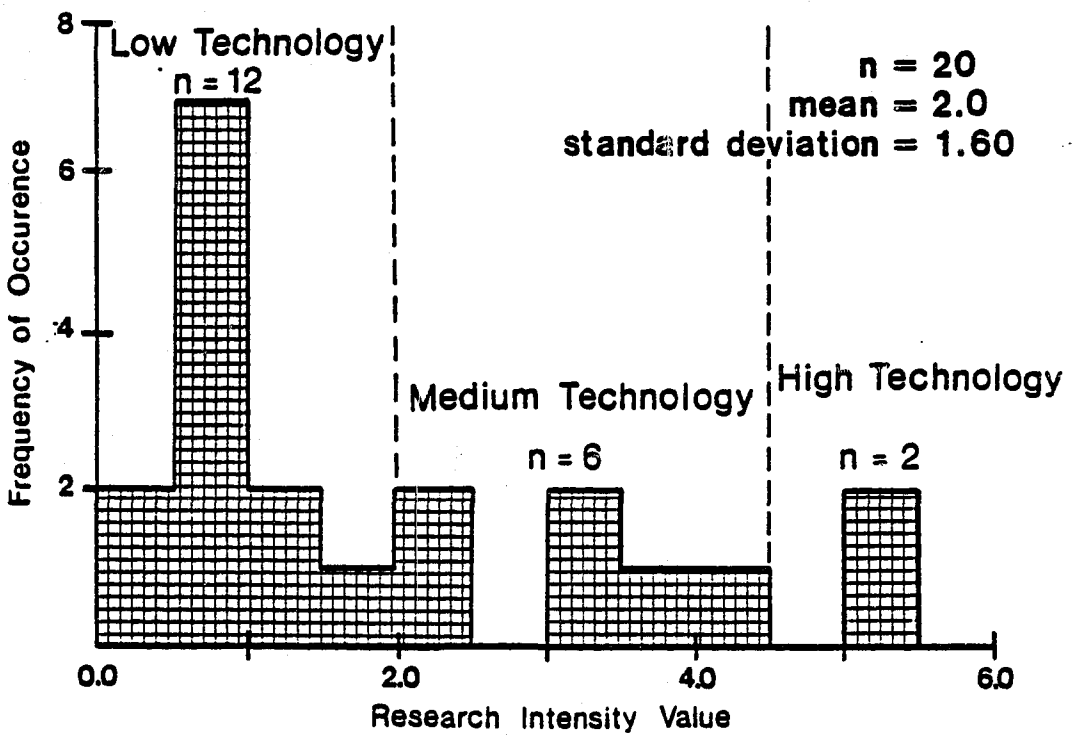

FIGURE 2 Bar Graph of High, Medium, and Low Technology Manufacturing in the United States in 1980

Table 1. Manufacturing Industries by Technological Order, 1962

(0-1.5) Low Technology Manufacturing	R&D/Sales %	(2.01-3.5) Intermediate Technology Manufacturing	R&D/Sales %	(4.01-) High Technology Manufacturing	R&D/Sales %
Food	.3	Chemicals	3.3	Instruments	4.1
Textiles and apparel	.4	Machinery	2.7	(office equipment)	5.1
Lumber/furniture	.4	Electric,electronic	3.5		
Paper	.7	Motor vehicles and other transportation equipment	2.5		
Petroleum	.9				
Rubber	1.5	Aircraft, missiles	2.6		
Stone, clay, glass	1.5				
Primary metals	.7				
Fabricated metals	1.2				
Other industries	.7				

Sources: Business Week 1976; National Science Foundation 1962, 1982

Table 2. Manufacturing Industries by Technological Order, 1979

(0-2.0) Low Technology Manufacturing	R&D/Sales %	(2.01-4.5) Intermediate Technology Manufacturing	R&D/Sales %	(4.51-) High Technology Manufacturing	R&D/Sales %
Food/tobacco	.47	Drugs	4.24	Instruments	5.40
Textiles/apparel	.47	Electric, electronic	3.70	Office equipment	5.10
Lumber/furniture	.70	Motor vehicles	3.20		
Paper/printing	.78	Aircraft, missiles	3.10		
Petroleum/coal	.60	Chemicals other than drugs	2.45		
Rubber, misc. plastics	1.70	Machinery other than electrical and office equipment	2.10		
Stone, clay, glass	1.50				
Primary metals	.60				
Fabricated metals	1.00				
Leather	.70				
Transportation (other than motor vehicle and aircraft and missiles)	.70				
Other industries	.70				

Sources: Business Week 1976; National Science Foundation 1982

Table 3. Research Intensity Values for Manufacturing Industries in 1962

Industry	Subsector	1962 (NSF)	1976 (Bus. Week)	(NSF) nearest year to 1962
Food		.3		.4 (1963)
Textiles/apparel				.4 (1958, 1966)
Lumber/furniture				
Paper		.7		
Petroleum		.9		
Rubber		1.5		
Stone, clay, glass		1.5		
Primary metals		.7		
Fabricated metals		1.2		
Other industries		.7		
Chemicals		3.3		
Machinery		2.7		
Electric, electronic-		3.5		
	Motor vehicles and other transport. equipment	2.5		
	Aircraft, Missiles	2.6		
Instruments		4.1		
	Office equipment		5.1	

Sources: Business Week 1976; National Science Foundation 1962, 1982

Table 4. Research Intensity Values for Manufacturing Industries in 1979

* indicates values used in figure 2 and table 2 of appendix A.

Industry	Subsector	1979 (NSF) R&D/Sales %	1976 (Bus. Week) R&D/Sales %	(NSF) 1976 or nearest year to 1979
Food/tobacco			.47*	.4 (1974), food
Textiles/apparel			.47*	.4 (1973)
Lumber/furniture		.7*		
Paper/printing			.78*	.8 (1972), paper
Petroleum/coal		.6*		
Rubber, misc. plastics		1.7*	1.89	
Stone, clay, glass		1.5*	1.74	
Primary metals		.6*	.77	.8 (1976)
Fabricated metals		1.0*	1.23	1.1 (1976)
Leather		.7*		
Transportation other than aircraft and missiles				.7* (1977)
Miscellaneous		.7*	1.55	.7 (1976)
Chemicals other than drugs			2.45*	
	Drugs		4.24*	
Electric, electronic		3.7*	2.44	3.7 (1976)
	Motor vehicles	3.2*	2.56	2.7 (1976)
	Aircraft, missiles	3.1*	3.08 (aircraft)	2.8 (1976)
	Machinery other than electrical and office	2.1*	2.20	2.1 (1977)
Instruments		5.4*	5.43	5.4 (1976)
	Office equipment	9.7	5.10*	9.1 (1976)

Sources: Business Week 1976; National Science Foundation 1982

Table 5. Ranking of Quaternary Sector Activities

Low Order		Intermediate Order		High Order	
General Category	Subsector	General Category	Subsector	General Category	Subsector
Finance		Finance		Finance	Federal reserve board
	Safe deposit companies		State banks		National banks, members FRS, insured
	Banking related services		National banks, not members FRS		Clearinghouse assns.
Insurance			Unicorp banks		Corporations for banking abroad
	Insurance agents, brokers, services		Mutual savings banks		Security, commodity brokers & services
Real Estate			State nondeposit trust companies	Insurance	
	Real estate exc. subdividers and developers (exc, cemetaries)		Foreign exchange establishments		Insurance carriers
	Combined real estate, insurance, etc.		Credit agencies other than banks	Business Services	
Business Services		Insurance			Advertising agencies
	Reproduction, commercial art, stenography, photography		Subdividers & developers exc. cemetaries		News syndicates
	Employment agencies	Real estate			Computer programming
	Equipment rental/ leasing		Holding & other investment offices		R&D labs
	Commercial testing laboratories	Business services			Management and public relations
	Business services, nec.		Junior colleges & technical institutes	Legal services	
Educational services			Libraries & information centers	Educational services	
	Correspondance schools	Membership Organizations			Colleges, universities, and professional schools
	Data Processing schools		Business associations	Misc. Services	Noncommercial research organization
	Business and secretarial schools		Professional organizations		Services, nec.
	Vocational schools		Labor organizations		
		Miscellaneous	Engineering & architectural services		
			Accounting, auditing, bookkeeping		

Table 6. Tertiary Sector

General Category	Subsector	Subsector Division
Transportation and public utilities	(all)	(all)
Wholesale trade	(all)	(all)
Retail trade	(all)	(all)
Services		
	Hotels and other lodging places	(all)
	Personal services	(all)
	Business services	
		Advertising services, outdoor
		Radio, Television advertising representatives
		Advertising, n.e.c.
		Credit reporting and collection
		Direct mail advertising
		Blueprinting and photocopying
		Window cleaning
		Disinfecting and exterminating
		Janitorial services, n.e.c.
		Temporary aid supply services
		Personnel supply services, n.e.c.
		Detective and protective agencies
		Photofinishing labs
		Trading stamp services
	Auto repair, services and garages	(all)
	Misc. repair services	(all)
	Motion pictures	(all)
	Amusement and recreation services	(all)
	Health services*	(all)
	Educational services*	
		Elementary and secondary schools
		Schools and educational services n.e.c.
	Social services	(all)
	Museum, botanical, zoological gardens	(all)
	Membership organizations	
		Civic and social organizations
		Political organizations
		Religious organizations
		Non-profit membership organizations n.e.c.

*Neither Health nor the subsector divisions of Educational services listed above are included in the quaternary sector (see table 5) because health services are exclusively consumer oriented (as opposed to being oriented toward corporate services). Tentatively, these services have been classified as components of the tertiary sector; however, because they involve professional training, employment figures for these services have not been incorporated into the empirical analysis discussed in chapters 4 and 5.

Appendix B

Procedure for Estimating the Ranges of Values for b_1 and b_2

I. Range of Mean Values

	range of $\bar{x}$ values, 4-way regional classification	range of $\bar{x}$ values, 9-way regional classification
E	.138-.398	.122-.462
t	-.020-.074	-.027-.099
s	.462-.705	.334-.878

II. Upper and Lower Limits of b_1 and b_2

A. Upper limits of b_1 and b_2

4-way regional classification	9-way regional classification
b(E)=1.00	b(E)=1.00
(.398/.074=5.378) b_1(t)=5.37	(.462/.099=4.666) b_1(t)=4.66
(.398/.705=.564) b_2(s)=0.56	(.462/.878=.526) b_2(s)=0.52

B. Lower limits of b_1 and b_2

4-way regional classification	9-way regional classification
b(E)=1.00	b(E)=1.00
(.138/-.02=-6.90) b_1(t)=-6.90	(.122/-.027=-4.518) b_1(t)=-4.51
(.138/.462=.298) b_2(s)=0.29	(.122/.334=.365) b_2(s)=0.36

III. Ranges of Values for b_1 and b_2

b_1: 0-5.37, by 1.3425 increments (n=5)

b_2: 0.29-0.56, by 0.0675 increments (n=5)

Appendix C

The Estimation of Values for b_1 and b_2

In the tables that follow, data are presented that provide information on the frequency of each rank given by the sensitivity analysis for each region in 1962 and 1980. The rank that occurs with the greatest frequency is considered to represent the optimal position of a region in the multiregional hierarchy. Thus, if a region is assigned a rank twenty times out of twenty-five possibilities in 1962, then that region is assigned that particular rank. This procedure is repeated to obtain a rank for the region in 1980. These data are provided in the first of three tables for each region. A pair of tables is then presented for each region that includes the frequency of each of the b values in 1962 and 1980, respectively, given a particular rank (derived from the first table). The b values that occur with the greatest frequency are then listed. The goal is to find a single value for b_1 and b_2 across both regional classifications (4-way and 9-way) and across 1962 and 1980. The ranks that occur with high frequency, derived from the first table presented for each region, are the ranks that are employed in the analysis of "R" values. The values that are derived for b_1 and b_2 across both regional classifications and across both years are the values that are employed in the regional index.

The reader will notice that in the listing of b values for each region the values of 2.68 and .42 for b_1 and b_2, respectively, occur in all cases in

the 4-way regional classification, and in all but one case in the 9-way classification. This one case is the West North Central region, in which the b values that occur with the greatest frequency for the ranks in 1962 and 1980 given by the first table are 2.68 for b_1 and .29 for b_2. However, the value of .42 does occur in association with the given ranks, and furthermore, the particular combination of 2.68 and .42 does result in the ranks given by the first table.

The 9-way classification, as a more disaggregate framework than the 4-way classification, is more complex and warrants some discussion. First, the reader will notice that the ranks that occur with the greatest frequency for the South Atlantic and Pacific divisions in 1962 is #4 in both cases. In this case, the rank assigned to the Pacific region in 1962 is #5 because the difference between ranks #4 and #5 is greater in the case of the South Atlantic division than it is in the case of the Pacific. Second, the rank that occurs with the highest frequency for the West South Central division in 1962 is #5, the same rank assigned to the Pacific division in this year, as indicated above. The West South Central division is then assigned a rank of #6. When b_1 equals 2.68 and b_2 equals .42 — the values that occur with the highest frequency in association with assigned ranks across both years and both regional classifications— the rank for the West South Central division is #6 in 1962. Third, ranks #8 and #9 occur with the highest and identical frequency for the East South Central division in 1980 and ranks #7 and #8 occur with the highest and identical frequency for the West South Central division in the same year, 1980. Rank #8 is assigned to the East South Central division and rank #7 is assigned to the West South Central division.

I. 4-Way Classification System

A. Northeast

Table I.A.1

year	rank	frequency
1962	1	25
	2	0
	3	0
	4	0
1980	1	25
	2	0
	3	0
	4	0

Table I.A.2a

rank	year	b_1 value	frequency
1	1962	0	5
		1.34	5
		2.68	5
		4.02	5
		5.37	5
1	1980	0	5
		1.34	5
		2.68	5
		4.02	5
		5.37	5

Table I.A.2b

rank	year	b_2 value	frequency
1	1962	.29	5
		.35	5
		.42	5
		.49	5
		.56	5
	1980	.29	5
		.35	5
		.42	5
		.49	5
		.56	5

b_1 = 0, 1.34, 2.68, 4.02, or 5.37

b_2 = .29, .35, .42, .49, or .56

B. North Central

Table I.B.1

year	rank	frequency
1962	1	0
	2	25
	3	0
	4	0
1980	1	0
	2	20
	3	5
	4	0

Table I.B.2a

rank	year	b_1 value	frequency
2	1962	0	5
		1.34	5
		2.68	5
		4.02	5
		5.37	5
2	1980	0	0
		1.34	5
		2.68	5
		4.02	5
		5.37	5

Table I.B.2b

rank	year	b_2 value	frequency
2	1962	.29	5
		.35	5
		.42	5
		.49	5
		.56	5
2	1980	.29	4
		.35	4
		.42	4
		.49	4
		.56	4

b_1= 1.34, 2.68, 4.02, or 5.37

b_2= .29, .35, .42, .49, or .56

C. South

Table I.C.1

year	rank	frequency
1962	1	0
	2	0
	3	15
	4	10
1980	1	0
	2	0
	3	0
	4	25

Table I.C.2a

rank	year	b_1 value	frequency
3	1962	0	0
		1.34	0
		2.68	5
		4.02	5
		5.37	5
4	1980	0	5
		1.34	5
		2.68	5
		4.02	5
		5.37	5

Table I.C.2b

rank	year	b_2 value	frequency
3	1962	.29	3
		.35	3
		.42	3
		.49	3
		.56	3
4	1980	.29	5
		.35	5
		.42	5
		.49	5
		.56	5

b_1= 2.68, 4.02, or 5.37

b_2= .29, .35, .42, .49, or .56

D. West

Table I.D.1

year	rank	frequency
1962	1	0
	2	0
	3	10
	4	15
1980	1	0
	2	5
	3	20
	4	0

Table I.D.2a

rank	year	b_1 value	frequency
4	1962	0	0
		1.34	0
		2.68	5
		4.02	5
		5.37	5
3	1980	0	0
		1.34	5
		2.68	5
		4.02	5
		5.37	5

Table I.D.2b

rank	year	b_2 value	frequency
4	1962	.29	3
		.35	3
		.42	3
		.49	3
		.56	3
3	1980	.29	4
		.35	4
		.42	4
		.49	4
		.56	4

b_1= 2.68, 4.02, or 5.37

b_2= .29, .35, .42, .49, or .56

II. 9-Way Classification System

A. New England

Table II.A.1

year	rank	frequency
1962	1	2
	1.5	1
	2	22
	3	0
	4	0
	5	0
	6	0
	7	0
	8	0
	9	0
1980	1	2
	2	5
	3	3
	4	15
	5	0
	6	0
	7	0
	8	0
	9	0

New England continued,

Table II.A.2a

rank	year	b_1 value	frequency
2	1962	0	5
		1.34	5
		2.68	5
		4.02	4
		5.37	3
4	1980	0	0
		1.34	0
		2.68	5
		4.02	5
		5.37	5

b_1= 2.68

b_2= .42, .49, or .56

Table II.A.2b

rank	year	b_2 value	frequency
2	1962	.29	3
		.35	4
		.42	5
		.49	5
		.56	5
4	1980	.29	3
		.35	3
		.42	3
		.49	3
		.56	3

B. Middle Atlantic

Table II.B.1

year	rank	frequency
1962	1	23
	2	2
	3	0
	4	0
	5	0
	6	0
	7	0
	8	0
	9	0
1980	1	22
	2	3
	3	0
	4	0
	5	0
	6	0
	7	0
	8	0
	9	0

Middle Atlantic continued,

Table II.B.2a

rank	year	b_1 value	frequency
1	1962	0	5
		1.34	5
		2.68	5
		4.02	5
		5.37	3
1	1980	0	3
		1.34	5
		2.68	5
		4.02	5
		5.37	4

b_1= 1.34, 2.68, or 4.02
b_2= .42 or .49

Table II.B.2b

rank	year	b_2 value	frequency
1	1962	.29	4
		.35	4
		.42	5
		.49	5
		.56	5
1	1980	.26	4
		.35	4
		.42	5
		.49	5
		.56	4

C. East North Central

Table II.C.1

year	rank	frequency
1962	1	0
	2	0
	3	24
	4	1
	5	0
	6	0
	7	0
	8	0
	9	0
1980	1	0
	2	0
	3	15
	4	10
	5	0
	6	0
	7	0
	8	0
	9	0

East North Central continued,

Table II.C.2a

rank	year	b_1 value	frequency
3	1962	0	4
		1.34	5
		2.68	5
		4.02	5
		5.37	5
3	1980	0	0
		1.34	0
		2.68	5
		4.02	5
		5.37	5

b_1= 2.68, 4.02, or 5.37
b_2= .29, .35, .42, or .49

Table II.C.2b

rank	year	b_2 value	frequency
3	1962	.29	5
		.35	5
		.42	5
		.49	5
		.56	4
3	1980	.29	3
		.35	3
		.42	3
		.49	3
		.56	3

D. West North Central

Table II.D. 1

year	rank	frequency
1962	1	0
	2	0
	3	0
	4	0
	5	5
	6	0
	7	12
	8	8
	9	0
1980	1	0
	2	0
	3	0
	4	0
	5	0
	6	14
	7	11
	8	0
	9	0

West North Central continued,

Table II.D.2a

rank	year	b_1 value	frequency
7	1962	0	0
		1.34	5
		2.68	5
		4.02	0
		5.37	2
6	1980	0	0
		1.34	1
		2.68	3
		4.02	5
		5.37	5

$b_1 = 2.68$

$b_2 = .29$

Table II.D.2b

rank	year	b_2 value	frequency
7	1962	.29	3
		.35	3
		.42	2
		.49	2
		.56	2
6	1980	.29	4
		.35	3
		.42	3
		.49	2
		.56	2

E. South Atlantic

Table II.E.1

year	rank	frequency
1962	1	0
	2	0
	3	0
	4	15
	5	5
	6	5
	7	0
	8	0
	9	0
1980	1	0
	2	0
	3	0
	4	0
	5	20
	6	5
	7	0
	8	0
	9	0

South Atlantic continued,

Table II.E.2a

rank	year	b_1 value	frequency
4	1962	0	0
		1.34	0
		2.68	5
		4.02	5
		5.37	5
5	1980	0	0
		1.34	5
		2.68	5
		4.02	5
		5.37	5

b_1= 2.68, 4.02, or 5.37
b_2= .29, .35, .42, .49, or .56

Table II.E.2b

rank	year	b_2 value	frequency
4	1962	.29	3
		.35	3
		.42	3
		.49	3
		.56	3
5	1980	.29	4
		.35	4
		.42	4
		.49	4
		.56	4

F. East South Central

Table II.F.1

year	rank	frequency
1962	1	0
	2	0
	3	0
	4	0
	5	0
	6	7
	7	4
	8	9
	9	5
1980	1	0
	2	0
	3	0
	4	0
	5	0
	6	0
	7	7
	8	9
	9	9

East South Central continued,

Table II.F.2a

rank	year	b_1 value	frequency
8	1962	0	0
		1.34	5
		2.68	4
		4.02	0
		5.37	0
8	1980	0	0
		1.34	1
		2.68	5
		4.02	3
		5.37	0

b_1= 2.68

b_2= .42, .49, or .56

Table II.F.2b

rank	year	b_2 value	frequency
8	1962	.29	1
		.35	2
		.42	2
		.49	2
		.56	2
8	1980	.29	2
		.35	1
		.42	2
		.49	2
		.56	2

G. West South Central

Table II.G. 1

year	rank	frequency
1962	1	0
	2	0
	3	0
	4	0
	5	11
	6	9
	7	5
	8	0
	9	0
1980	1	0
	2	0
	3	0
	4	0
	5	5
	6	6
	7	7
	8	7
	9	0

West South Central continued,

Table II.G.2a

rank	year	b_1 value	frequency
6	1962	0	0
		1.34	5
		2.68	4
		4.02	0
		5.37	0
7	1980	0	0
		1.34	1
		2.68	3
		4.02	3
		5.37	0

$b_1 = 2.68$

$b_2 = .42$

Table II.G.2b

rank	year	b_2 value	frequency
6	1962	.29	1
		.35	2
		.42	2
		.49	2
		.56	2
7	1980	.29	2
		.35	1
		.42	2
		.49	1
		.56	1

H. Mountain

Table II.H.1

year	rank	frequency
1962	1	0
	2	0
	3	0
	4	0
	5	0
	6	0
	7	0
	8	5
	9	20
1980	1	0
	2	0
	3	0
	4	0
	5	0
	6	0
	7	0
	8	10
	9	15

Mountain continued,

Table II.H.2a

rank	year	b_1 value	frequency
9	1962	0	0
		1.34	5
		2.68	5
		4.02	5
		5.37	5
9	1980	0	0
		1.34	0
		2.68	5
		4.02	5
		5.37	5

b_1= 2.68, 4.02, or 5.37
b_2= .29, .35, .42, .49, or .56

Table II.H.2b

rank	year	b_2 value	frequency
9	1962	.29	4
		.35	4
		.42	4
		.49	4
		.56	4
9	1980	.29	3
		.35	3
		.42	3
		.49	3
		.56	3

I. Pacific

Table II.I.1

year	rank	frequency
1962	1	0
	2	0
	3	1
	4	9
	5	4
	6	4
	7	5
	8	2
	9	0
1980	1	1
	1.5	1
	2	16
	3	7
	4	0
	5	0
	6	0
	7	0
	8	0
	9	0

Pacific continued,

Table II.I.2a

rank	year	b_1 value	frequency
5	1962	0	0
		1.34	0
		2.68	4
		4.02	0
		5.37	0
2	1980	0	0
		1.34	3
		2.68	5
		4.02	5
		5.37	3

$b_1 = 2.68$

$b_2 = .42$

Table II.I.2b

rank	year	b_2 value	frequency
5	1980	.29	0
		.35	1
		.42	1
		.49	1
		.56	1
2	1980	.29	3
		.35	3
		.42	4
		.49	3
		.56	3