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Economic growth in Missouri River Basin metropolitan centers

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ECONOMIC GROWTH IN MISSOURI RIVER BASIN METROPOLITAN CENTERS

by

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I. INTRODUCTION

A study of regional economic growth can show the relation of the economic activity of a particular region to that of the nation as a whole. Research of this nature provides an opportunity to examine the components of economic growth within the region itself, it yields the much-needed information sought by both public and private decision-makers. This particular study focuses on regional economic growth in the Missouri River Basin.

A. Objectives

Within the Polya framework* of research giving rise to problematic solution, a dichotomy is suggested which separates the task into "problems to find" and "problems to prove" (64, pp. 154-157). The objectives of this study can be expressed as problems to find which include the following:

(1) Where is the economic growth or decline occuring in the Missouri Basin, both spatially and sectorally?

(2) What are the information needs of both public and private management decision-makers with reference to resource use and investment in the Region?

(3) How can this information be developed and its use made operational?

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*Polya distinguishes between two kinds of problems and the analysis involved in their solution; they are (a) problems to find and (b) problems to prove. In a problem to find, the objective is to find the unknown of the problem. Its principal parts are the unknown, the data, and the condition. In a problem to prove, the aim is to show conclusively that a certain stated assertation is true. Its principal parts are the hypothesis and the conclusion of the theorem which has to be proved or disproved.

B. Regional Economic Development

The Missouri River Basin Region, which is coterminous with the Missouri River watershed, is comprised of 425 counties encompassing the larger portion of seven states -- Montana, North Dakota, South Dakota, Wyoming, Colorado, Nebraska, and Kansas, and smaller portions of three states -- Minnesota, Iowa and Missouri. Geographically, the region is a highly heterogeneous spatial system, including areas of the Rocky Mountains, the Great Plains, the Corn Belt and fringes of the Manufacturing Belt. The Missouri Basin does not have the advantage of a long period of institutionalized regional identity as do other areas such as the Upper Midwest Region (a federal reserve district); however, increasing attention will be drawn to this region as a result of the federal-state programs for water resource development.

Underlying economic changes in the Missouri Basin are such national forces as the migration of population from rural to urban areas, the corresponding shift in employment from agriculture and other resource-based activity to the service sectors and government, changes in transportation patterns, continuous technological advancement of society and the explosion of knowledge generally. As national economic growth is accompanied by increased emphasis on human resource development, the attractiveness of a region's labor force to potential industry will be increasingly measured by the educational opportunities available in that region.

The Missouri Basin is largely an agricultural based region; yet, like other regions in the United States, it is experiencing economic upheaval and basic changes in the distribution of its economic activity which accompanies industrialization and urbanization. Regional specialization in agriculture has declined significantly over the past two decades as the economic base of the region has become

more diversified. Coupled with the decentralization and geographic dispersement of industrial activity, increased population mobility has given rise to significant changes in the region's employment structure. Effects of these changes in the composition of the labor force, both by industrial sector and by occupational classification, are widely felt by a region's economy -- especially its urban economy. The impact of these employment shifts results in the modification and redistribution of regional income and production levels.

C. Purpose and Scope of Study

Research on regional economic development includes, first, the establishment of criteria for economic growth, and, secondly, the choice of appropriate indicators of such growth. Criteria for economic growth include both quantity and quality considerations. Measures of population and employment change in various sectors of the economy illustrate the quantity aspects, whereas quality characteristics are involved in relative income changes, whether in the total region's contribution to GNP or those quality changes in the form of per capita and family incomes. Smaller sub-regions and urban centers will be examined with reference to indicators of regional growth, and, thus, information will be generated about the larger region's employment characteristics.

Using employment data, this study will apply several analytical techniques, including shift analysis, economic base studies, industrial location theory, and the concept of comparative advantage between cities and their industrial sectors. Treating a region as an isolated entity raises the question of the validity of regionalization. Perhaps this problem can best be resolved by treating regional isolation as only an initial constraint to develop a framework for a discussion, after which it can be disregarded in treating the endogenous and exogenous variables free from regional confinement.

D. Regional Growth Centers

Economic growth in the Missouri Basin is inseparable from industrial and urban growth. Projected trends in rural to urban migration suggest, however, that the metropolitan areas are the region's "growth centers"; they hold the key to the future of the larger region. This study will examine in detail the industrial sectors of selected "growth centers" within the region for the purpose of gaining insights into the strengths and weaknesses of the region itself.

The emphasis of this study will be limited to urban areas which come under the classification of "Standard Metropolitan Statistical Areas" (subsequently referred to as SMSAs). The use of SMSAs provides expediency for research as the data is collected on a county basis and is more readily available and consistent than if the definition of Urbanized Area were used. Support for the choice of the SMSA over the Urbanized Area is reinforced by the availability of employment data by place of residence rather than by place of work; frequently a large number of persons employed within the urbanized area will actually live outside of the contiguous urban area in "dormitory towns" or other rural, non-farm places of residence. The use of SMSA data appears to be the logical choice as the most representative of employment within the contiguous metropolitan area itself. Similar arguments appear in the Census criteria for the delineation of SMSAs (84, p. 24).

The use of employment change as indicative of the growth and decline of individual industrial sectors within the SMSAs will enable one to draw preliminary economic profiles of the "growth centers" themselves, the large sub-regions, and the Missouri Basin Region as a whole. Data to be used in the analysis includes 1950 and 1960 employment levels for twelve major industrial sectors which are disaggregated to a total of thirty-nine prime categories. (See Table I for a representative employment breakdown and corresponding S.I.C. code identification of each sector.)

Table 1. Industrial employment sectors and standard industrial classification equivalents.

	Industrial Sector	S.I.C. Codes
1	Agriculture, forestry, and fisheries	
2	Agriculture	01, 02, 07
3	Forestry and fisheries	08, 09
4	Mining	10, 11, 12, 13, 14
5	Manufacturing	
6	Food and kindred products	20
7	Printing, publishing and allied	27
8	Chemical and allied	28
9	Other non-durable goods	
10	Textile mill products	22
11	Apparel and other fabricated textiles	23
12	Other non-durable goods	21, 26, 29, 30, 31, 39
13	Furniture, lumber and wood products	24, 25
14	Primary and fabricated metals	
15	Primary metal industries	33
16	Fabricated metal industries	34
17	Machinery, except electrical	35
18	Electrical machinery, equipment	36
19	Other durable goods	
20	Motor vehicles and equipment	371
21	Transportation equipment	37 (except 371)
22	Other durable goods	19, 32, 38
23	Transportation	
24	Railroad and railway express service	40
25	Trucking service and warehousing	42
26	Other transportation	41, 44, 45, 46, 47
27	Communication and public utilities	
28	Communications	48
29	Utilities and sanitary service	49
30	Wholesale trade	50
31	Retail trade	
32	Food and dairy product stores	54
33	Eating and drinking places	58
34	Other retail trade	52, 53, 55, 56, 57, 59
35	Finance, insurance and real estate	60, 61, 62, 63, 64, 65, 66, 67
36	Services	
37	Business services	73
38	Repair services	75, 76
39	Personal services	

Table I. (Continued)

	Industrial Sector	S.I.C. Codes
40	Private households	88
41	Other (including hotels)	70, 72
42	Entertainment and recreation services	78, 79
43	Professional and related services	
44	Medical and hospitals	80
45	Educational: government	9182
46	private	82
47	Other professional and related	81, 84, 86, 89
48	Contract construction	15, 16, 17
49	Public administration	91 (except 9182), 92, 93
50	Industries not reported	99

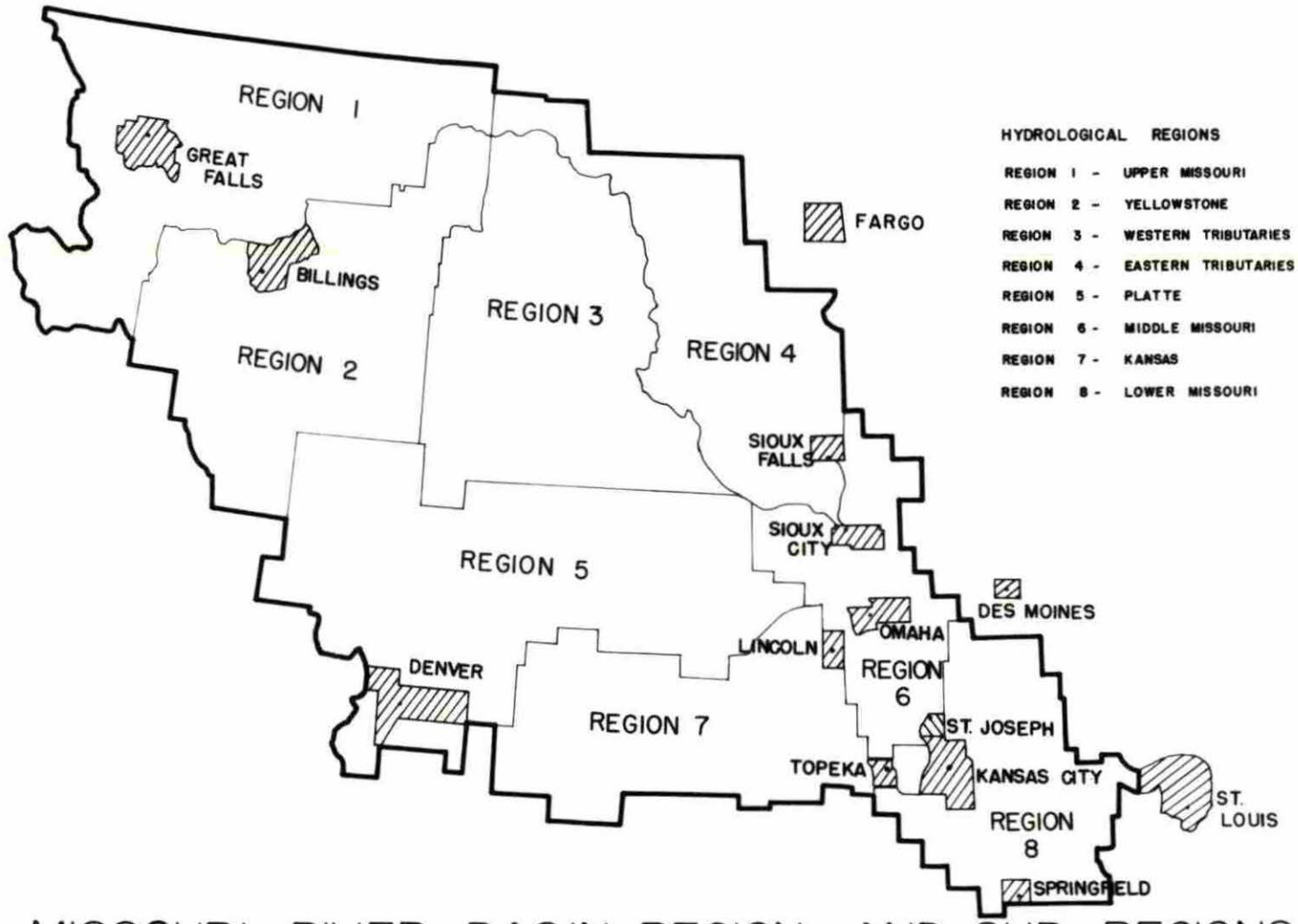
Fourteen SMSAs (eleven of which are within the Missouri Basin Region -- Great Falls, Billings, Denver, Lincoln, Omaha, Sioux City, Sioux Falls, Topeka, St. Joseph, Kansas City and Springfield, and three which lie on the eastern borders of the Basin -- namely Fargo, Des Moines, and St. Louis) will be examined in detail with reference to changes in their employment composition. The Basin has been divided into eight sub-regions, each of which has at least one SMSA for which the term "growth center" would be an appropriate designation. An exception would be sub-region 3; however, Rapid City is almost large enough to qualify as an SMSA, it could be appropriately referred to as the central city for that sub-region.

Figure I shows the regional boundaries of the Missouri Basin with its SMSAs and eight major sub-regions. The map more clearly illustrates the central city characteristics of the SMSAs and the areas which they serve.

Tables 2 and 3 provide a summary of Missouri Basin population data which provide helpful background information for the study of the Basin's employment characteristics which follow. Reference to population data is essential in determining a rank size of cities and in discussing the functional role of the city with regard to its employment structure.

Table 2 indicates a wide variance of population change between areas of the larger region. For example, sub-region 5 has shown a population increase of 50.3 percent in twenty-year interval, while sub-region 4 has remained practically unchanged in terms of total population with an increase of only 1.6 percent. Table 3 shows that while the total population growth of the Basin lags behind that of the national population, its urban growth rate is slightly greater than that for the Nation.

Figure 1. The Missouri River Basin Region, hydrological sub-regions, and Standard Metropolitan Statistical Areas.



MISSOURI RIVER BASIN REGION AND SUB-REGIONS

Table 2. Missouri River Basin population summary, 1940, 1950, and 1960, by hydrological sub-regions.

	Subregion	Total Population			Change 1940-60
		1940	1950	1960	
		(number)	(number)	(number)	(percent)
1	Upper Missouri	247,907	254,734	298,191	19.3
2	Yellowstone	210,589	234,626	270,382	28.4
3	Western Tributaries	282,246	277,411	299,545	6.1
4	Eastern Tributaries	659,248	662,431	669,635	1.6
5	Platte	1,108,948	1,299,817	1,666,837	50.3
6	Middle Missouri	1,504,473	1,516,754	1,613,851	7.3
7	Kansas	1,038,001	1,089,869	1,231,806	18.7
8	Lower Missouri	1,718,568	1,727,799	1,880,856	9.4
Missouri Basin Total		6,771,980	7,063,441	7,931,103	17.1
United States Total		131,699,000	150,698,000	174,464,000	32.5

Table 3. Missouri River Basin urban population summary, 1940, 1950, and 1960, by hydrological sub-regions.

	Subregion	Urban Population			Change 1940-60
		1940	1950	1960	
		(number)	(number)	(number)	(percent)
1	Upper Missouri	80,454	102,060	137,101	70.0
2	Yellowstone	71,333	103,314	146,122	104.8
3	Western Tributaries	45,079	73,990	100,201	122.3
4	Eastern Tributaries	155,608	197,044	246,519	58.4
5	Platte	559,984	803,589	1,209,498	116.0
6	Middle Missouri	680,436	775,062	926,378	36.1
7	Kansas	368,480	509,094	688,190	86.8
8	Lower Missouri	750,497	908,934	1,101,947	46.8
Missouri Basin Urban		2,711,869	3,473,088	4,555,954	68.0
United States Urban		74,424,000	96,468,000	124,699,000	67.6

Figure 2 and Table 4 demonstrate the relative population growth of the fourteen SMSA's during the period of 1940 to 1960. The region's western cities experienced the greatest growth during the period with Denver out in front showing a population increase of 108.8 percent. The growth for all fourteen SMSA's during the period was 49.8 percent compared with 55.0 percent for all SMSA's in the United States (212 areas). Besides the western cities of Billings, Great Falls and Denver, only Kansas City, with a population increase of 60.8 percent, was above the U.S. figure. The remaining ten SMSA's under consideration fell below the average growth rate of all SMSA's in the Nation. Sioux City experienced the least growth with a 4.1 percent gain, while St. Joseph suffered a population decline of 3.7 percent over the twenty-year period.

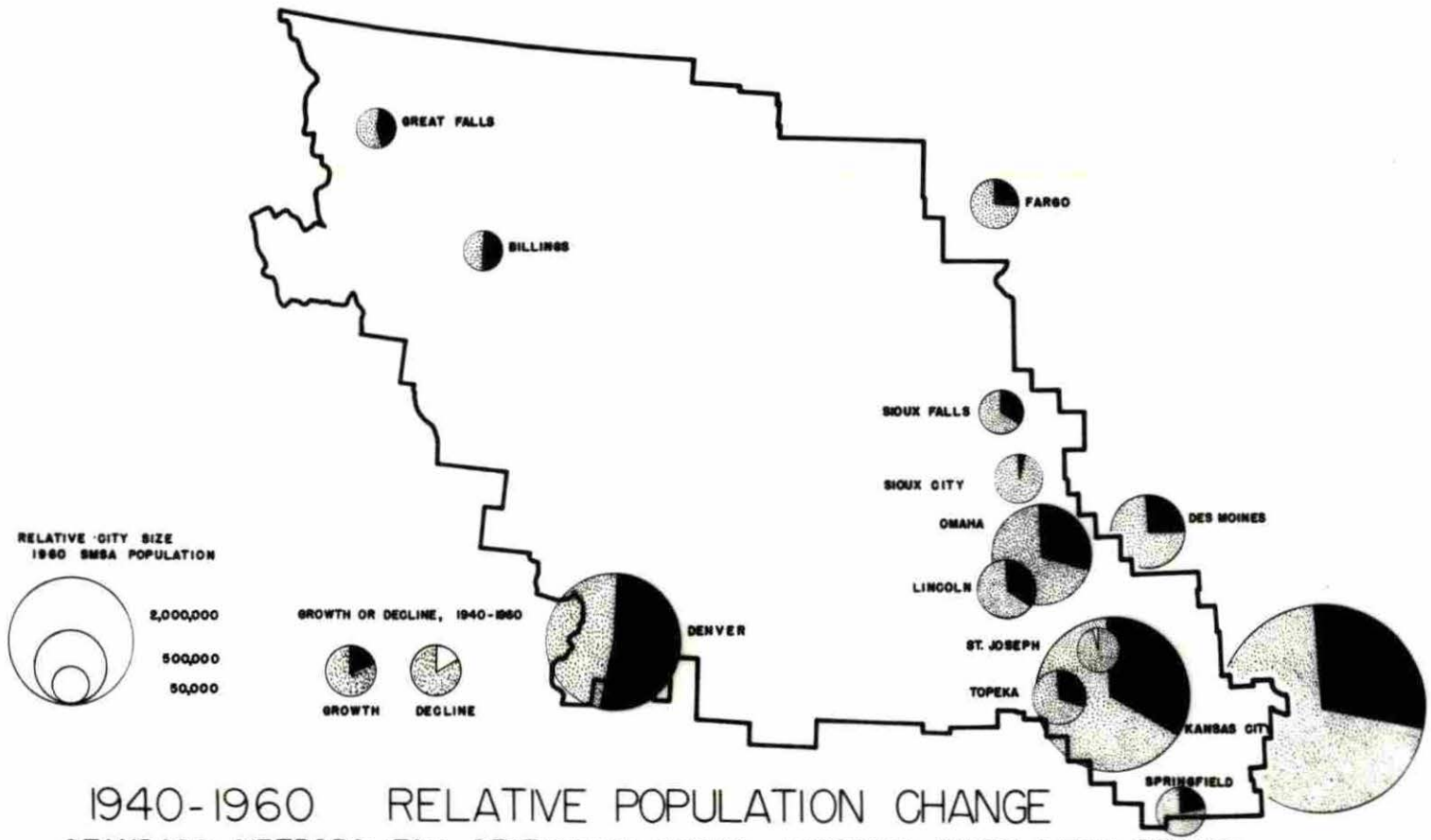
Regional analysis for this study will attempt to pinpoint reasons for the wide differences of population change in each of the Region's metropolitan centers.

In summarizing population characteristics of the Missouri River Basin for the years 1940, 1950 and 1960, the Economic Work Group of the Missouri Basin Inter-Agency Committee reported as follows:

> Although the Missouri River Basin comprises about one-sixth of the conterminous United States, the basin's population in 1960 represented less than five percent of the national total. In the two decades . . . the basin's percentage of the United States' population has declined moderately . . . .
>
> The basin's decreasing relative position arises from its more predominant rural character and declining farm population. Comparative changes in rural population in the 1950-1960 decade show a basin decline of 6.0 percent and a drop of only 0.9 percent for the United States . . Conversely, urban population growth in the basin has been almost synonymous with urban gains nationally (65, p. 1).

The Missouri Basin's urban population characteristics illustrate the historical trend for rapid economic growth to occur in the urban centers while the outlying region lags behind. For this reason, the study emphasizes urban economic change

Figure 2. Population growth during twenty-year period, 1940-1960, for Missouri River Basin and adjacent SMSAs.



1940-1960 RELATIVE POPULATION CHANGE

STANDARD METROPOLITAN STATISTICAL AREAS MISSOURI RIVER BASIN REGION

Table 4. Population summary for fourteen selected standard metropolitan statistical areas, 1940, 1950, 1960.

SMSA	1940	1950	1960	Change 1940-60
	(number)	(number)	(number)	(percent)
Great Falls	41,999	53,027	73,418	74.8
Billings	41,182	55,875	76,016	84.6
Sioux Falls	57,697	70,910	86,575	50.1
Denver	445,206	612,128	929,383	108.8
Omaha	325,153	366,395	457,873	40.8
Sioux City	103,627	103,917	107,849	4.1
Lincoln	100,585	119,742	155,272	54.4
St. Joseph	94,067	96,826	90,581	-3.7
Topeka	91,247	105,418	141,286	54.8
Kansas City	686,643	814,357	1,039,493	60.8
Springfield	90,541	104,823	126,276	39.5
St. Louis	1,464,111	1,719,288	2,060,103	40.7
Des Moines	195,835	226,010	266,315	36.0
Fargo	78,186	89,240	106,027	35.6
Eleven Basin SMSA's	2,077,947	2,503,418	3,284,022	58.0
Fourteen SMSA's	3,816,079	4,537,956	5,716,467	49.8
United States' SMSA's (212 Areas)	72,834,468	89,316,903	112,885,178	55.0

with attention focused primarily on the eleven SMSAs, which are viewed as the region's growth centers.

II. LITERATURE REVIEW

Regional economic analysis involves multi-faceted economic, geographic and spatial concepts. Difficulty arises in trying to utilize the concepts of several related disciplines in order to develope a useful "information system". One aspect of regional economic analysis is to provide information for regional development programming. This involves taking a look at the information available and the agencies responsible for its processing and interpretation as well as those agencies which make resource planning operational.

Lloyd Rodwin would have us learn from the European situation where the crux of the problem appeared to have been neglected by both the economists and the physical planners. The physical planners tended to operate historically only on the local or regional level without knowledge of the national economic development policies and programs. On the other hand, the economic planners conducted their analysis and programs on an aggregative and sector basis (66). Critical areas deserving attention are thereby lost in the aggregate while policy continues to be formulated based on inadequate information.

A. Economic Space

John Friedmann suggests that the regional development problem is one of spatial organization. Since economic growth can be traced to location of economic activity, shifts in location patterns are associated with changes in levels of income, employment and welfare.

Location or spatial organization is a function of the interaction of economic activities. Consequently, ". . . regional planning. . . endeavors to improve the organization of economic space in accordance with indicated criteria or goals" (19, p. 20). Francois Perroux contends that the concept of economic space needs

to be extended beyond the containment point of reference of cartographers to the multi-dimensional and abstract space of the mathematician (62).

We will remain at a level of abstraction in which the region will be examined in view of its role as an economic entity and agglomoration of spatially distributed economic units.

B. Location Theory

Location theories suggest that a region's spatial arrangement be viewed as a complex system of interacting forces and sub-regions. Losch supports the "systems" approach to regional analyses by asserting that ". . . a region is a system of various areas, an organism rather than just an organ" (44, p. 115). Location theory, as expressed by John Alexander, is ". . . an endeavor to account in a consistent, logical way for the location pattern of economic activity and for the manner in which economic areas are interrelated" (2, p. 612). The components of such a regional economic "system" include the larger region, the sub-regions, and the spatial distribution of cities within the region; together with the interaction and inter-dependencies which the region's component parts exhibit.

Much of location theory at one level or another has been tied to cost considerations. Growth or decline of a region's economic activity depends both on its access to inputs and to markets for its outputs -- at competitive costs and prices. Cost minimization has been dealt with at considerable length by location theorists in lieu of the more direct concern for profit maximization considerations. Transfer costs have been cited by both Hoover and Weber as one of the primary determinants of industrial location (21, 35). Depending on the nature of its activity, a given industry may be primarily demand based (market oriented) or supply based (material oriented). In some cases, location decisions favor an

intermediate position in the minimization of total costs. Where transfer costs affect the location decision to a lesser degree, the industry may remain "footloose" or be located in terms of individual preference or amenities alone.

Public and private managers alike need to consider social costs in all location analysis: "From a social standpoint, accurate weighing of comparative costs is especially necessary in the case of private monopoly or public enterprise, where bad location may spell an indefinitely continued waste of resources " (35, p. 1).

C. Central Place Theory

Christaller developed a theory dealing with the influence of transportation and spatial interaction on the location of cities. His "Central place" theory suggests a tendency for service centers to be dispersed over the countryside in a hexagonal pattern with a "central-place" in each hexagon. The primary prerequisite for a central place is that it provides goods and services for an area larger than itself (53, pp. 72-81). The importance of a city as a central place is not determined by its size, but by the functions it performs; however, these functions tend to be increasingly complex the larger the urban center.

The Christaller Central Place Theory suggests a dispersed pattern; a rather homogenous region with geometrically arranged growth centers, central-places, and smaller urban places. Digressions from the dispersed pattern include the clustered pattern as seen in areas of specialized activity such as mining, and the linear pattern of urbanization as seen along major transportation routes and waterways. Both of the latter are visible in the Missouri Basin. Duncan emphasizes that ". . . the central place model is only one tool for the understanding of a system of cities" (15, p. 81).

Another classification scheme for regions based on city spatial distribution is twofold; simply, regions may be classified as homogeneous, based on some common features, or nodal. The latter denotes the ranking of regions according to the economic function performed by the "central city" or node of each region. The nodal configuration would be most approrpiate for a region with much diversity of activity and one which would not fall neatly into the highly regular Christaller pattern. The nodal aspect of regions has been modified by Karl Fox in his concept of a "functional economic area" (19). The functional economic area, or FEA, is determined by the trade area surrounding the node of economic activity -- the central city. Fox makes the distinction that the economic activity of his areas are people-oriented rather than resource-oriented. With respect to larger areas, he views the region as a rather homogeneous building block in terms of its internal organization.

Location theory, as noted by Isard, is frequently oriented towards ad hoc locational problem solving and as such does not provide a profile of the total regional economy's changing urban and industrial structure. Location theory, by itself, is inadequate for a complete empirical analysis of a region's economy.

D. Systems of Cities

Christaller, Losch, and others have developed an order or hierarchy of cities based on population and on the market areas or hinterland served by the cities. As summarized by Isard, "Corresponding to each order, there is both a definite number of functions which each city of the order performs and a population size typical for each city of that order" (38, p. 222).

Philbrick, in the "Nested-Hierarchy" Theory of location, has ranked central places according to the following economic functions: (1) consuming, (2) retailing, (3) wholesaling, (4) trans-shipment, (5) exchange, (6) control, and (7) leadership; in order of importance from the smaller to the larger city (63).

The seventh order position in the Philbrick model is usually associated with those cities that are in a strategic location with respect to the nation as a whole, and whose economic functions are of national and international importance. Sixth order cities would generally be in the category of regional capitals, and the fourth and fifth order designations would apply to the regional "growth centers" as sub-regional or political capitals.

John Friedmann maintains that ". . . the hierarchy of urban places represents the ultimate means for organizing a geographic area and its component social, political, administrative and economic spaces" (19, p. 349). He further suggests a hierarchy of primate, regional, provincial, and local service cities. The primate category would include growth centers of manufacturing, finance, commercial and specialized services; the regional city would be a service, trade and regional administrative center; the provincial city, a sub-regional trade center; and his final category, local service cities, would primarily serve rural areas. These designations correspond roughly to Philbrick's seventh, sixth, fourth and third orders respectively.

Friedmann supports the thesis that cities have historically moved through a kind of a hierarchical structure in becoming fully developed economic centers.

> Area specialization, functional differentiation, and the degree of interaction among activities distributed in space may be accepted as one of the more important criteria for measuring the relative degree of maturity or regional urban structure, as the hierarchy evolves from its rudimentary stages . . ., it will help organize the entire area over

> which its influence extends into an inter-dependent system of "nested", city-oriented regions. . . , which will in turn increasingly partake of the urban way of life (19, p. 349).

Duncan (15), in Metropolis and Region, ties together the evolutionary process of metropolitan development as proposed by N.S.B. Gras and R.D. McKenzie. Gras suggests that a "fully developed" metropolitan center, in addition to having a large population, would perform important financial functions for itself and surrounding areas, and place greater importance on trade and commerce than on industrial production (28, p. 249). McKenzie's "community", which is a regional concept of a metropolis, is defined as a functional entity which he views as, ". . . a central city or focal point of dominance in which are located the institutions and services that cater to the region as a whole and serve to integrate it with other regions. . ." (47, p. 70). Dominance, according to Duncan, refers to the unilateral exercise of the city's influence to its surrounding region or "hinterland".

The interdependency of metropolis and region is underscored by Gras in his insistence that the metropolis, in addition to possessing a healthful and efficient location between producers and consumers, must possess an adjacent hinterland rich in resources with a productive population and an adequate transportation network for accessibility to the central city. Population alone will not determine the metropolitan character of a city. It must exhibit a certain level of functional leadership for the region it serves. Duncan demonstrates that ". . . A city of a given size is more likely to have metropolitan features if it has room to establish a sizeable hinterland than if it lies in the shadow of a larger city" (15, p. 128). A city's functional maturity is more visible by a

criterion of relative rather than absolute size. To better understand the functional and leadership roles of particular cities in the context of the total urban economy, many systems of classification have been devised.

A city's employment structure, for example, refers to the way that its labor force is divided up among the various functions or categories of economic activity. Employment structures of cities vary remarkably from one another and from the national average. The employment structure of cities has been used frequently as a means of classifying cities on the basis of function. Every large city is multi-functional, yet frequently one type of activity will be so predominant in the city that it shapes that city's unique character. The functional role of a city has been illustrated by a number of city classification schemes such as those by Chauncy Harris, Howard Nelson, and Gunnar Alexanderson (31, 54, 3).

Historically, metropolitan centers have demonstrated unparalleled population growth coupled with an evolutionary process of functional economic development. These "growth centers" have provided regional leadership in terms of income and employment levels. High wages and social ammenities attract labor to the growth center, thus reinforcing its strength in human resources.

The spatial and sectoral aspects of an urban system must be examined in detail to find those characteristics which are the most responsive to instrument and goal variables of regional economic planning. Regional models must be disaggregated into sub-regional systems to understand the relationships which exist between the growth centers and their hinterland. Frequently the growth or decline of an area hinges on one or two sectors within the system whose identification is lost in the aggregate. Behavior of a particular sector may hold the key to an area's future development.

III. ANALYTICAL FRAMEWORK

A. Shift Analysis

The primary analytical technique for this study will be the "shift analysis" as conceptualized by Edgar Dunn and Daniel Creamer, and expanded by Robert Graham and Lowell Ashby (16, 26, 4). A number of supporting tools for regional analysis will follow. The primary purpose of the analysis is to develop a useful information system which can be drawn upon for both public and private decision-making.

Regional economic development takes place within the larger context of the national economy and, hence, it must be discussed within a national framework. As a measure of change in economic activity the shift-share technique provides a means of separating the various effects which give rise to change. In other words, change at the national level affects regions and sectors in different ways because of differences in regional-sectional composition.

Shift analysis, divides total change into three components: (a) the national growth effect, (b) industrial mix effect, and (c) regional share effect. This technique, suggests Dunn, ". . . permits the identification of the results of factors which operate more or less uniformly nationally, and more or less specifically in a particular region. It permits comparison of growth in a specific sector of the economy in different regions" (16, p. 97).

The model which will be used in analyzing shifts in total employment is given by the equation:

$$\frac{\Delta e_i}{e_{it}} = \frac{\Delta E_{..}}{E_{it}} + \left(\frac{\Delta E_i}{E_{it}} - \frac{\Delta E_{..}}{E_{.t}}\right) + \left(\frac{\Delta e_i}{e_{it}} - \frac{\Delta E_i}{E_{it}}\right),$$

in which

e_i = change in regional employment in i-th industry from base year to terminal year.

e_{it} = regional employment in i-th industry in base year, t.

E_i = change in U.S. employment in i-th industry from base year to terminal year.

E_{it} = U.S. employment in i-th industry in base year, t.

$E_{.}$ = change in U.S. employment in all industries from base year to terminal year.

$E_{.t}$ = U.S. employment in all industries in base year, t.

The proportional change in regional employment in industry (i) is composed of three parts, namely:

(1) The national growth effect

$$\frac{\Delta E_{.}}{E_{.t}},$$

(2) The industry-mix or proportionality effect

$$\left(\frac{\Delta E_i}{E_{it}} - \frac{\Delta E_{.}}{E_{.t}}\right),$$

and (3) The regional share or differential effect

$$\left(\frac{\Delta e_i}{e_{it}} - \frac{\Delta E_i}{E_{it}}\right).$$

Employment changes are due largely to (1) the overall economic growth of the U.S., and (2) the redistribution or shift of the labor force that occurs via interregional and intersectoral migration. This kalidascope of employment change depends first on the national growth rate and subsequently on the two "shift coefficients" -- industry-mix and regional-share. These shift coefficients, may augment or diminish the change due to national growth.

> National growth is the percentage increase in total national employment. Industry-mix refers to the percentage distribution of employment according to industry. The regional-share component expresses the competitive position of a particular industry in a particular region or area (49, p. 196).

The national growth effect during any one period is the same for all industries, whereas the industry-mix effect varies with the industries for all regions; the regional-share effect will vary for all regions and all industries in these regions. Rewriting the model in terms of actual change for the period 1950-1960, we will translate the national growth effect into the "A" component, the industry-mix effect into the "B" component, and the regional-share effect into the "C" component. Hence, the total change in employment for the i-th industry in the j-th region:

$$\Delta\, e_{ij(50-60)} = A + B + C.$$

The components of change are as follows:

$$A = \left(\frac{\Delta E_{..50-60}}{E_{..50}}\right) e_{ij50}$$

$$= \left(\frac{E_{..60}}{E_{..50}} - 1\right) e_{ij50}$$

$$= (G - 1)\, e_{ij50},$$

where $G_{..}$ is national growth coefficient for all industries, 1950-1960.

$$B = \left(\frac{\Delta E_{i.50-60}}{E_{i.50}} - \frac{\Delta E_{..50-60}}{E_{..50}}\right) e_{ij50}$$

$$= \left(\frac{E_{i.60}}{E_{i.50}} - \frac{E_{..60}}{E_{..50}}\right) e_{ij50}$$

$$= (G_{i} - G_{..}) e_{ij50},$$

where $G_{i.}$ is national growth coefficient for i-th industry, 1950-1960.

$$C = \left(\frac{\Delta e_{ij|50-60}}{e_{ij|50}} - \frac{\Delta E_{i.50-60}}{E_{i.50}}\right) e_{ij|50}$$

$$= \left(\frac{e_{ij|60}}{e_{ij|50}} - \frac{E_{i.60}}{E_{i.50}}\right) e_{ij|50}$$

$$= (g_{ij} - G_{i.})\, e_{ij|50},$$

where g_{ij} is the growth coefficient for i-th industry in the j-th region, 1950-1960.

Or, expressed as proportional change with reference to national and regional rates of growth:

$$\frac{\Delta e_{ij|(50-60)}}{e_{ij|50}} = (G - I) + (G_{i.} - G_{..}) + (g_{ij} - G_{i.})$$

$$= N_i + M_i + S_i .$$

B. Employment Projections

Assuming that employment in each sector will continue to grow or decline as it did in the period 1950-1960, future employment levels or shift coefficients can be projected accordingly.

The unadjusted projections are given by the equation:

$$e_{it} = \left(1 + \frac{\Delta e_i}{e_{i50}}\right)^{\frac{t}{10}} e_{i60},$$

or rewritten as:

$$e_{it} = (1 + A + B_i + C_i)^{\frac{t}{10}} e_{i60},$$

in terms of the shift effects for a particular activity. Future employment estimates will depend on the values assumed for these three coefficients (49, p. 200).

The extrapolation of a ten-year or even a twenty-year historical trend can yield fantastically high estimates for those new and rapidly growing industries; this is especially true of those in relatively small geographical areas. On the other hand,

". . . potentially feasible industrial developments may be extremely difficult to anticipate because of the lack of historical data. Shift analysis must be supplemented by detailed studies of changing market demands and labor productivity for particular industries, both nationally and regionally" (48, p. 200). Control totals will be helpful to bring rapid growth industry estimates back into line when projected over long periods of time. Inter-industry relationships will also help to identify those projected employment levels which are unreasonable.

C. Economic Base

A thorough analysis of a city's economy will go beyond that of its internal relationships alone. This is provided by the concept of the urban economic base which deals with the larger sphere of a city's economic activity.

> "Clearly, knowing the total employment structure of a city is not enough. To understand that city's economic functioning we should know what keeps it going, what sustains it. The economic base is one concept for revealing this force. It also gives a criterion by which urban regions could be mapped and by which types of cities could be determined" (1, p. 246).

This concept attempts to separate economic activity into two types, basic and nonbasic, where basic economic activity is that which depends on the revenues from outside the city; and nonbasic is that component which meets the needs of the city itself. For example, grocery stores are essentially nonbasic whereas manufacturing plants are largely basic. The percentage of the total employment of a city which is involved in basic activity would be expressed as the index of basic activity. The economic base idea is best expressed by a ratio: that of the number of employees involved in basic activities over the number involved in nonbasic activities. This basic-nonbasic ratio (frequently referred to as the

basic-service ratio) thus utilizes employment data to provide an indicator of a city's source of economic well-being, that from the export of basic commodities.

Charles Tiebout (71) suggests carrying out a Community Economic Base Study as a first approximation of an area's economic structure. Later, more detailed analysis would be recommended -- for example, shift analysis. Economic base studies are important to the growth center concept in that they identify the growth factors of a community.

To conduct such a study requires three choices: unit of measurement, technique, and area. For our purposes, employment will be the unit of measurement, with application to be made to selected SMSAs. The choice of technique is between conducting an actual comprehensive survey or simply employing a rough approximation. The former would hardly be justifiable in terms of the cost involved. Employment distribution coefficients provide a means of demonstrating the sectoral employment composition of each region, sub-region or SMSA. These distribution coefficients can be differentiated spatially as follows:

(1) Area employment distribution coefficient,

$$p_{ijt} = \frac{e_{ijt}}{e_{ijt}}, \quad t = 1950, 1960;$$

and (2) U.S. Employment distribution coefficient,

$$P_{ijt} = \frac{E_{i.t}}{E_{..t}}.$$

The following formula will give an adequate approximation of the number of basic employees:

$$N_B = e_{it} - e_{Bt}$$

where basic employment for a particular region and industry is the difference between the actual employment (e_{it}) and the employment base (e_{Bt}).

The basic-nonbasic ratio can be found as follows:

A. Determine the employment base (e_{Bt}) for each industry for the given year:

$$e_{Bt} = \frac{e_{it}}{q_{it}},$$

where the location quotient (q_{it}) is determined as follows:

$$q_{it} = \frac{p_{it}}{P_{it}}.$$

Thus, when the location quotient is unity (i.e., $q_{it} = 1.00$), the employment base equals the actual employment -- hence, no basic economic activity exists.

B. Determine net employment (excess or deficit) based on the differential of the following:

$$e_{it} - e_{Bt} > 0,$$

excess employment implies exporting, hence, basic employment, and

$$e_{it} - e_{Bt} < 0,$$

deficit employment implies the necessity for importing to maintain local balance.

C. Compute the basic-nonbasic ratio for each region as follows:

$$R = \frac{\Sigma \text{ excess}}{\Sigma e_{ijt} - \Sigma \text{excess}}$$

The location quotient referred to above is useful in determining the concentration of a particular sector's employment in a given area; it is a measure of that sector's relative importance to the area or region.

A more general form of the location quotient is the following ratio:

$$r = \frac{\dfrac{\text{Empl. in i-th industry in j-th region}}{\text{Empl. in all industries in j-th region}}}{\dfrac{\text{Empl. in i-th industry in U.S.}}{\text{Empl. in all industries in U.S.}}}.$$

A ratio of unity or more for a particular industry indicates a concentration of that sector in the particular area. Correspondingly, the higher the number, the greater the degree of concentration. On the other hand, a ratio of less than unity indicates a regional deficiency of a particular industrial sector. Ratios greater than unity suggest employment in basic industries, i.e., those which export a portion of their produce or services.

D. Development Strategy

Walter Isard has observed that attraction of new economic activity to a given city is based largely on the question of comparative advantage. "Units are attracted to or repelled from cities according to a simple comparison of advantages and disadvantages generated by these cities" (37, p. 183). Hence, regional development strategy could be focused on strengthening a region's comparative advantage, whether in terms of regional or sectoral strength, particularly of those industries which have exhibitied rapid national growth.

There are two schools of thought for innovating successful regional economic growth. According to the export-base theory, growth in the export industries results in over-all regional economic expansion through a multiplier process. The key role of exportable commodities and services in regional economic growth has been stressed by Innis, Meier and North (36, 51, 57). On the other hand, Clark and Fisher (13) have advanced the economic-sector theory, the observation that a rise in per capita income is generally accompanied by a decline in the proportion of the labor force employed in agriculture and a rise, first in the proportion of employment in the secondary activities, and then in tertiary or service activities. The export-base theory emphasizes

regional or community growth as directly tied to the national economy, while the sector theory focuses primarily on a region's internal development. Both approaches are partial in scope and deal with aggregate classifications which limit analysis.

Regional development success can be measured by both regional and national norms. In both cases, development progress is a measure of cyclical performance of key economic variables. Once economic growth in a region has been initiated it tends to be self-perpetuating. McGaughy (46) suggests that industries within a region could be classified into those that converge and those that diverge from an aggregate regional growth rate, hence, relative growth rates provide the key to a particular region or sector. The comparative growth rates of areas and industries are readily explained analytically by shift analysis.

Consideration of national forces is of basic importance in discussing the economic trends of any particular region. Such forces as national population growth and migration, growth in employment, changes in productivity through technological changes and improvements in the training of human resources, all contribute to differing regional effects.

North (56) suggests that traditional theory of economic growth is not appropriate to apply to the historical development of regions in America. He suggests that regional advantages of economic growth will disappear over time, ultimately leading to increased factor mobility, more equalization of per capita income and wider dispersion of production.

The study of regional economic growth provides the greatest utility when it can be translated into predictions for the region's future. Reliable projections of employment data are of value to economic policy makers, resource planners, engineers, educators, and myriad public and private agencies.

A first approximation or neutral projection is a simple extrapolation of historical time series data. From this point, many refinements are in order if the projections are to be useful. Analysis of detailed components of economic change will provide the primary basis for revising neutral projections. For example, the neutral projections will be revised upward in the case of accelerated economic growth in certain sectors, and downward in other sectors experiencing declining economic growth.

The system in which use is made of neutral projections also needs to be responsive to changing program planning. Adjustment of projections will be necessary according to expectations of economic program contribution to over-all growth. Accurate projections are of particular importance to engineers involved in planning for future production capacity and facility utilization. Over-estimating future needs will result in wasteful excess capacity, while low estimates will cause inadequate capacity to meet future demand and as such will impose additional social costs.

Regional development planning is concerned with increased efficiency in the use of resources to meet certain socially desirable objectives. Both goal variables and instrument variables will influence estimates and give rise to further modification of projections. The goal variables of regional development planning include accomplishing certain desirable objectives with respect to employment structures, plant utilization, population composition, labor force participation rates, unemployment levels, out-migration of a region's youth, idle plant capacity, empty land, resource exploitation and conservation, average household income levels, and those problems of pollution, congestion, and urban blight.

Instrument or policy variables, which also affect the neutral projections, might include such things as land use policy, state and local government

expenditures, taxation structure, transfer payments, legal structure, and programs of public investment and capital formation. Policy variables are generally quite broad in scope whereas program planning usually deals with quite specific regions or areas. Such localized programs are most often directed towards education, welfare, recreation, renewal, transportation, and water resources.

Shift analysis and economic base studies supply useful information for public and private management decision-making. The adequacy of the information will be evaluated in the future as the effects of the decision-makers are felt throughout the region. For such an information system to continue its usefulness, it must have built-in means of feedback and control. The system will be short-lived unless it is in a continuous state of change and modification to meet the ever-changing demands placed upon it.

Weaknesses of data used in the proposed model include the very limited historical time period and the inability to account for technological change. This is illustrated by major modifications which changing technology has made in the labor structure of certain industries. The movement from a "labor intensive" operation to a highly automated "capital intensive" one will show up in the analysis as a loss of employment in an industry which may actually be experiencing rapid growth in terms of constraints other than employment. Leven (40) argues that value added, rather than employment, is the best indicator of economic growth over a sustained time period.

IV. CRITERIA AND INDICATORS OF ECONOMIC GROWTH

A. Measures of Economic Growth

A format for regional research must include (1) the establishment of a criteria for economic growth and (2) the choice of appropriate indicators of such growth.

The most useful criteria for economic growth is that of relative growth, in reference to some particular, readily identifiable base. Criteria for growth in the Missouri Basin will be in relation to over-all growth of the U.S. This is the most meaningful as the basin is just a segment of the larger national whole.

Secondly, an indicator of economic growth must be chosen. The most common indicators of economic growth used in regional studies are population, employment, and value added.

A discussion of population change sets the stage for the study, but the primary analysis is based on employment change. The value added concept would provide an additional useful constraint, but employment data should yield enough information about the region from which we can draw inferences for future resource development and planning in the Basin.

Perloff (61, p. 63) makes the following suggestions as an approach to regional analysis: To understand economic growth within a particular region it is necessary (1) to relate the region's development to developments in the nation as a whole, (2) to "weigh" its growth in relative terms -- i.e., in terms of a departure from the national norm, (3) to examine the characteristics of its growth pattern, (4) to evaluate its changing position with regard to its ability to hold and attract persons and industries, and (5) to study how it reacts to changes in national "parameters" that influence supply and demand conditions for the major industries.

B. Relative Growth of the Region and Its Metropolitan Centers

Population change nationally or regionally gives a clue as to the localization of economic growth. For example, it was shown (Tables 2 and 3) for the twenty-year period, 1940-1960, that the increase in total U.S. population was 32.5 percent whereas urban population increased over 67 percent during the same period. Certainly the most significant population growth is taking place in the cities. The data further demonstrates that a similar condition exists in the Missouri Basin as well, even though its economy is dominated by agriculture.

The Basin has been divided into eight hydrological sub-regions, all of which have experienced net population increase during the past two decades, however slight in some regions. The smallest relative change occurred in region four with a net increase of only 1.6 percent whereas the same region's urban population showed a net increase of 58.4 percent. Region three showed the highest urban growth (no SMSA included) with an increase of 122.3 percent while its over-all population increase was only 6.1 percent.

Other research sources have demonstrated the high degree of out-migration which has taken place in the Missouri Basin States (32, 48); rural to urban movement is the first stage of migration, but as jobs are frequently unavailable in smaller cities the more mobile citizens move to other geographic locations in the U.S., notably larger metropolitan centers. Reducing this out-migration is frequently one of the objectives of regional development planning.

Compared to the 212 SMSAs in the U.S., the eleven Basin SMSAs show slightly higher growth for the twenty-year period: 58 percent increase compared to 55 percent; however, adding the other three SMSAs into the Basin average lowers

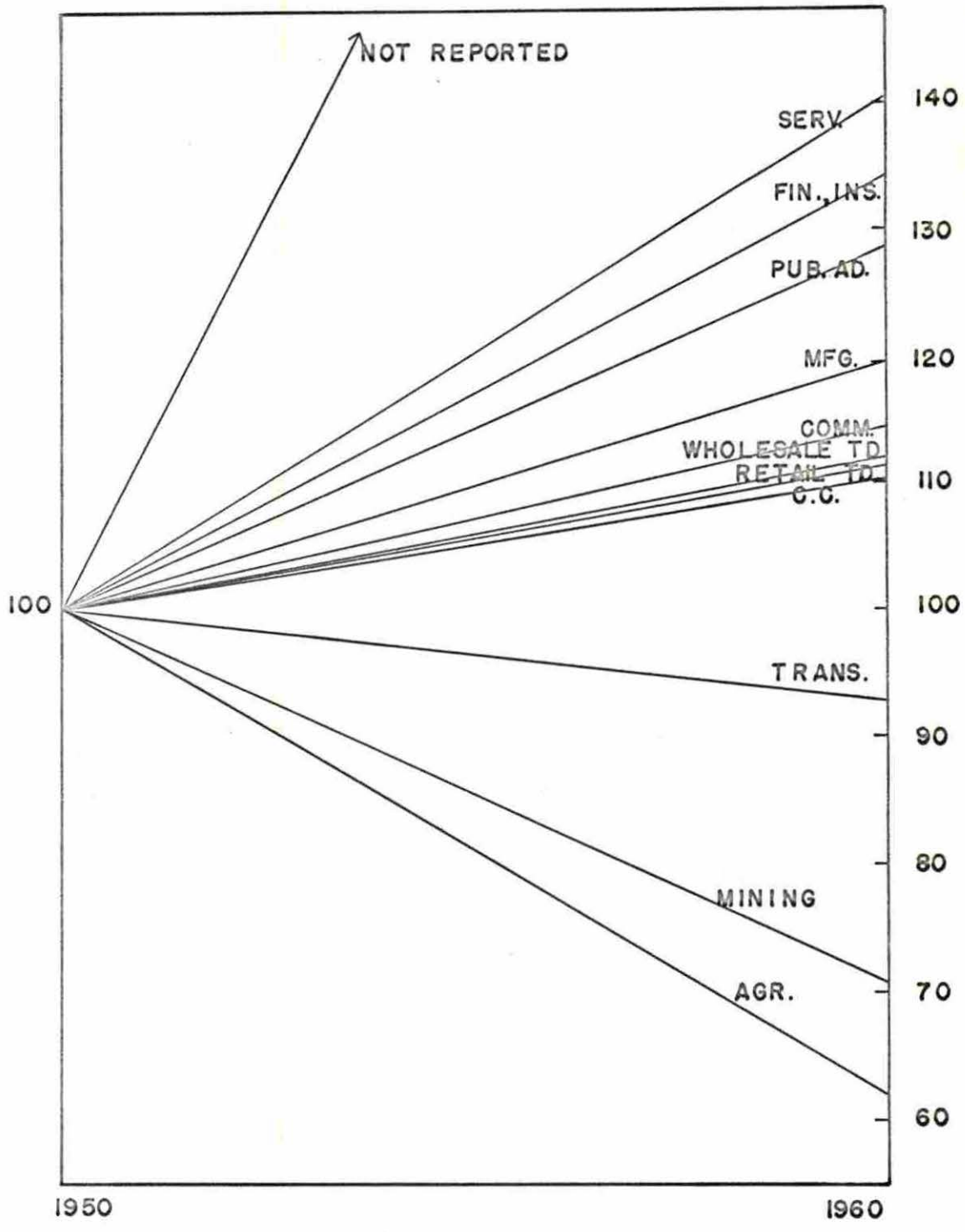
the growth rate for the fourteen SMSA's to 49.8 percent for the period, which still is higher than the average growth rate for the total U.S. during the two decades.

How population growth in the Missouri Basin has occurred can best be discussed in terms of regional economic growth, for which employment change is an appropriate indicator. Employment data is disaggregated into twelve 1-digit sectors and thirty-nine 2-digit detail categories. Employment changes which have occurred for all U.S. industries will provide the criteria for regional economic growth. The average employment change from 1950 to 1960 for all industries in the U.S. is a 14.54 percent increase, and on a twelve-sector basis, net increase for the decade is seen in nine sectors, with transportation, mining, and agriculture experiencing decline (See Figure 3).

Relative employment growth for the corresponding sectors in the Missouri Basin is shown in Figure 4. Those sectors with an employment growth rate above that for all industries would be classified as rapid growth industries, and all others would be in the slow-growth category (See Table 5). On a thirty-nine detail sector basis, 57.40 percent of U.S. employment is in rapid-growth industries, whereas for the Missouri Basin only 50.04 percent are included in this category. This is due largely to the high percentage of agricultural employment in the Missouri Basin, and the specialization of portions of the Basin in the mining industry (primarily metals and petroleum). The Basin SMSA's more closely approximate the percentage of U.S. employment in rapid growth sectors and in most cases exceed it, as shown in Table 6.

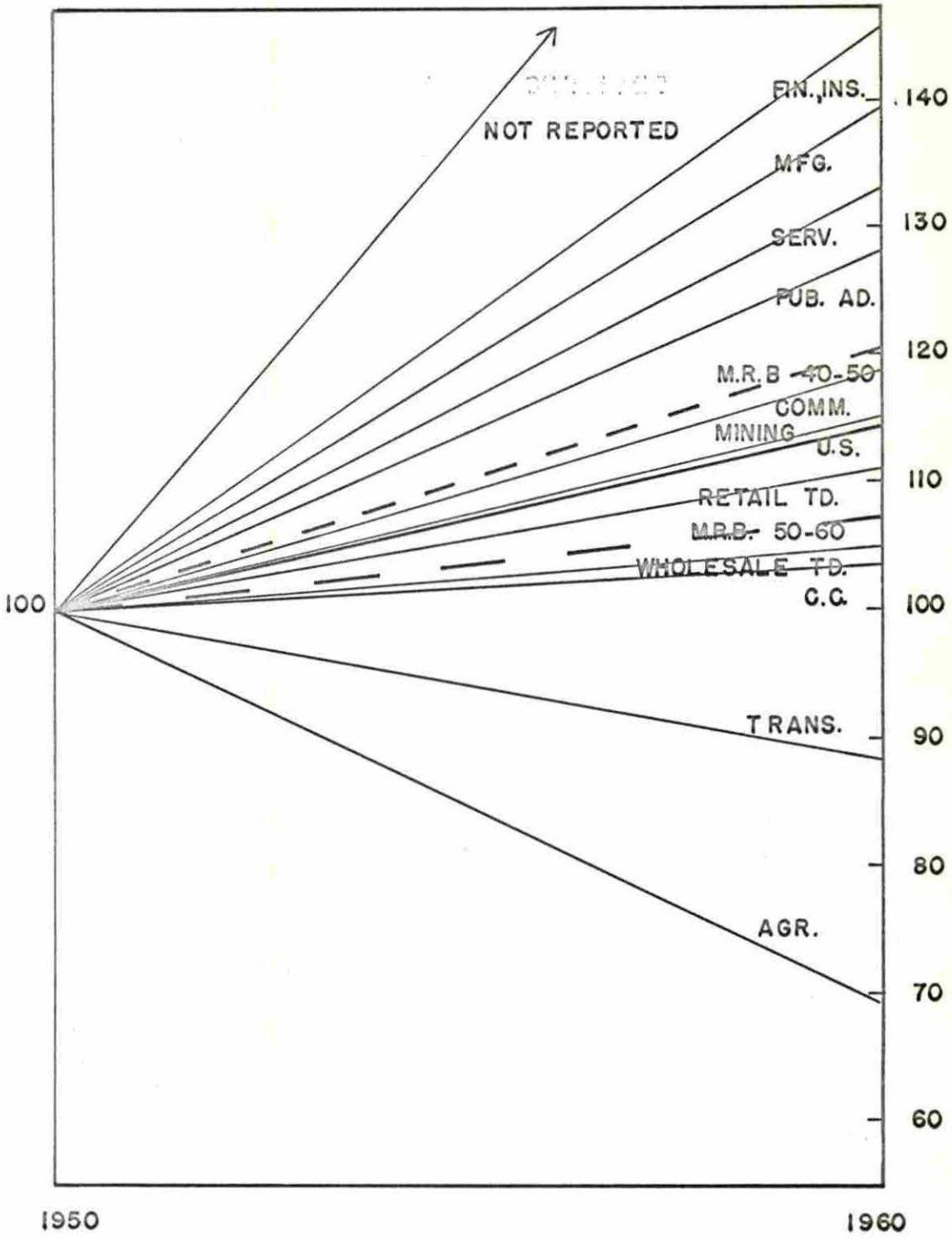
So far, we have been referring to employment changes which have occurred primarily in the national base. Of greater value for the study will be a consideration of the Basin and its component sub-regions and SMSA's. The major focus here will be those eleven SMSA's which lie within the Basin itself, and the three additional

Figure 3. Employment growth, 1950–1960, for twelve major industrial sectors, United States.



UNITED STATES

Figure 4. Employment growth, 1950-1960, for twelve major industrial sectors, Missouri Basin.



MISSOURI RIVER BASIN

Table 5. Rapid growth industries in the U.S., by percentage change, 1950-1960.

Sector	Industry Title	Percent Change (1950-60)
37	Business Services	112.62
21	Transportation equipment	100.84
18	Electrical machinery	72.64
44	Medical and hospitals	70.10
45	Educational: Government	64.19
46	Educational: Private	60.61
43	Professional and related services	57.00
16	Fabricated metal industries	52.47
47	Other professional and related	42.22
35	FINANCE, INSURANCE AND REAL ESTATE	40.37
8	Chemical and allied	35.65
36	SERVICES	34.26
7	Printing, publishing and allied	32.25
19	Other durable goods	31.72
25	Trucking service	30.55
49	PUBLIC ADMINISTRATION	27.34
22	Other durable goods	27.13
17	Machinery, except electrical	25.09
14	Primary and Fabricated metal industries	23.84
6	Food and kindred products	23.03
40	Private households	19.72
5	MANUFACTURING	19.25
34	Other retail trade	17.42
28	Communications	15.36
27	COMMUNICATION AND PUBLIC UTILITIES	14.86
	ALL INDUSTRIES	14.54

Key:

U.S. TOTAL EMPLOYMENT
MAJOR (12-sector) TOTALS
Sub-totals
Prime categories

Table 6. Relative employment in rapid-growth and slow-growth industries in Missouri Basin SMSA's, 1960.

Region	Slow-Growth Industries (percent)	Rapid-Growth Industries (percent)
United States	42.60	57.40
Missouri Basin	49.96	50.04
Kansas City	37.14	62.86
Denver	35.97	64.03
Omaha	37.11	62.89
Lincoln	33.15	66.85
Topeka	35.86	64.14
Springfield	44.64	55.36
Sioux City	36.93	63.07
St. Joseph	36.81	63.42
Sioux Falls	37.87	62.13
Billings	44.85	55.15
Great Falls	44.77	55.23

SMSAs which are assumed to draw largely from the Basin in terms of the hinterland served by the larger metropolis. Preliminary discussion surrounding these fourteen SMSAs will compare populations, employment levels, and corresponding employment growth rates. Table 7 furnishes the suggested comparison and ranks relative population and employment of each SMSA. Labor force participation rates, i.e., the percentage of the population of each city which are gainfully employed, are also included in the comparison. However, this information does not appear to provide any consistent contribution to the analysis. Des Moines, a relatively slow-growth city shows the highest participation rate, 40.39 percent; while Denver, the most rapidly growing city, has a labor force participation rate of only 37.99. Great Falls indicates only 32.94 percent of its population employed. These rates are of value only to the extent of suggesting the composition of the population and labor force in terms of age and marital status. The ranking of the respective cities based on employment growth would establish an order much different from that of relative size (See Table 8).

Urban geographers have devised many systems for classifying cities -- from a rank-size hierarchy to a functional classification. On a functional basis, four major groups emerge -- primary, secondary, tertiary, and quaternary. The functional role of individual cities, and in turn their criteria for classification in the respective group are determined by:

(1) sheer size and over-all history of U.S. urban development;

(2) spatial orientation of city geographically: access to markets, materials, and labor;

(3) relation of city to its hinterland and resources;

(4) relation of city to markets: local, national, and international.

Table 7. Population, employment, and labor force participation rates of fourteen SMSA's for 1960

SMSA	Population	Employment	Labor Force Participation Rate
	(number)	(number)	(percent)
St. Louis	2,060,614	763,637	37.06
Kansas City	1,040,454	407,343	39.15
Denver	929,393	353,086	37.99
Omaha	457,873	173,404	37.87
Des Moines	266,315	107,563	40.39
Lincoln	155,272	60,255	38.81
Topeka	141,286	50,878	36.01
Springfield	126,276	47,331	37.48
Sioux City	107,849	39,851	36.95
Fargo	106,027	39,336	37.10
St. Joseph	90,581	34,789	38.41
Sioux Falls	86,575	32,347	37.36
Billings	79,016	29,470	37.30
Great Falls	73,418	24,184	32.94

Table 8. Rank by percent employment change for fourteen SMSA's, 1950-60.

SMSA	1960 as percent of 1950
	(percent)
Denver	150.79
Billings	137.70
Great Falls	122.50
Lincoln	122.80
Springfield	121.63
Kansas City	119.87
Omaha	117.50
Topeka	115.89
Des Moines	113.34
Fargo	112.21
St. Louis	110.68
Sioux Falls	110.32
Sioux City	94.68
St. Joseph	93.77

The fourteen cities under consideration lend themselves to being typed into three broad, somewhat functional, categories: national cities, regional cities, and growth centers. National cities, or those which relate directly with national and international trade and commerce include St. Louis, Kansas City (including St. Joseph), and Denver. This category is characterized by a disproportionate percentage of employment in the quaternary industries. Truly regional centers, or those with disproportionate employment in tertiary activities, include Omaha (with Lincoln as a part of the larger metropolitan function) and Des Moines. Sub-regional cities or "growth centers" would include Topeka, Springfield, Sioux City, Sioux Falls, Fargo, Billings and Great Falls. One would suspect employment in these growth centers of being largely tertiary and secondary.

For purposes of comparison, the four major sectoral categories which roughly correspond to levels of development of a community include:

(1) Primary industries -- agriculture, forestry, fisheries and mining;

(2) Secondary industries -- manufacturing and contract construction;

(3) Tertiary industries -- transportation, communication, public utilities, wholesale trade, and retail trade; and

(4) Quaternary industries -- finance, insurance, real estate, services (business, personal, and professional), and public administration.

Table 9 shows the SMSAs by city category, and lists the three highest growth sectors for each (excluding industry not reported).

The first level of discussion on research findings relates to the left-hand side of the basic analytical model:

$$\frac{E_{i60}}{E_{i50}} = A + B + C$$

Table 9. Basin metropolitan centers by type, including three top ranking growth sectors for each.

NATIONAL CITIES:	St. Louis –	Finance Services Manufacturing		
	Kansas City –	Finance Services Public Administration	St. Joseph –	Finance Public Administration Mining
	Denver –	Mining Manufacturing Finance		
REGIONAL CENTERS:	Omaha –	Services Manufacturing Communication	Lincoln –	Services Finance Communication
	Des Moines –	Communication Finance Services		
GROWTH CENTERS:	Topeka –	Communication Finance Public Administration		
	Springfield –	Manufacturing Mining Public Administration		
	Sioux City –	Public Administration Finance Services		

Sioux Falls –	Services Mining Finance
Fargo –	Finance Communication Services
Billings –	Mining Finance Services
Great Falls –	Finance Communication Public Administration

i.e., the percentage change of employment in various industries in the ten-year period.

For the national cities, Denver leads with an increase in employment of 50.79 percent compared with 17.87 percent for Kansas City and 10.58 percent for St. Louis (which is below the U.S. average employment growth). Both Kansas City and Denver demonstrate strength in the primary and secondary industries; Denver shows exceptional growth in both mining and manufacturing, 148.00 percent and 80.00 percent, respectively. Hence, the above-average growth for nearly all categories of Denver's employment can be traced through the multiplier effect to the city's growth in basic industries. Kansas City shows above-average growth in manufacturing with 23.34 percent increase, while employment change in St. Louis reflects a below-average growth rate for these categories, which is traceable to a lack of growth in the tertiary and quaternary categories. Closer examination of the detailed industrial classification reveals that St. Louis has experienced significant growth in four areas: Chemical and allied, motor vehicles, transportation equipment, public education, and other professional and related services.

Denver's exceptional growth in mining is largely due to the concentration of petroleum activity headquarters in the Denver area, and its areas of greatest strength in the manufacturing sector includes transportation equipment, fabricated metals, electrical machinery, machinery and chemical and allied (See Table 10).

Primary strengths for Kansas City manufacturing lie in fabricated metals, electrical machinery, and printing and publishing. In spite of considerable growth in the professional services, Kansas City has not experienced repercussions of expanded tertiary employment as was true for Denver.

Table 10. Percentage increase of manufacturing activities in the Denver SMSA, 1950-1960.

Sector	Manufacturing Activity	Percent Change
21	Transportation equipment	1,784.69
16	Fabricated metals	672.17
18	Electrical machinery	305.98
5	MANUFACTURING EMPLOYMENT	80.55
17	Machinery, except electrical	71.54
22	Other durable	63.75
8	Chemical and allied	59.67
7	Printing, publishing, and allied	55.90
	ALL INDUSTRIES - DENVER	50.79
11	Apparel and other fabricated textile	46.86
6	Food and kindred	33.39
12	Other non-durables	29.31
13	Furniture and wood products	16.04
	ALL INDUSTRIES - U.S.	14.54
20	Motor vehicles	11.90
15	Primary metals	-18.52
10	Textile mill products	-20.00

Both Kansas City and Denver have had substantial growth in the public administration sector. Denver clearly exhibits leadership as a national city, whereas St. Louis is lagging considerably behind. Kansas City may be viewed as "maintaining" its position relative to urban centers in the central U.S. These generalizations will be pursued more fully when we examine the components of economic change in a later chapter. Application of shift analysis and the economic base concept will provide some insights into the question about the growth of individual cities. The position of Kansas City will be modified considerably if St. Joseph is trated as a satellite city of the Kansas City complex.

At the regional city level, the Omaha-Lincoln complex is a focal point for the Missouri River Basin Region. Des Moines will be considered in the same context, but its primary region is actually in the Mississippi Basin.

Viewing the rank of employment growth in twelve sectors, services and manufacturing rank first and second in Omaha, while services and finance are the two growth activities in Lincoln. The service orientation of both cities and the financial leadership of Lincoln indicate complementary functions which serve the larger region. Omaha's manufacturing strength lies in electrical machinery, fabricated metals, machinery, chemical and allied, and printing and publishing, respectively. On the other hand, Lincoln's great strength is in transportation equipment, chemical and allied, and food and kindred. Both cities have experienced large growth in education, and other professional services. Lincoln has shown exceptional growth in both business services and private household services.

Des Moines, on the other hand, has experienced an over-all growth rate of slightly less than the national average, with below-average growth in all major

sectors, except communication. Electrical machinery and fabricated metals are the manufacturing activities which have demonstrated exceptional growth. In the service sector, considerable growth has been seen in private education and other professional and related services.

For the cities to be viewed as "growth centers", Billings, Great Falls, and Springfield have exhibited the most rapid change in the decade. The rapid growth in employment in Billings can be traced to growth in the primary and secondary industries, and the resulting impact on all other sectors of the city's economy via the multiplier effect. The 417.95 percent increase in mining, predominately petroleum and metals, is probably the key factor here together with the 65.84 percent gain in manufacturing employment due largely to transportation equipment, electrical machinery, and chemical and allied -- all directly associated with the rapid growth of extracting industry activity. Manufacturing growth in Great Falls lags behind the national average despite exceptional gains in transportation and motor vehicles, and electrical machinery. Its growth in services may be more regionally supported than supported by the city itself, as indicated by the relatively high growth in retail trade, finance and the professional services with the exception of medical and hospital. Construction ranks higher in Great Falls than in any other Basin SMSA, and perhaps is traceable to the relatively immature stage of development of that city. This may also be tied in some way to the high increase of employees in local governmental jobs as borne out by the public administration category. Springfield shows considerable strength in both manufacturing (primarily non-durables, machinery, and motor vehicles) and mining (coal and petroleum). Fargo, while below the national growth level for manufacturing ranks high in motor vehciel production, and chemical and allied (probably agricultural related), and

shows considerable strength in private education and other professional services. Sioux Falls derives its economic strength from some areas of manufacturing (greatest growth in transportation equipment, other non-durables, and fabricated metals) and the professional services. Sioux City, while experiencing over-all employment decline, indicated growth in transportation equipment, primary metals, communication, apparel, and private education.

Relative growth rates, or percentage change in employment for a given ten-year period (1950-60), quite appropriately show the variance of economic conditions that exist in key areas within a larger region. To simplify discussion, the fifty industrial categories of the analysis will be summarized by twelve major one-digit industrial sectors. Such a summary is given by Table II. The relative employment growth rates, by sector, for the Kansas City SMSA are given graphically in Figure 5, and for the other thirteen SMSAs in Appendix A. These "growth charts" provide a ranking of relative sectoral growth. In addition to the twelve sectors, each growth chart includes the U.S. average growth rate, plus the average for the particular SMSA. The aggregate average growth rates are summarized in Figure 6. These growth charts essentially suggest answers to the question of how growth has occurred by isolating sectors of growth; the question of why this growth has taken place regionally will be the focus of the shift-share analysis which follows in a subsequent chapter. Appendix Figures A.11 - A.14 of Appendix A provide representative growth charts for Kansas City in which detail categories of primary, secondary, tertiary, and quaternary employment are isolated, respectively.

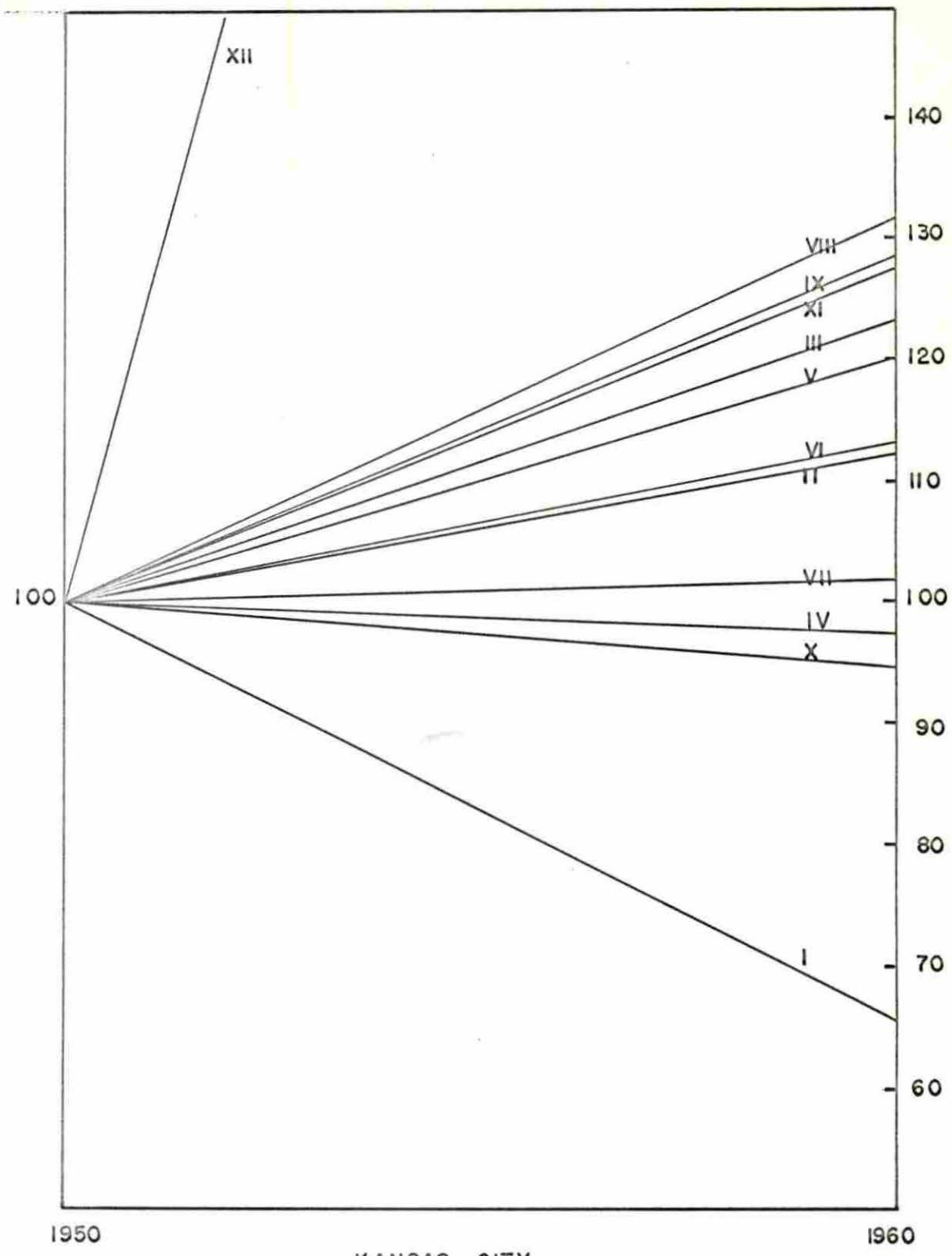
Table 11. Percent change in employment, 1950-1960, for U.S., Missouri Basin, and fourteen SMSA's: Twelve-sector summary.

Industry	U.S.	Missouri Basin	St. Louis	Kansas City	Denver	Omaha	Des Moines	Lincoln
I. Agriculture	-38.16	-30.98	-36.37	-34.09	-21.25	-28.86	-30.51	-36.60
II. Mining	-29.75	19.75	-29.37	12.34	148.00	-15.34	-19.01	29.63
III. Manufacturing	19.25	39.76	7.46	23.24	80.55	32.13	18.01	30.10
IV. Transportation	-7.25	-11.80	-10.78	- 2.54	6.52	-16.93	- 9.41	- 9.36
V. Communications and Public Utilities	14.86	18.83	5.66	19.82	35.72	31.49	37.53	30.23
VI. Wholesale Trade	12.62	5.17	- 7.82	12.93	35.83	0.59	8.13	2.06
VII. Retail Trade	12.14	11.46	- 1.05	1.29	32.60	6.03	- 1.82	9.90
VIII. Finance, Insurance and Real Estate	40.37	43.04	27.14	31.43	77.56	86.91	33.26	35.65
IX. Services	34.26	32.45	24.90	28.95	57.55	35.39	20.83	50.41
X. Contract Construction	10.35	3.84	3.23	- 5.32	26.29	23.77	- 3.65	28.79
XI. Public Administration	27.34	28.23	5.45	27.66	66.19	18.04	12.46	17.40
XII. Industry not Related	209.26	81.73	229.00	306.61	279.07	147.58	181.82	104.14
Average	14.54	7.70	10.58	19.87	50.79	17.50	13.34	22.80

Table 11. (Continued)

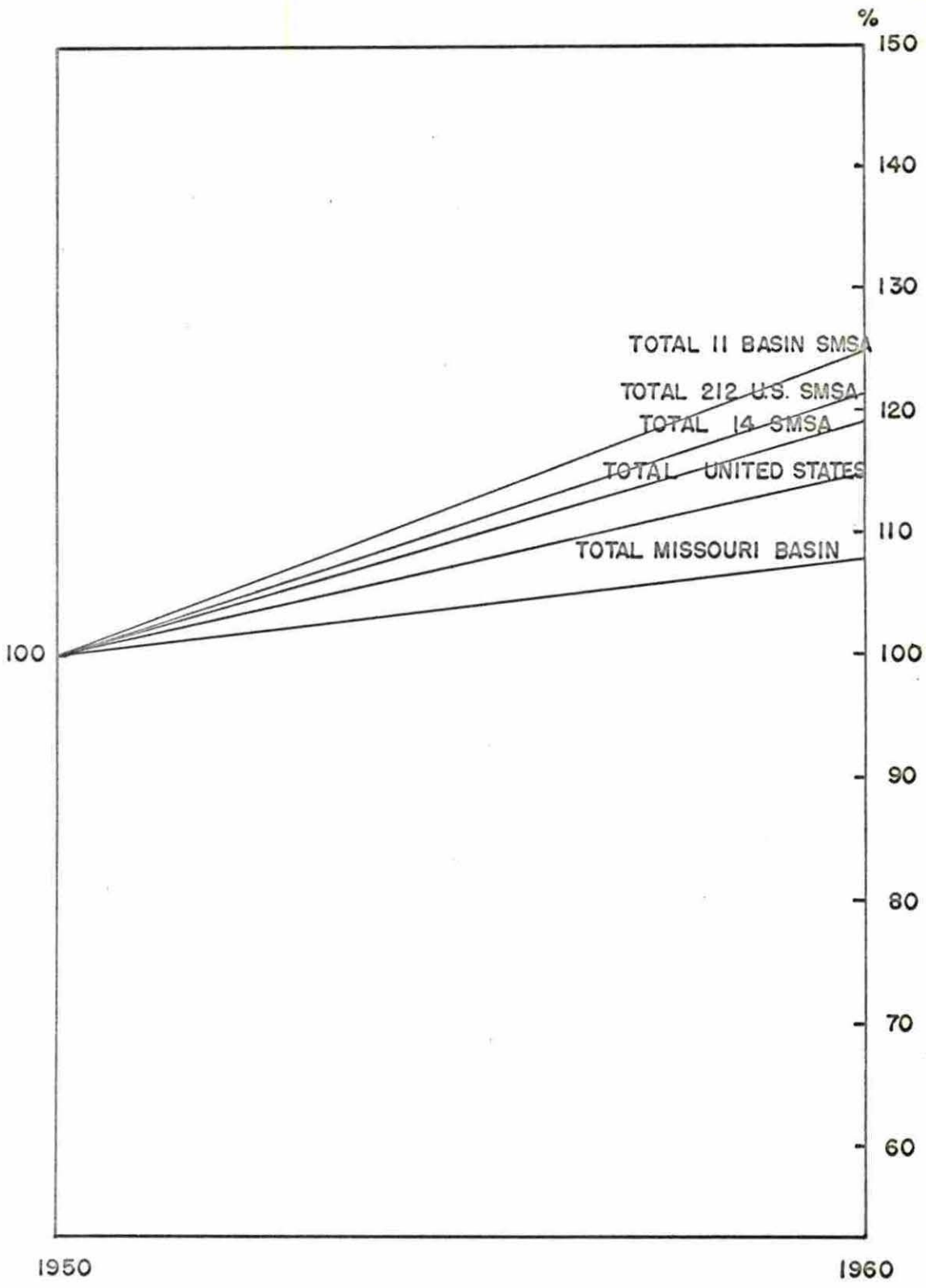
Industry	Topeka	Springfield	Sioux City	Fargo	St. Joseph	Sioux Falls	Billings	Great Falls
I. Agriculture	-46.53	-46.34	-33.33	-26.83	-46.88	-25.25	-28.75	-22.03
II. Mining	-20.59	77.50	-22.73	-71.43	9.09	40.38	417.95	0.82
III. Manufacturing	- 3.10	82.80	- 6.66	2.98	1.15	13.52	65.84	11.07
IV. Transportation	-10.32	-16.83	-30.14	-10.02	-26.66	4.99	13.17	-26.00
V. Communications and Public Utilities	54.45	43.73	5.73	44.07	1.36	5.15	67.82	52.58
VI. Wholesale Trade	- 1.60	- 4.36	-22.62	0.76	-24.04	1.78	30.71	12.35
VII. Retail Trade	12.13	12.24	-12.22	13.24	-27.89	- 2.17	27.28	19.97
VIII. Finance, Insurance and Real Estate	34.67	46.05	9.50	57.29	12.95	38.55	122.22	64.10
IX. Services	26.05	25.26	9.31	41.74	4.58	42.57	74.16	47.46
X. Contract Construction	23.18	22.20	- 0.27	19.41	-14.01	4.35	6.38	42.62
XI. Public Administration	27.27	49.04	17.74	27.02	7.38	- 7.53	6.30	53.65
XII. Industry not Reported	414.65	249.90	268.75	113.45	261.48	112.19	125.76	126.43
Average	15.89	21.63	- 5.32	12.21	- 6.33	10.32	37.70	22.50

Figure 5. Employment growth, 1950–1960, for twelve major industrial sectors, Kansas City SMSA.


XII
VIII
IX
XI
III
V
VI
II
VII
IV
X
I
140
130
120
110
100
90
80
70
60
100
1950
1960

KANSAS CITY

Figure 6. Employment growth summary for U.S., Missouri Basin, and fourteen SMSA's, 1950-1960.


%
150
140
130
120
110
100
90
80
70
60
TOTAL 11 BASIN SMSA
TOTAL 212 U.S. SMSA
TOTAL 14 SMSA
TOTAL UNITED STATES
TOTAL MISSOURI BASIN
100
1950
1960

C. Regional Employment Structures

The growth indicated by individual sectors of a regional economy must be put into proper perspective in terms of the sector's relative importance. The "employment structures" of the Region and its SMSAs, nomenclature used by Geographers ". . . to denote the way in which the working population of a place is divided up among the various categories of economic activity" (2, p. 541), will set the stage.

The historical and projected employment structure for the total Missouri Basin by industry is shown in Figure 7. Relative growth or decline of the twelve-sector employment categories is represented. A comparison is made of the percentage employed by each industry of a twelve-sector breakdown for the U.S., the U.S. urban, the Missouri Basin, and each of the fourteen SMSAs (See Table 12).

For the U.S., the greatest total employment occurs in manufacturing, with services and retail trade in second and third position, respectively. From the standpoint of urban employment alone, service employment ranks first for U.S., and for all SMSAs under consideration with the exception of St. Louis, Kansas City, and St. Joseph, where manufacturing employment predominates. For the Missouri Basin as a whole, the service industries account for the largest number of workers, (21.28 percent) with agriculture a close second accounting for 17.36 percent of the total Region's employment. In third and fourth position are retail trade and manufacturing with 16.07 percent and 13.70 percent of total employment, respectively. Mining employment ranks in third place in Billings and Great Falls, but elsewhere among the SMSAs, service, manufacturing and retail trade employment vie for the first three positions. Figure 8 compares the 1960 U.S. employment structure for twelve sectors with that of the Missouri Basin. See Appendix B for the Missouri Basin SMSA employment structures.

Figure 7. Missouri River Basin employment structure, 1940, 1950, 1960, and 1975 (projected).

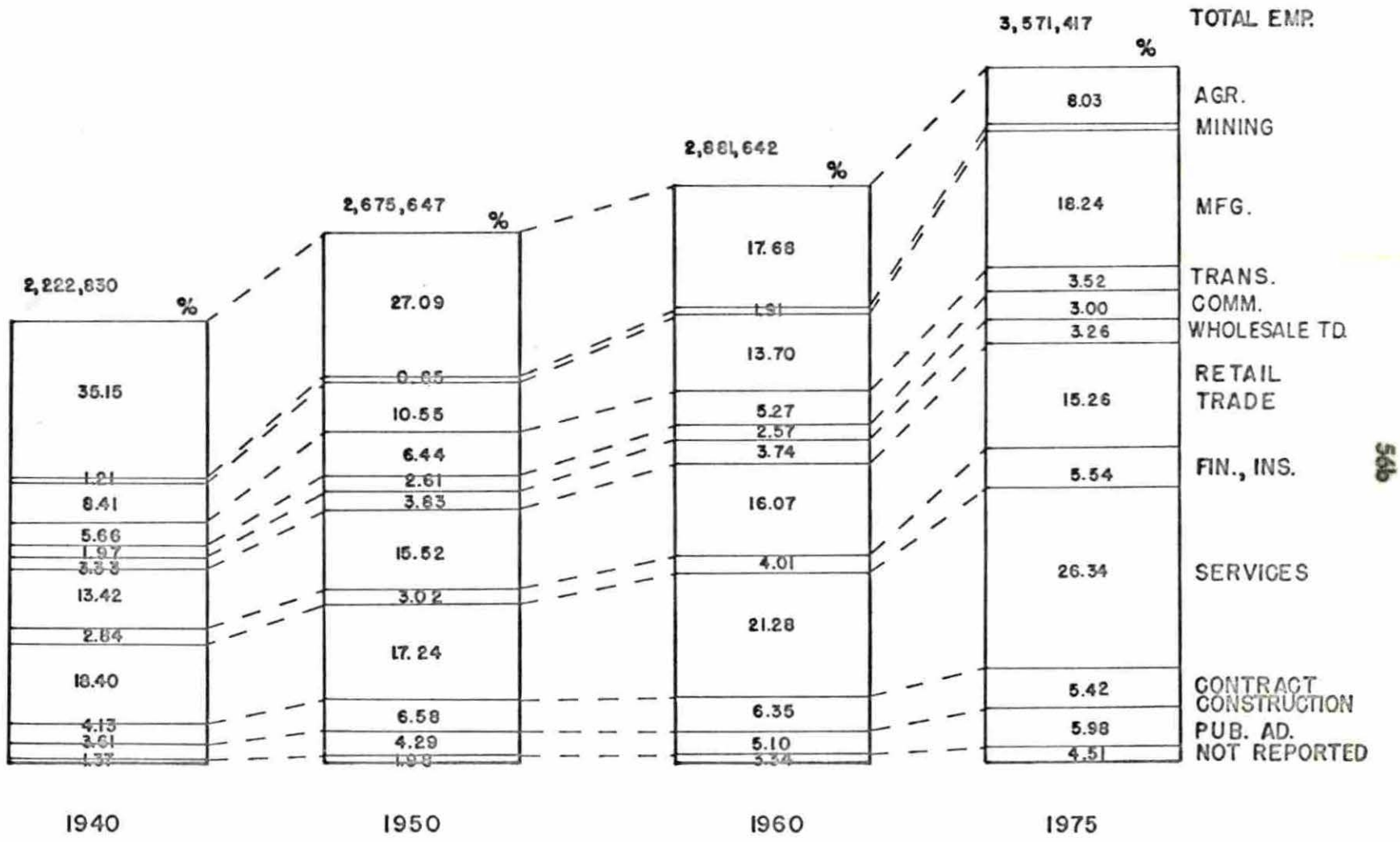

2,222,830
%
35.15
1.21
8.41
5.66
1.97
3.33
13.42
2.64
18.40
4.13
3.01
1.37
2,675,647
%
27.09
0.65
10.55
6.44
2.61
3.83
15.52
3.02
17.24
6.58
4.29
1.98
2,881,642
%
17.68
1.51
13.70
5.27
2.57
3.74
16.07
4.01
21.28
6.35
5.10
3.34
3,571,417
%
8.03
18.24
3.52
3.00
3.26
15.26
5.54
26.34
5.42
5.98
4.51
TOTAL EMP.
AGR.
MINING
MFG.
TRANS.
COMM.
WHOLESALE TD.
RETAIL TRADE
FIN., INS.
SERVICES
CONTRACT CONSTRUCTION
PUB. AD.
NOT REPORTED
1940
1950
1960
1975

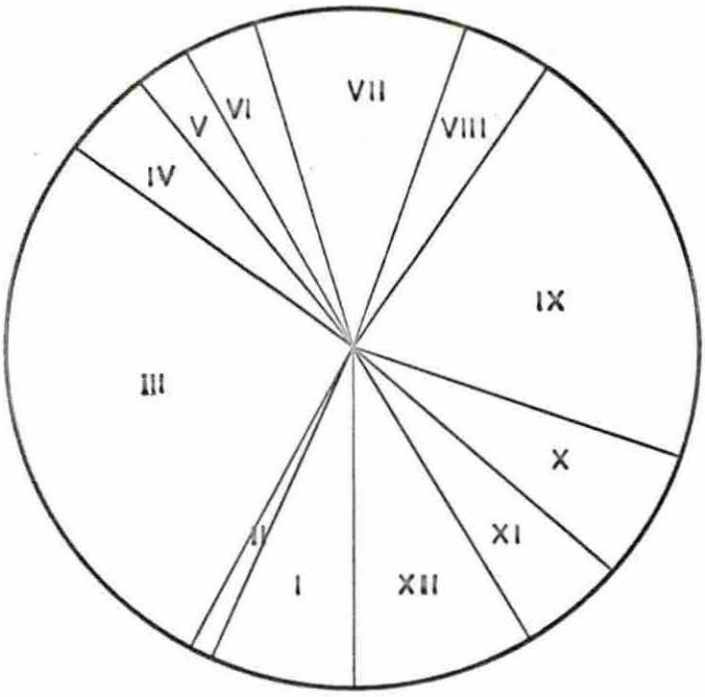
Table 12. 1960 employment structures — percentage employment by each twelve-sector industrial category.

Industry	U.S.	Missouri Basin	U.S. Urban	St. Louis	Kansas City	Denver	Omaha	Des Moines	Lincoln
	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)
I. Agriculture	6.74	17.36	1.10	1.26	1.24	1.97	3.38	2.26	3.86
II. Mining	1.01	.91	0.90	.28	.19	.93	.09	.09	.06
III. Manufacturing	27.09	13.70	29.40	32.99	24.64	19.13	20.54	21.25	13.92
IV. Transportation	4.24	5.27	6.00	5.75	7.77	5.23	8.78	4.36	5.28
V. Communication and Public Utilities	7.66	2.87	—	2.79	3.04	3.26	3.98	3.52	3.39
VI. Wholesale Trade	3.42	3.74	4.30	3.84	5.04	4.92	5.00	5.40	3.54
VII. Retail Trade	14.82	16.07	17.60	14.05	15.76	16.25	15.07	16.38	16.53
VIII. Finance, Insurance, and Real Estate	4.17	4.01	4.40	4.67	5.79	5.86	7.25	9.59	6.08
IX. Services	20.96	21.28	29.50	19.15	19.79	24.23	21.12	22.18	20.40
X. Contract Construction	5.90	6.35	—	4.91	5.20	6.99	6.51	5.42	7.31
XI. Public Administration	4.96	5.10	5.20	4.68	5.17	7.33	4.42	6.06	7.10
XII. Industry not Reported	4.03	3.34	—	5.63	6.37	3.90	3.86	3.49	2.53
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

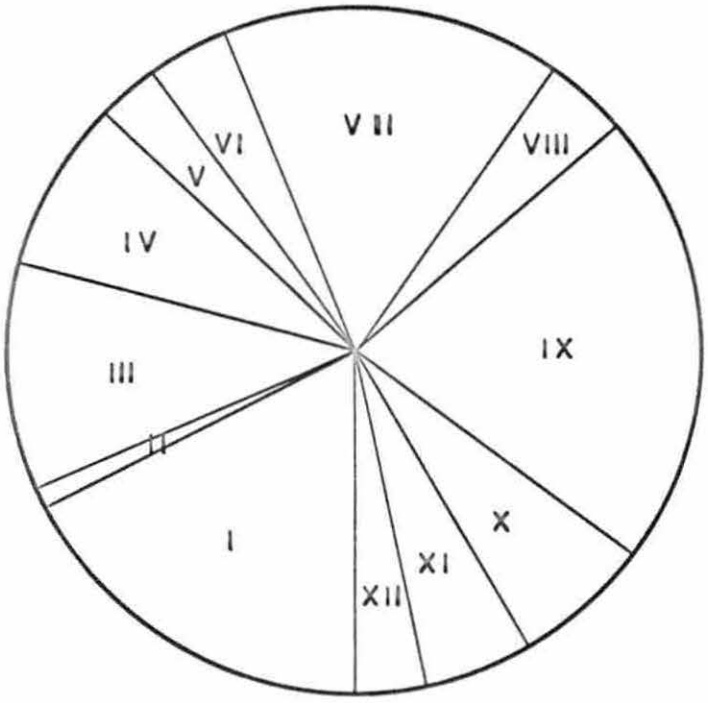
Table 12. (Continued)

Industry	Topeka	Springfield	Sioux City	Fargo	St. Joseph	Sioux Falls	Billings	Great Falls
	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)
I. Agriculture	2.50	4.30	7.00	13.21	3.65	9.29	6.54	6.24
II. Mining	.11	.15	.04	.03	.10	.23	1.37	.50
III. Manufacturing	11.46	20.97	20.17	6.93	28.60	16.80	11.40	13.48
IV. Transportation	9.36	7.55	5.01	5.55	5.62	4.56	8.11	5.94
V. Communication and Public Utilities	4.27	2.98	2.78	3.24	2.99	3.54	2.79	3.55
VI. Wholesale Trade	3.49	5.19	6.70	6.71	5.70	6.73	6.99	4.40
VII. Retail Trade	15.92	18.43	18.85	19.09	16.53	16.89	19.36	19.30
VIII. Finance, Insurance, and Real Estate	5.28	3.71	4.08	5.32	3.61	5.20	5.63	5.70
IX. Services	25.45	22.56	21.20	27.21	20.20	23.60	23.48	23.56
X. Contract Construction	7.50	6.87	5.53	5.97	5.21	6.23	6.74	8.59
XI. Public Administration	9.55	3.62	4.35	4.88	3.72	3.49	4.64	6.62
XII. Industry not Reported	5.11	3.67	4.24	1.86	4.07	3.44	2.77	2.62
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Figure 8. 1960 employment structures, United States and Missouri Basin.



UNITED STATES



MISSOURI BASIN

Reviewing the growth charts of Figure 5, and Appendix A, where sectors are essentially ranked by growth for the fourteen SMSAs, yields some interesting insights as to the relative significance of employment growth experienced by individual sectors. Sector XII (industry not reported) will be disregarded because of its indeterminate nature in comparing relative growth rates. Highly significant is the fact that Sector VIII, finance, insurance and real estate, demonstrated the most rapid growth in the U.S., the total Missouri Basin, and in four of the fourteen SMSAs, and ranked second or third place in seven of the remaining ten SMSAs. This would suggest that these cities have moved through three evolutionary stages and are entering the fourth or quaternary stage. The high rank of services and public administration in many of these cities would support this assumption. St. Louis and Kansas City both fall into this pattern, but differ from each other in that St. Louis has only two sectors above the U.S. average growth rate, while Kansas City has five. A major weakness is the information which is concealed in the twelve-sector aggregate. For example, transportation (Sector IV) ranks below the U.S. average in every SMSA, yet examination of the detail will show relative decline in railway related employment, but significant growth in trucking service employment, and rather stable growth in the other transportation sector, relative to the growth of each city (See Table 13). The percentage decline in railroad related employment in several cases is greater than that for agriculture, while the growth rate for trucking service is above the average growth rate, and some instances is higher than the fastest growing major sector. For example, trucking service employment for Topeka, Sioux City, St. Joseph, and Sioux Falls would rank above the fast-growing sector (excluding Sector XII) and in second place is St. Louis and Kansas City. Selection

Table 13. Detail summary of percentage change in transportation, 1950-1960.

Sector	U.S.	Missouri Basin	St. Louis	Region Kansas City	Denver	Omaha	Des Moines	Lincoln
IV. Transportation	-7.25	-11.80	-10.76	-2.54	6.52	-16.93	-9.41	-9.36
24. Railroad and Railway Express Service	-32.35	-29.12	-28.89	-19.90	-31.68	-22.67	-35.91	-12.30
25. Trucking Service and Warehousing	30.55	18.61	26.32	30.08	53.30	13.52	33.09	26.23
26. Other Transportation	2.62	3.77	-7.03	3.82	24.86	-28.30	-26.74	-32.18

Table 13. (Continued)

Sector	Topeka	Springfield	Sioux City	Region Fargo	St. Joseph	Sioux Falls	Billings	Great Falls
IV. Transportation	-10.32	-16.83	-30.24	-10.02	-26.66	4.99	13.17	-26.00
24. Railroad and Railway Express Service	-15.97	-27.15	-56.27	-24.48	-50.81	-51.59	-13.59	-36.54
25. Trucking Service and Warehousing	69.53	28.32	18.61	42.30	40.21	50.99	99.95	28.52
26. Other Transportation	-23.44	-31.33	-19.74	-30.75	-20.84	-3.65	-5.36	-20.75

of other detail sectors such as electrical machinery manufacturing, and professional services would show growth much higher than the respective aggregate sectors (See details of Tables 14 and 15).

The question of just how important the relative growth rates of an area's industrial sector are, must be placed in perspective with employment structures; i.e., the percentage employment in a particular sector. In most every case, the high growth centers are those of relatively less importance in terms of the actual numbers of a city's labor force involved.

On a national scale, the largest percentage of employment is in manufacturing -- with services a close second. In the Basin SMSAs, Kansas City and St. Joseph show the larger percentage engaged in manufacturing, with the remaining nine cities showing a larger percentage of their labor force in the service sector.

Table 14. Detail summary of manufacturing growth rates, 1950-1960.

Sector	U.S.	St. Louis	Kansas City	Denver	Omaha	Des Moines	Lincoln	Topeka
III. Manufacturing	19.25	7.46	23.34	80.55	32.13	18.01	30.10	-3.10
6. Food and kindred	23.03	-8.95	-12.57	33.39	8.45	38.71	118.06	-42.13
7. Printing and publishing	32.25	17.18	55.98	55.90	35.62	24.24	25.60	2.30
8. Chemical and allied	35.65	39.30	38.39	59.67	53.75	4.85	302.88	467.16
9. Other non-durable	-2.13	-22.07	2.22	30.12	-6.89	12.84	39.53	50.05
10. Furniture and wood products	-10.87	-3.07	2.32	16.04	22.04	17.58	10.00	-58.15
15. Primary metals	3.37	-12.13	-8.79	-18.52	-11.77	-62.96	24.00	-33.33
16. Fabricated metals	52.47	1.58	195.46	672.17	90.75	66.09	103.21	20.90
17. Machinery	25.09	18.28	30.66	71.54	63.08	19.91	-34.15	10.05
18. Electrical machinery	72.69	23.73	158.52	305.98	947.58	111.33	33.15	20.00
20. Motor vehicles	-1.74	24.89	-11.18	11.90	4.20	-48.25	-11.11	-88.46
21. Transportation equipment	100.84	198.77	95.58	1784.69	91.86	-73.87	472.58	33.33
22. Other durables	27.13	4.67	44.73	63.75	41.70	3.09	-75.94	2.44

Table 14. (Continued)

Sector	Springfield	Sioux City	Fargo	St. Joseph	Sioux Falls	Billings	Great Falls
III. Manufacturing	82.80	-6.66	2.98	1.15	13.52	65.89	11.07
6. Food and kindred	46.24	-7.30	-14.08	-8.18	8.46	49.92	55.50
7. Printing and publishing	35.74	23.66	9.38	-7.41	43.08	54.18	93.94
8. Chemical and allied	111.93	-64.65	80.00	41.50	-20.96	102.56	-80.95
9. Other non-durable	208.67	-4.27	-28.46	7.97	114.46	64.63	52.63
13. Furniture and wood products	-1.93	-20.69	2.82	-6.94	-39.05	19.44	0
15. Primary metals	-69.92	35.62	-7.06	16.67	-28.57	33.33	-25.08
16. Fabricated metals	71.89	45.83	40.32	69.83	82.93	95.29	-37.25
17. Machinery	340.70	5.58	7.78	22.48	46.50	125.86	120.41
18. Electrical machinery	0	- 35.55	-15.91	74.74	50.00	314.29	444.44
20. Motor vehicles	124.50	30.58	22.22	-56.16	-72.22	0	220.00
21. Transportation equipment	109.35	1350.00	2166.67	-9.88	766.67	1100.00	1600.00
22. Other durables	32.51	15.45	66.12	-20.09	24.19	145.98	104.17

Table 15. Detail summary of service growth rates, 1950-1960.

Sector	U.S.	St. Louis	Kansas City	Denver	Omaha	Des Moines	Lincoln	Topeka
IX. Services	34.26	24.90	23.95	57.55	35.39	20.83	50.41	26.05
37. Business services	112.62	32.98	30.88	92.13	30.11	27.58	159.28	66.39
38. Repair services	-10.51	-6.45	-4.02	10.37	-4.31	-6.65	-12.01	-11.57
39. Personal services (including hotel)	11.36	-5.34	-1.90	32.52	3.49	-4.97	40.50	10.25
42. Entertainment and recreation	1.91	-15.27	-9.45	11.40	-12.60	-38.07	1.35	-38.24
43. Professional and related	57.00	56.86	64.11	81.75	71.09	50.86	58.28	36.00
44. Medical and hospital	70.10	6.63	1.06	2.53	25.17	-10.35	-4.05	-9.55
45. Education: government	64.19	81.86	98.52	117.32	58.56	53.94	65.07	3.97
46. Education: private	60.61	59.84	43.34	50.35	77.29	78.06	82.54	62.35
47. Other professional	42.22	118.39	139.29	208.76	155.72	136.02	164.07	176.24

Table 15. (Continued)

Sector	Springfield	Sioux City	Fargo	St. Joseph	Sioux Falls	Billings	Great Falls
IX. Services	25.26	9.31	41.74	9.58	42.57	74.16	47.46
37. Business services	71.43	9.30	66.67	26.72	19.27	83.29	52.80
38. Repair services	16.71	-28.57	-23.60	-28.85	-31.17	0.74	-39.81
39. Personal services (including hotel)	9.57	-4.53	49.36	-6.91	42.90	63.73	65.91
42. Entertainment and recreation	-34.73	-37.07	-30.33	-52.47	-18.93	21.90	4.56
43. Professional and related	39.25	27.89	55.80	26.92	72.61	107.78	60.85
44. Medical and hospital	-26.15	-10.52	-2.85	-9.06	28.17	19.39	5.12
45. Education: government	57.24	18.38	45.19	8.87	50.85	117.21	89.12
46. Education: private	39.97	75.00	120.29	73.50	92.84	100.63	64.37
47. Other professional	173.26	95.32	186.96	118.15	166.06	280.89	149.88

V. DETERMINANTS OF REGIONAL CHANGE

Perloff (61) suggests that regional growth could be viewed as a measure of those changes associated with individual and family welfare and those which are associated with volume of economic activities. The welfare and volume measures correspond with the quality and quantity aspects of economic growth discussed earlier. The quantity or volume measures imply that regional growth be gauged by changes in population, employment or value added.

In discussing national economic growth since 1870, Perloff makes these observations about population:

> Throughout the period under review that has been a continuous decline in the proportion of total population living in rural areas and a marked increase in urban population. The rate of urban increase has been positive in every region at every census since 1870. Urbanization in all parts of the country has been a central facet of recent American history. This significant change has accompanied the industrialization of the nation (61, p. 15).

He illustrates the growth in urbanization which has taken place in the United States: urban population has increased from 25.2 percent of the total population in 1870 to 59.0 percent in 1950.

To this point we have demonstrated only the question of what has taken place in terms of over-all employment growth in the Missouri Basin, and as such have limited discussion to the left-hand side of our shift-share model equation. If one is to consider the question of why this growth has taken place at different rates in the various sectors and SMSAs, it is necessary to view the components of economic growth (i.e., the right side of the equation).

A. Urbanization

Comparisons of percentage urban population for the Missouri Basin regions is given in Table 16 for the years 1940, 1950, and 1960. The urban population as a percentage of the Missouri Basin for 1960 (57.4 percent) is substantially below that of the total U.S. (69.9 percent). The importance of urban population varies widely between Basin areas; for example in 1960 the urban population of region 3 was only 33.6 percent compared with the 72.6 percent figure for region 5. The discrepancy between tables for the 1950 figures is due to census definitional change which was adjusted for in the Missouri Basin table to maintain internal consistency.

The total population picture for the Basin differs from the urban characteristics. In the fifteen-year period from 1939 to 1954, all states involved in the Missouri Basin study, with the exception of Colorado, experienced either relative or absolute downward shift in total population. However, for the period 1940-60, the urban population of the Missouri Basin experienced a growth of 68.0 percent; much higher than the total national population growth of 32.5 percent, and even slightly above the national urban population increase of 67.6 percent. For selected regions within the Basin, urban growth was at a higher rate than for the Basin's urban population as a whole -- for example regions three and five showed increases of 122.3 percent and 116 percent, respectively. Urbanization is an important factor in the recent and potential growth of the Missouri Basin.

According to the Philbrick "Nested Hierarchy Theory" (63), hypothetically, the SMSAs would qualify for the fourth-order or trans-shipment category, six meet the requirements for a fifth-order city which is based on the economic function of exchange, and St. Louis, Kansas City, and Denver demonstrate

Table 16. Missouri Basin urban population as percentage of total, by region, 1940, 1950, and 1960.

Region	1940	1950	1960
	(percent)	(percent)	(percent)
1 Upper Missouri	32.2	40.1	46.0
2 Yellowstone	33.9	44.0	54.0
3 Western Tributaries	16.0	26.7	33.6
4 Eastern Tributaries	23.6	29.7	36.8
5 Platte	50.5	61.8	72.6
6 Middle Missouri	45.2	51.1	57.4
7 Kansas	35.5	46.7	55.9
8 Lower Missouri	43.7	57.6	58.6
Missouri Basin Total	40.0	49.2	57.4
U.S. Total	56.5	64.0	69.9

sixth-order or control functions. The seventh-order or leadership function is not particularly visible in any of the Basin cities.

B. Regional Employment Shifts

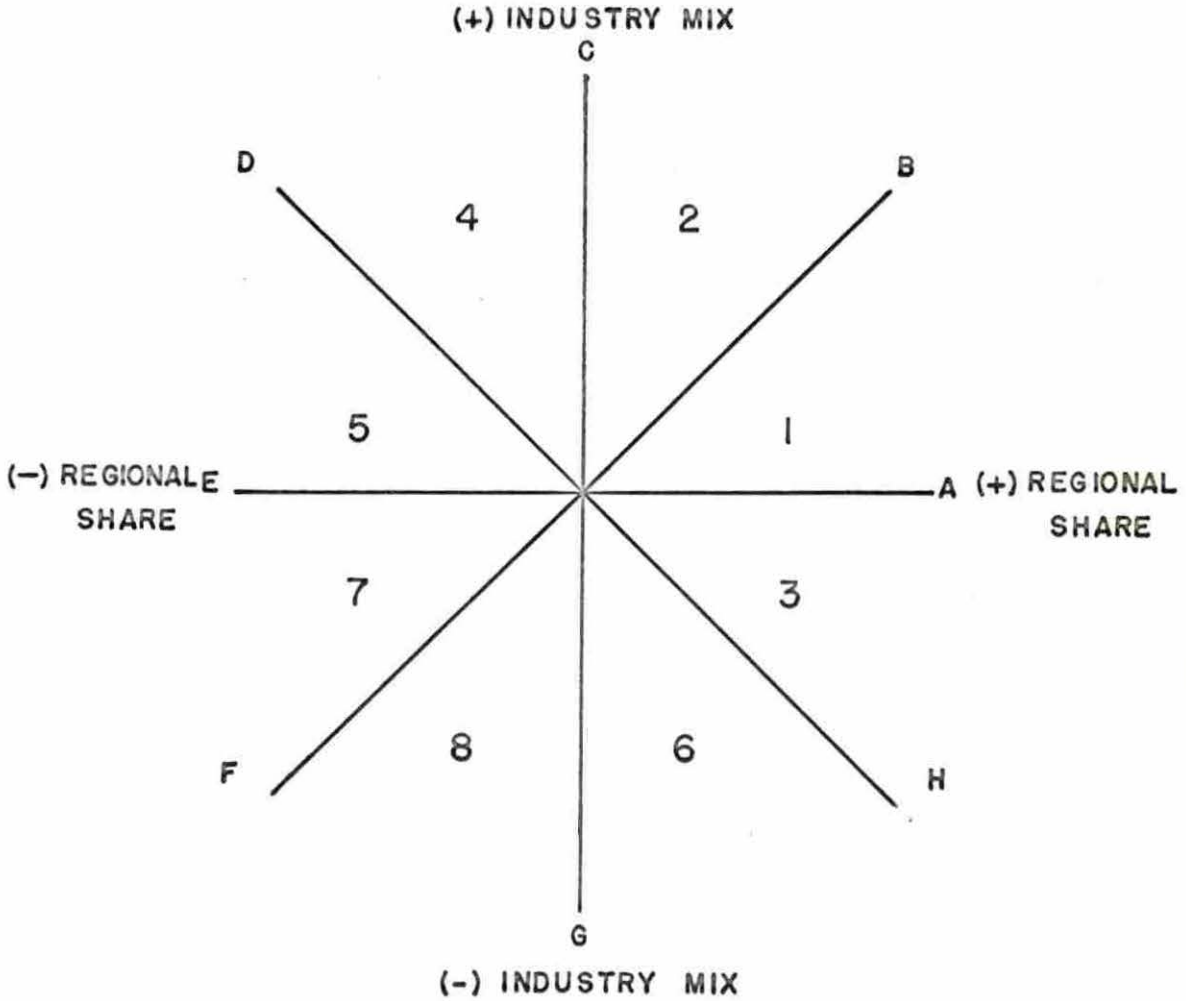
Economic activity in the Missouri Basin has undergone considerable spatial redistribution in recent years. As throughout the study, employment change is used as the measure of the growth in the volume of economic activity for the ten-year period, 1950-1960.

The detailed analysis of the change in the distribution of employment will be summarized in terms of shifts which have taken place. The combined A, B, and C effects of shift analysis make up the absolute changes in employment which have taken place, while employment shifts are the result of the B and C effects. By way of illustration, the Missouri Basin experienced an actual increase of employment of 205,995 workers between 1950 and 1960. However, had its employment increased at the same rate as occurred nationally for all industries during the period, its increase would have been 389,036, which corresponds to our model's "A" or national growth effect. The Basin, during this period, can be said to have experienced a downward shift in employment of the difference between the two figures, or -183,037. This net employment shift (or relative change) is due to both national and local factors. On a national basis, those industries which are growing due to increased demand for their products tend to stimulate growth in those regions in which the growing industries are located. The effect of such national patterns on an area depend on that area's industrial composition, hence the industry-mix effect. This effect becomes visible in that those regions which

tend to specialize in the slow-growth sectors, such as agriculture, will experience downward shifts in total employment, whereas those which tend to specialize in the rapid-growth sectors will show net upward shifts. Thus a favorable industry-mix, or "B" effect is an important component of an area's actual or potential economic growth. On the other hand, local factors tend to influence a region's ability to compete for industry of any kind. Such factors include the skill level and size of available labor force, transportation facilities, local and state tax structure, and amenities such as weather and recreation, plus numerous other considerations involved in the location of economic activity. This competitive or local-factor effect corresponds to our "C" component, the regional-share effect. Locational advantages for the operation of particular industries in a given region will yield net upward local-factor shifts for that region. For our illustration, both the industry-mix and regional-share effects for the Missouri Basin during the period are negative, -19,344 and -63,463, respectively. These are additive, and taken together equal the net employment shift of -183,037.

Relative employment shifts are best visualized graphically by use of an octant chart (See Figure 9). The vertical axis is a measure of industry-mix and the horizontal axis a measure of regional-share. The octants are numbered in order from most favorable to least favorable position in terms of a favorable industry-mix and regional-share combination. The most favorable position is the case of the two effects reinforcing each other -- i.e., when both are positive as in octants 1 or 2. Correspondingly, the least favorable position is in the negative quadrant -- i.e., octants 7 or 8. The positive regional share is most desirable for private investment, whereas a positive industry mix is most desirable from the standpoint of public investment. In other words, octant 3 would be preferred over

Figure 9. The basic octant chart model for illustrating shift analysis.


(+) INDUSTRY MIX
C
D
B
4
2
5
1
(−) REGIONAL SHARE
E
A
(+) REGIONAL SHARE
7
3
F
8
6
H
G
(−) INDUSTRY MIX

octant 4 by a private manager, and conversely for a public manager. As a general rule, the line D-H separates desirable positions from undesirable ones.

By breaking the two shift effects of the total Basin into component 1-digit sectors, it is possible to get a better understanding of the redistribution which has taken place among the region's major industrial categories. The components of change for the total Basin are given by Table 17 and depicted graphically in the corresponding octant chart, Figure 10.

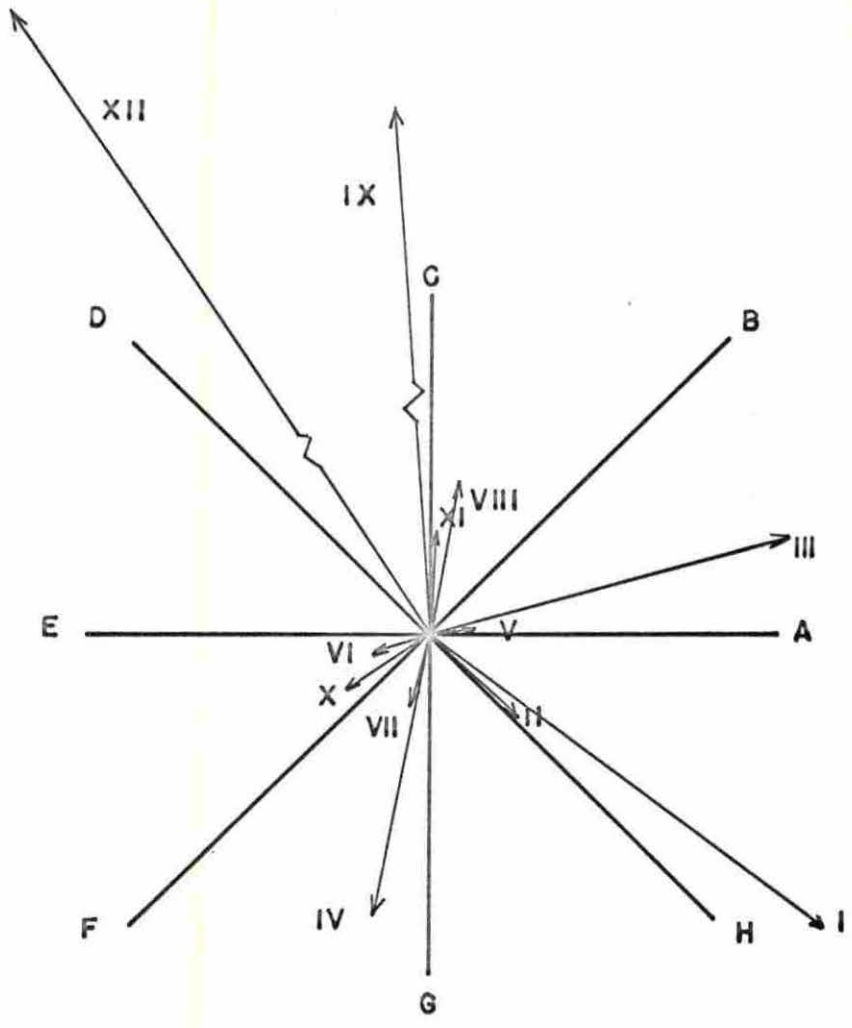
Because of their additive feature, these components of employment shifts may be reinforcing or cancelling in their over-all net effect. Again, using data for the Basin as a whole, the large negative shift of -382,020 in agricultural employment due to the national decline in that sector (as seen in the industry-mix component) is offset slightly by a favorable regional-share for agriculture in the Basin. The resulting net shift of -329,980 workers indicates that the Basin's relative decline in agricultural employment is less severe than that for the nation as a whole. In the case of mining, also a declining industry nationally, the net effect of a strongly favorable regional-share effect yields a positive net shift for the sector. On the other hand, a strongly positive regional share in manufacturing for the Basin (+57,910) augments a positive industrial mix nationally (+13,300), yielding net manufacturing employment for the Region that is greater than if it has grown at the national average; an additional 71,210 workers in contrast to an estimated employment increase of 41,060 based on the national growth rate.

The spatial and industrial distribution of employment shifts which have occurred in the Basin and its eleven SMSA's are summarized in Tables 18, 19, and 20. The shifts are separated into industry-mix and regional-share components, and then

Table 17. Components of employment change, Missouri Basin, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
				(1000)	(1000)	(1000)	(1000)	(1000)
I	Agriculture	-0.5270	0.0718	105.40	-382.02	52.05	-224.60	-329.98
II	Mining	-0.4429	0.4450	3.32	- 10.12	10.16	3.37	0.05
III	Manufacturing	0.0471	0.2051	41.06	13.30	57.91	112.25	71.21
IV	Transportation	-0.2179	-0.0455	25.04	- 37.52	- 7.83	- 20.32	- 45.25
V	Utilities and Communication	0.0032	0.0397	10.14	0.22	2.77	13.12	2.99
VI	Wholesale Trade	-0.0192	-0.0745	14.92	- 1.97	- 7.64	5.31	- 9.61
VII	Retail Trade	-0.0240	-0.0068	60.38	- 9.97	- 2.82	47.61	- 12.79
VIII	Finance, insurance and Real Estate	0.2583	0.0267	11.76	20.88	2.16	34.80	23.04
IX	Services	0.1972	-0.0131	67.07	90.96	- 6.04	157.00	8.49
X	Contract Construction	-0.0419	-0.0646	25.61	- 7.38	-11.38	6.85	- 18.76
XI	Public Administration	0.1284	0.0085	16.67	14.72	0.98	32.37	15.70
XII	Industry not reported	1.9472	-1.2753	7.69	103.04	-67.49	43.25	35.56
	Total			389.04	-119.39	-63.64	206.00	-183.03

Figure 10. Octant chart for total Missouri Basin, based on twelve industrial sectors, 1950–1960 (1-digit disaggregation).



MISSOURI RIVER BASIN

Table 13. Summary of industry-mix shifts in employment by major employment sectors for Missouri Basin Region and SMSA's, 1950-1960.

Industry	Total Missouri Basin	Total Basin SMSA's	Kansas City	Denver	Omaha	Lincoln
I. Agriculture	-382,020	-26,099	-4,047	-4,663	-4,348	-1,934
II. Mining	- 10,120	- 1,178	- 309	- 588	- 84	- 12
III. Manufacturing	13,300	9,035	3,832	1,762	1,270	304
IV. Transportation	- 37,520	-20,097	-7,075	-3,779	-3,991	- 766
V. Utilities and Communication	220	102	33	27	17	5
VI. Wholesale Trade	- 1,970	- 1,090	- 349	- 246	- 166	- 40
VII. Retail Trade	- 9,970	- 4,437	-1,522	-1,039	- 591	- 217
VIII. Finance, Insurance, and Real Estate	20,880	13,104	4,634	3,010	2,560	698
IX. Services	90,960	40,019	12,325	10,700	5,333	2,502
X. Contract Construction	- 7,380	- 2,924	2,118	2,000	833	468
XI. Public Administration	14,720	6,857	2,118	2,000	833	468
XII. Industry not Reported	103,040	32,121	12,435	7,070	5,271	1,457
Total	-119,390	45,413	22,933	17,060	6,045	3,723

Table 18. (Continued)

Industry	Topeka	Springfield	Sioux City	St. Joseph	Sioux Falls	Billings	Great Falls
I. Agriculture	-1,254	-1,999	-2,205	-1,260	-2,119	-1,251	-1,019
II. Mining	- 30	- 18	- 10	- 15	- 25	- 35	- 54
III. Manufacturing	284	256	406	463	235	95	138
IV. Transportation	-1,157	- 936	- 623	- 581	- 306	- 460	- 423
V. Utilities and Communication	4	3	3	3	3	2	2
VI. Wholesale Trade	- 35	- 49	- 66	- 50	- 41	- 30	- 18
VII. Retail Trade	- 173	- 187	- 205	- 168	- 134	- 108	- 93
VIII. Finance, Insurance, and Real Estate	516	311	383	287	314	193	198
IX. Services	2,026	1,681	1,525	1,325	1,056	784	762
X. Contract Construction	- 130	- 112	- 93	- 88	- 81	- 78	- 61
XI. Public Administration	490	148	189	155	157	165	134
XII. Industry not Reported	983	968	904	763	1,022	703	545
Total	2,013	18	1,346	1,243	504	- 96	- 219

Table 19. Summary of regional-share shifts in employment by major employment sectors for Missouri Basin Region and SMSA's, 1950-1960.

Industry	Total Missouri Basin	Total Basin SMSA's	Kansas City	Denver	Omaha	Lincoln
I. Agriculture	52,050	3,410	313	1,496	767	57
II. Mining	10,160	3,179	293	2,359	27	16
III. Manufacturing	57,910	28,959	3,328	22,936	3,472	699
IV. Transportation	-7,830	562	1,529	2,388	-1,773	-74
V. Utilities and Communication	2,770	4,383	513	1,771	872	241
VI. Wholesale Trade	-7,640	-1,047	56	2,971	-1,037	-221
VII. Retail Trade	-2,820	-3,729	-6,879	8,853	-1,505	-203
VIII. Finance, Insurance, and Real Estate	2,160	1,231	-1,604	4,334	-1,334	-127
IX. Services	-6,040	12,458	-3,319	12,638	306	1,967
X. Contract Construction	-11,380	1,706	-3,506	3,114	1,224	630
XI. Public Administration	980	4,562	46	6,047	-606	-364
XII. Industry not Reported	-67,490	6,973	6,217	2,535	-1,670	-786
Total	-63,640	62,647	-4,881	67,832	- 1,575	331

Table 19. (Continued)

Industry	Topeka	Springfield	Sioux City	St. Joseph	Sioux Falls	Billings	Great Falls
I. Agriculture	-199	-310	202	-208	519	461	312
II. Mining	6	43	2	13	36	349	35
III. Manufacturing	-1,346	3,451	-2,231	-1,780	-274	944	-240
IV. Transportation	-163	-411	-655	-518	172	431	-364
V. Utilities and Communication	556	283	-96	-139	-106	276	212
VI. Wholesale Trade	-257	-436	-1,215	-958	-232	285	-3
VII. Retail Trade	-1	8	-2,084	-2,103	-799	679	305
VIII. Finance, Insurance, and Real Estate	-114	68	-458	-305	-22	611	182
IX. Services	-843	-767	1,929	-1,994	445	1,586	510
X. Contract Construction	397	315	-235	-513	-116	-74	470
XI. Public Administration	-4	249	-142	-241	-426	-271	274
XII. Industry not Reported	1,037	202	276	205	-510	-301	-232
Total	-1,418	2,741	-9,700	-8,948	-1,825	5,059	1,791

Table 20. Summary of net employment shifts by major industrial sectors for Missouri Basin Region and SMSA's, 1950-1960.

Industry	Total Missouri Basin	Total Basin SMSA's	Kansas City	Denver	Omaha	Lincoln
I. Agriculture	-329,980	-22,689	-3,734	-3,167	-3,581	-1,877
II. Mining	50	2,001	- 16	1,771	- 57	4
III. Manufacturing	71,210	37,994	7,160	24,698	4,742	1,003
IV. Transportation	- 45,350	-19,535	-5,546	-1,391	-5,764	- 840
V. Utilities and Communication	2,990	4,485	546	1,798	889	246
VI. Wholesale Trade	- 9,610	- 2,137	- 293	2,725	-1,203	- 261
VII. Retail Trade	- 12,790	- 8,166	-3,401	7,814	-2,096	- 420
VIII. Finance, Insurance, and Real Estate	23,040	14,335	3,030	7,344	1,226	571
IX. Services	8,490	52,477	9,006	23,338	5,659	4,469
X. Contract Construction	- 18,760	- 1,218	-4,443	2,295	842	487
XI. Public Administration	15,700	11,419	2,164	8,047	227	104
XII. Industry not Reported	35,560	39,094	18,652	9,605	3,601	671
Total	-183,030	108,060	18,122	84,892	4,470	4,054

Table 20. (Continued)

Industry	Topeka	Springfield	Sioux City	St. Joseph	Sioux Falls	Billings	Great Falls
I. Agriculture	-1,453	-2,309	-2,003	-1,468	-1,600	- 790	- 707
II. Mining	- 24	- 25	- 8	- 2	13	314	- 19
III. Manufacturing	-1,062	3,707	-1,825	-1,317	- 49	1,039	- 102
IV. Transportation	-1,320	-1,347	-1,278	-1,099	- 134	- 29	- 787
V. Utilities and Communication	560	286	- 93	- 136	- 103	278	214
VI. Wholesale Trade	- 292	- 485	-1,281	-1,008	- 273	255	- 21
VII. Retail Trade	- 174	- 179	-2,289	-2,271	- 933	571	212
VIII. Finance, Insurance, and Real Estate	402	379	- 75	- 18	292	804	380
IX. Services	1,183	914	3,454	- 669	1,501	2,370	1,272
X. Contract Construction	267	203	- 328	- 601	- 197	- 152	409
XI. Public Administration	406	397	47	- 86	- 269	- 106	408
XII. Industry not Reported	2,020	1,170	1,180	968	512	402	313
Total	595	2,759	-8,354	-7,705	-1,241	4,958	1,572

aggregated in terms of net employment shifts for the twelve one-digit industrial sectors. Of particular interest is the employment shifts seen in the aggregate of the eleven SMSAs. The result of this aggregation is that of both a positive total mix effect and a positive total share effect. In contrast, both effects are negative for the Basin as a whole. This aggregation also suggests favorable industry-mix and regional-share positions for the Basin SMSAs in manufacturing, communications, finance, services, and public administration. From these summaries, the employment shifts which have been experienced by each of the cities can be evaluated, at least on the twelve-sector level of disaggregation.

C. Comparative Advantage of Metropolitan Centers

It has been suggested that the future of a region depends primarily on its comparative advantage within a larger system of spatial organization. Table 21 reviews the relative growth of SMSAs and selected aggregates of employment which serve as standards of comparison. Eight of the Basin's SMSAs grew at a faster rate than all SMSAs in the U.S. and five of these exhibited more rapid growth than the average for all U.S. SMSAs. However, three of the Basin SMSAs and the three SMSAs adjacent to the Basin all fell below the average growth rate for the total United States.

The questions inevitably arises, what has led to this wide divergence of relative growth rates for the various segments of the Missouri Basin? Why have certain sectors responded more favorably to employment growth in some cities than in others?

The first level of response to questions of economic growth can be expressed in terms of shift analysis for each total SMSA, thereby providing a

Table 21. Rank of areas by relative percentage change in employment, 1950-1960.

REGION	Percentage change (1950-60)	Octant
	(percent)	
Denver	+50.79	1
Billings	+37.30	3
Total 11 Basin SMSAs	+24.92	
Lincoln	+22.80	2
Great Falls	+22.50	3
Springfield	+21.63	1
Total 212 U.S. SMSAs	+21.21	
Kansas City	+19.87	4
Total 14 SMSAs	+18.64	
Omaha	+17.50	4
Topeka	+15.89	4
TOTAL UNITED STATES	+14.54	
Des Moines	+13.34	5
Fargo	+12.21	6
St. Louis	+10.58	5
Sioux Falls	+10.32	5
TOTAL MISSOURI BASIN	+ 7.70	8
Sioux City	- 5.32	5
St. Joseph	- 6.63	5

basis for observing comparative advantage of single metropolitan areas. Again, from Table 21 it is observed that those Basin SMSA's which experienced faster growth than the U.S. would appear on the most dynamic half of an octant chart (octants I through 4); whereas those which experienced growth less than that of the U.S. during the period would all appear on the less dynamic half of a chart (octants 5 through 8).

The components of employment change for the Missouri Basin and its metropolitan centers are summarized in Table 22. From the data provided, employment shifts can be determined for each SMSA and illustrated by use of the corresponding octant chart designation as was demonstrated above.

For the Missouri Basin as a whole, the change in employment which would be due to national growth is decreased by both an unfavorable industrial mix and an unfavorable regional share. For the SMSA's the pattern is greatly varied. Denver, with the highest growth rate, can point to both a favorable industrial-mix and regional-share as reason for its continued growth. Lincoln and Springfield, likewise both have positive mix and share components. Billings and Great Falls, on the other hand, have overcome a position of unfavorable industrial-mix with an exceptionally favorable regional-share component which has resulted in high growth levels for both SMSA's. A favorable industrial-mix has undoubtedly made it possible for Kansas City, Omaha, and Topeka to remain in a higher relative position of employment growth than that for the total U.S., in spite of a negative regional share.

Table 23 summarizes the octant chart position for the Basin and related SMSA's on a twelve-sector basis. These sectors in octants I and 2 suggest industrial categories which have made the greatest contribution to the over-all

Table 22. Employment and components of employment change in Missouri Basin, 1950-1960.

	Employment 1950	Employment 1960	1950-1960 Changes Related To: National Growth (A)	Industrial Mix (B)	Regional Share (C)	Total Change	Net Relative Change
Total Missouri Basin	2,675,647	2,881,642	389,036	-119,394	-63,642	205,995	-183,037
Basin SMSA's							
(1) Kansas City, Mo.	339,811	407,343	49,404	22,933	-4,811	67,532	18,122
(2) Denver, Colo.	234,158	353,086	34,043	17,060	67,832	118,928	84,892
(3) Omaha, Nebr.	147,490	173,404	21,437	6,045	-1,575	25,914	4,470
(4) Lincoln, Nebr.	49,066	60,255	7,134	3,723	331	11,189	4,054
(5) Topeka, Kansas	43,901	50,878	6,383	2,013	-1,418	6,977	595
(6) Springfield, Mo.	38,913	47,331	5,660	18	2,741	8,418	2,759
(7) Sioux City, Iowa	42,088	39,851	6,118	1,346	-9,700	-2,237	-8,359
(8) St. Joseph, Mo.	37,101	34,789	5,394	1,243	-8,948	-2,312	-7,705
(9) Sioux Falls, S. D.	29,322	32,347	4,262	584	-1,825	3,025	-1,241
(10) Billings, Mont.	21,402	29,470	3,108	-96	5,054	8,068	4,958
(11) Great Falls, Mont.	19,742	24,184	2,868	-219	1,791	4,442	1,572
(12) St. Louis, Mo.	690,600	763,637	100,413	64,192	-91,573	73,037	-27,381
(13) Des Moines, Ia.	94,899	107,563	13,800	8,616	-9,750	12,664	-1,134
(14) Fargo, N. D.	35,056	39,336	5,094	-1,270	454	4,280	-816

Table 23. Octant chart summary for Missouri River Basin and related SMSA's, based on a twelve-sector aggregation for the period 1950-1960.

Industrial Sector	Basin	Total Basin SMSA's	Octant: Basin SMSA's 1	2	3	4	5	6	7	8	9	10	11	Non-Basin SMSA's 12	13	14
I	3	6	6	6	6	6	8	8	6	8	6	6	6	6	6	6
II	3	3	6	3	6	3	6	3	6	6	3	3	6	6	6	7
III	1	1	2	1	1	1	5	1	5	7	5	1	7	5	4	5
IV	8	6	6	6	8	8	8	8	7	8	6	6	8	8	8	8
V	1	1	1	2	1	1	1	1	5	5	5	1	1	5	1	1
VI	7	8	6	3	7	7	7	7	8	7	7	3	8	7	7	7
VII	8	8	7	3	7	8	8	6	7	7	7	3	3	7	7	6
VIII	2	2	4	1	4	4	4	2	5	5	4	1	2	4	4	2
IX	4	2	4	2	2	2	4	4	1	5	2	1	2	4	4	2
X	7	6	7	3	3	1	3	3	7	7	7	8	3	7	7	3
XI	2	2	4	4	4	4	4	1	4	5	5	5	1	5	5	4
XII	4	2	2	4	4	4	1	2	2	2	4	4	4	2	4	4
TOTAL	8	1	4	1	4	2	4	1	5	5	5	3	3	5	5	6

growth of a particular area. Table 24 separates out those sectors which have shown growth over the ten-year period which is greater than both the total national average, and the particular industry's national average. One should note that most categories that meet these criteria are also in octants I or 2 and all others are in octants 3 or 4.

Examination of the components of employment change for each of the Basin SMSAs will point out those strong and weak sectors within each "growth center" in terms of its realized and potential economic growth. The A, B, and C effects of the total employment change experienced in the historical period 1950-1960 for Kansas City are given in Table 25; and, correspondingly, a graphical "picture" of the SMSAs employment change is presented by way of the octant charts of Figure IIa. As a representative case, octant charts are included for the detailed manufacturing and the service sectors of Kansas City; this provides insight into those individual industries responsible for the growth of the larger one-digit categories (See Figures IIb and IIc).

Appendix C provides the employment change component data together with corresponding octant charts for the remaining ten Basin SMSAs, again, only on a twelve-sector basis.

The research related to this study has assembled the kinds of data from which more exhaustive studies could be made of individual cities or of employment shifts in individual industrial sectors -- a possibility for some thirty-nine detail sectors. However, the presentation here is necessarily limited to the higher level of aggregation within the broader regional framework.

Table 24. Ten-year employment growth greater than the national average and national industry average.

INDUSTRIAL SECTOR	U.S.	Basin	SMSA's 1	2	3	4	5	6
	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)
TOTAL	14.54	7.70	19.87	50.79	17.50	22.80	15.89	21.63
I. Agriculture	-38.16	--	--	--	--	--	--	--
II. Mining	-29.75	14.75	--	148.00	--	29.63	--	77.50
III. Manufacturing	19.25	39.76*	23.34*	80.55*	32.13*	30.10*	--	82.80*
IV. Transportation	- 7.25	--	--	--	--	--	--	--
V. Communication and Utilities	14.86	18.83*	19.82*	35.72*	31.49*	30.23*	54.45*	43.73*
VI. Wholesale Trade	12.62	--	--	35.83	--	--	--	--
VII. Retail Trade	12.14	--	--	32.60	--	--	--	--
VIII. Finance, Insurance, and Real Estate	40.37	43.04*	--	77.56*	--	--	--	46.05*
IX. Services	34.26	--	--	57.55*	35.39*	50.41*	--	--
X. Contract Construction	10.35	--	--	26.29	23.77	28.79*	23.18	22.20
XI. Public Administration	27.34	28.23*	27.66	66.19	--	--	--	49.04*
XII. Industry not Reported	209.26	--	306.61*	277.07	--	--	414.65*	249.90*

* Octant 1 or 2

Table 24. (Continued)

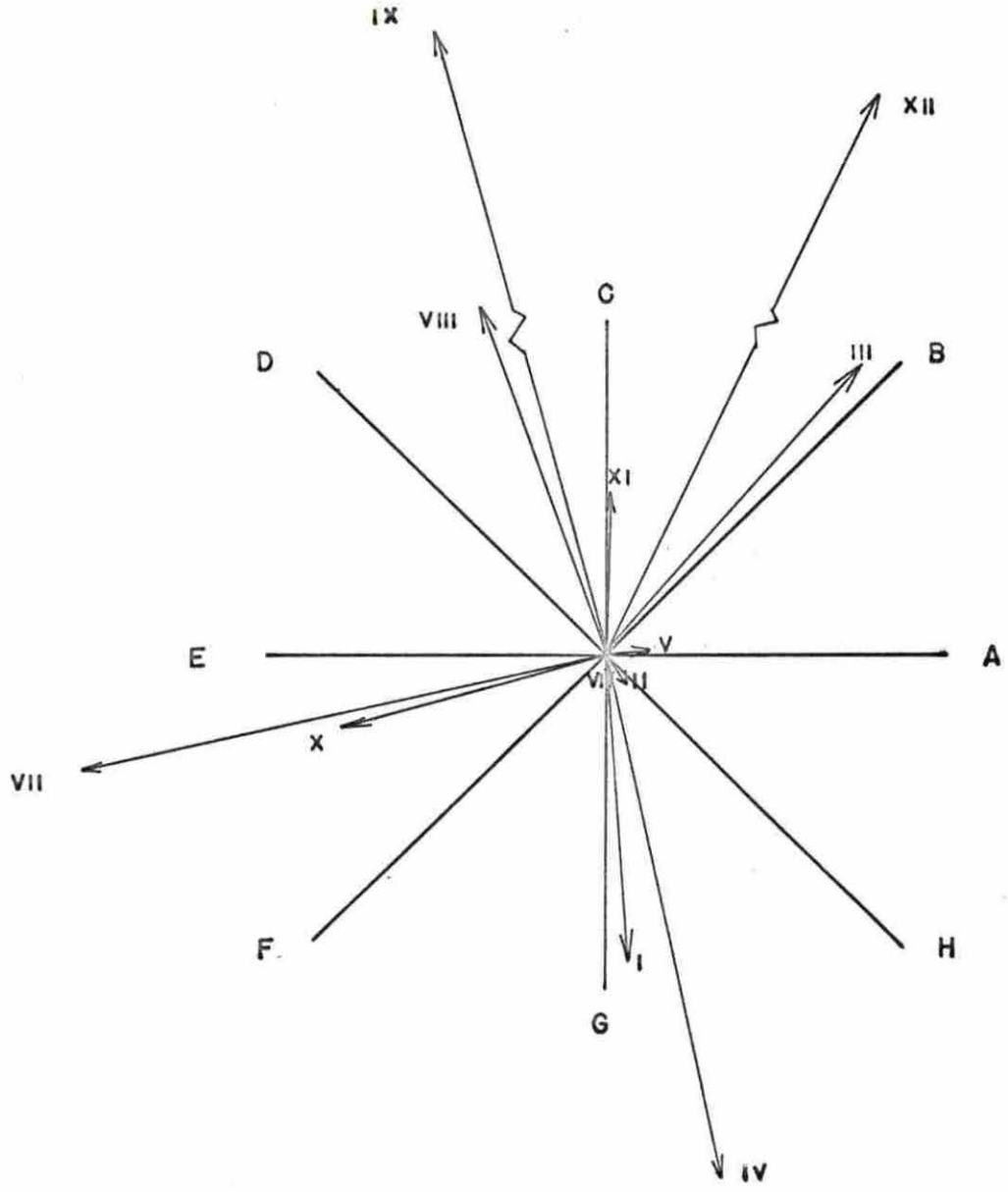
INDUSTRIAL SECTOR	SMSA's 7	8	9	10	11	12	13	14
	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)
TOTAL	- 5.32	- 6.23	10.32	37.70	22.50	10.58	13.34	12.21
I. Agriculture	--	--	--	--	--	--	--	--
II. Mining	--	--	40.38	417.95	--	--	--	--
III. Manufacturing	--	--	--	65.84*	--	--	--	--
IV. Transportation	--	--	--	--	--	--	--	--
V. Communication and Utilities	--	--	--	67.82*	52.58*	--	37.53*	44.07*
VI. Wholesale Trade	--	--	--	30.71	--	--	--	--
VII. Retail Trade	--	--	--	27.28	19.97	--	--	--
VIII. Finance, Insurance, and Real Estate	--	--	--	122.22*	64.10*	--	--	57.29*
IX. Services	--	--	42.57*	74.16*	47.47*	--	--	41.74*
X. Contract Construction	--	--	--	--	42.62	--	--	19.41
XI. Public Administration	--	--	--	--	53.65*	--	--	--
XII. Industry not Reported	268.75*	261.48*	--	--	--	229.00*	--	--

* Octant 1 or 2

Table 25. Components of employment change, Kansas City SMSA, 1950-60.

	Industry	Shift Coefficients		Components of Change				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.0407	1,117	-4,047	313	-2,618	-3,734
II	Mining	-0.4429	0.4209	101	- 309	293	86	- 16
III	Manufacturing	0.0471	0.0409	11,831	3,832	3,328	18,990	7,160
IV	Transportation	-0.2179	0.0471	4,721	-7,075	1,529	- 824	-5,546
V	Communication and Utilities	0.0032	0.0496	1,502	33	513	2,048	546
VI	Wholesale Trade	-0.0192	0.0031	2,642	- 349	56	2,350	- 293
VII	Retail Trade	-0.0240	-0.1085	9,218	-1,522	-6,879	815	-8,401
VIII	Finance, Insurance and Real Estate	0.2583	-0.0894	2,608	4,634	-1,604	5,638	3,030
IX	Services	0.1972	-0.0531	9,088	12,325	-3,319	18,096	9,006
X	Contract Construction	-0.0419	-0.1567	3,253	- 937	-3,506	-1,191	-4,443
XI	Public Administration	0.1284	0.0028	2,398	2,118	46	4,562	2,164
XII	Industry not Reported	1.9472	0.9735	929	12,435	6,217	19,580	18,652
	Total			49,404	22,933	-4,811	67,532	18,122

Figure IIa. Octant chart for Kansas City SMSA, twelve-sector aggregation, 1950-60.



KANSAS CITY

Figure IIb. Octant chart for Kansas City SMSA manufacturing employment, 1950-1960.

KEY:	Sector No.	Industry
	6	Food and kindred products
	7	Printing, publishing, and allied
	8	Chemical and allied
	10	Textile mill products
	11	Apparel and other fabricated textiles
	12	Other non-durable goods
	13	Furniture, lumber and wood products
	14	Primary and fabricated metal industries
	17	Machinery, except electrical
	18	Electrical machinery and equipment
	20	Motor vehicles and equipment
	21	Transportation equipment
	22	Other durable goods

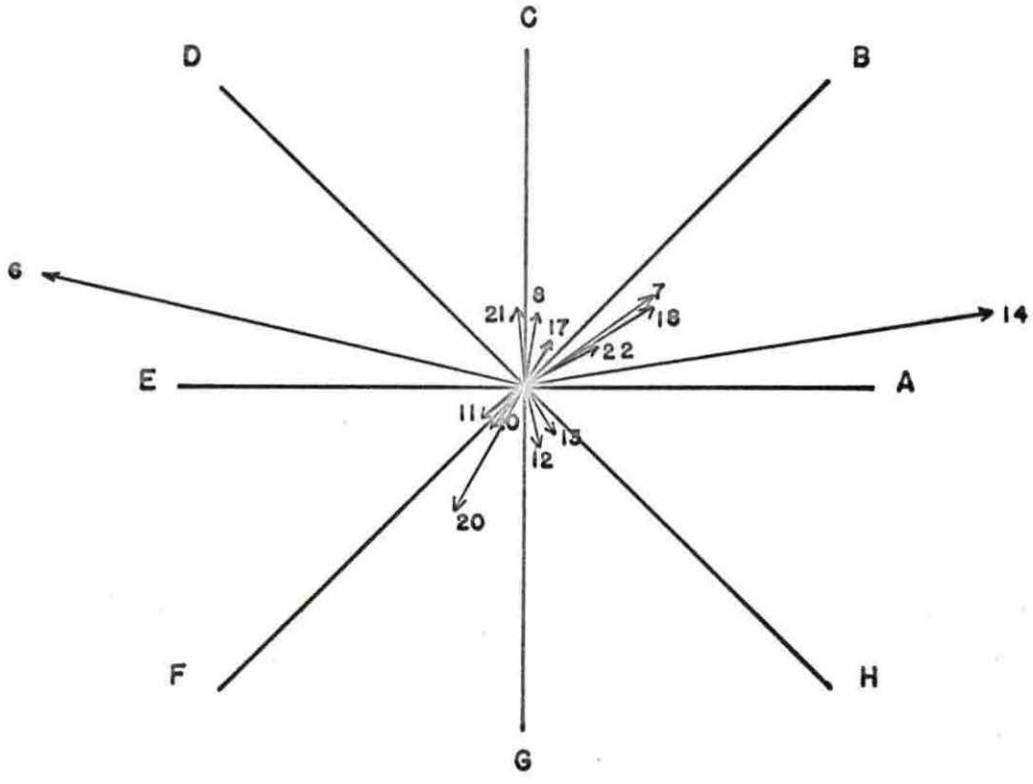
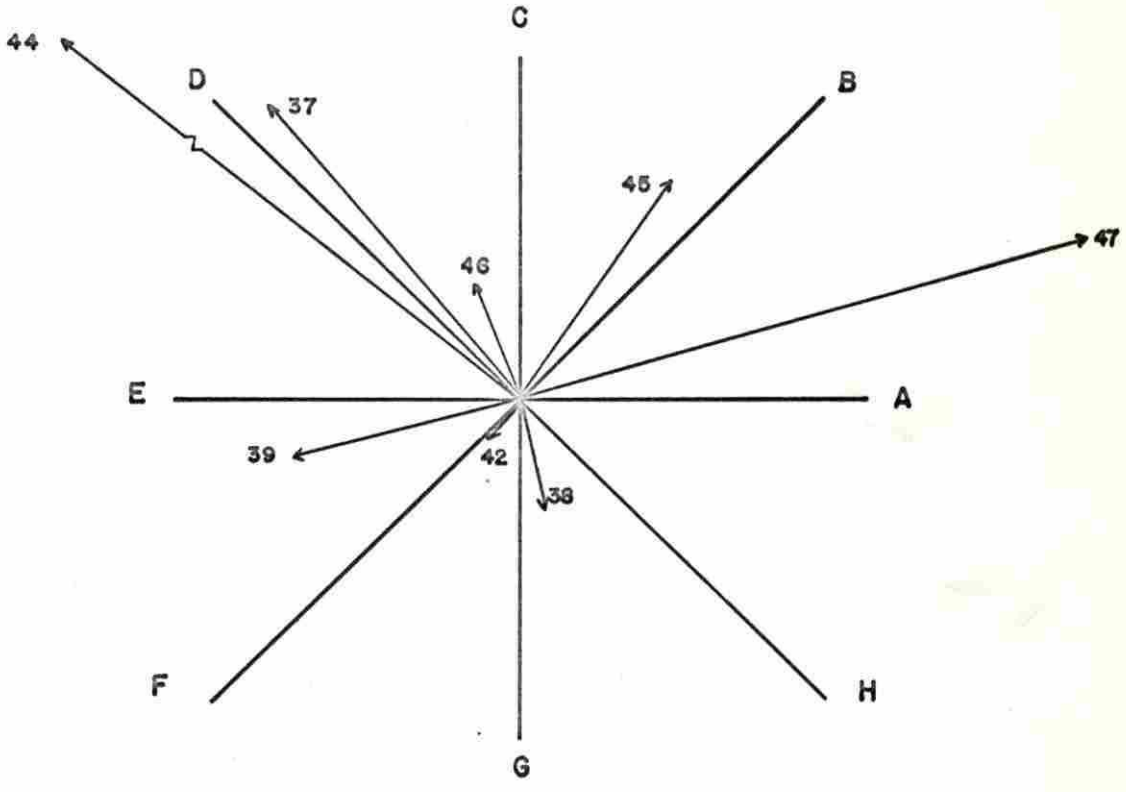

C
D
B
6
14
E
A
F
H
G
21
8
17
7
18
22
11
10
12
13
20

Figure IIc. Octant chart for Kansas City SMSA services employment, 1950–1960.

KEY:	Sector No.	Industry
	37	Business services
	38	Repair services
	40	Private households
	41	Other personal services
	42	Entertainment and recreation services
	44	Medical and hospitals
	45	Educational: government
	46	Educational: private
	47	Other professional and related services


C
44
D
37
B
45
47
46
E
A
39
42
38
F
H
G

D. Input-Output Access

More satisfactory fundamental explanations of the differential growth patterns are needed. Perloff (60, p. 73) suggests that the industry-mix effect and the regional-share effect raise these two key questions, respectively: (1) "Why do some employment sectors of the national economy expand more than others?" and (2) "Why does the same employment sector expand more rapidly in some regions than in others?"

At least a partial answer to these questions is provided by using an input-output scheme in netting-out the advantages or disadvantages of a particular region for the economic activities of a given industry or of all industries combined in that particular region. Perloff (61, p. 87) contends that this process must be "selective and related to specific industries rather than in terms of a . . . . single index". Competitive costs, as well as "opportunity" costs and transfer costs, must be included in the concept of access to resources or markets.

Variations in access, as a measure of the sum of the relative advantages and disadvantages for the production of a particular commodity at some given place, conceptually might identify at least sixteen possible types of regions, as shown in Figure 12. This particular model is an over-simplification, but a comprehensive classification scheme based on this principle could provide very useful and significant application to the specific regional development planning problems in the Missouri Basin.

Perloff suggests that such an approach focuses one's attention on the wide range of prospects for growth, and that even an awareness of the basic concept points up the fallacy of an "extreme local economic-development approach which

Figure 12. A schematic presentation of types of regions that can exhibit different potentials with respect to growth (61, p. 91).

		Good access to basic inputs* from external regional and national sources		Poor access to basic inputs* from external regional and national sources	
		Good access to basic inputs in home region	Poor access to basic inputs in home region	Good access to basic inputs in home region	Poor access to basic inputs in home region
Poor access to external regional and national markets	Poor access to markets in home region	#1 II	#2 I	#3 I	#4 0
	Good access to markets in home region	#5 III	#6 II	#7 II	#8 I
Good access to external regional and national markets	Poor access to markets in home region	#9 III	#10 II	#11 II	#12 I
	Good access to markets in home region	#13 IV	#14 III	#15 III	#16 II

*Not only basic resources but important intermediate sources need to be considered.

NOTE: Roman numerals indicate number of "good" access dimensions, and suggest relative over-all locational advantages or disadvantages.

regards every region and community as capable of limitless economic expansion" (61, p. 90). From the figure, to the extent that the region's excess measures may be taken as a rough indicator of its growth potential, Region 4 would have little prospect for growth, while that of Region 13 would be unsurpassed. The other regions fall between these extremes. Perloff takes exception to the general assumption that growth is initiated by advances in primary extractive activity, and tends to follow a prescribed sequence. Rather, for an economically advanced nation he suggests that growth may begin with primary, secondary or tertiary activities and proceed in several directions. This, he suggests, can be demonstrated by a schematic approach like the one proposed which focuses attention on the variety of growth experiences that can be found in regions of different types. Generally in support of the application of such a model to regional development planning, ". . . the various growth patterns displayed can be explained by identifying the relative advantages and disadvantages of the regions with regard to input and output access for the major types of economic activity" (61, p. 93).

Recognizing the limitations involved in using a model such as "input-output access" without a highly refined system for evaluation, an attempt to evaluate "access" dimensions of the Missouri Basin SMSA's becomes highly subjective. Those with characteristics of access which quite obviously place them at the extreme ends of the spectrum are readily located in the appropriate cells of the preceding model. Cells 13 and 4 would seem most appropriate for Denver and St. Joseph, respectively. However, most of the others would be placed largely in terms of experienced relative growth, and that which has been predicted by the shift-share analysis; otherwise it comes to a matter of mere guesswork.

Lincoln, Omaha and Kansas City appear to have good access to markets, both local and national, but the empirical evidence for differing growth rates would suggest varying degrees of access to basic inputs -- hence, could be appropriately placed in cells 14, 15 and 16, respectively. Shift analysis suggests the probability of relatively "poor" access dimensions for Sioux City, but quite "good" dimensions for Springfield -- cells 3 and 9 might be correspondingly appropriate positions for these SMSA's. Billings, with excellent input access and relatively strong local markets is most severely limited by poor access to national markets, and could be appropriately placed in cell 5. Sioux Falls, Topeka and Great Falls all have good local markets, but limited wider markets and access to inputs -- cells 6 or 7 might be appropriate for any one or all of these.

VI. REGIONAL ECONOMIC BASE ANALYSIS

The economic base of a community or region consists of those activities which provide the basic employment and income on which the rest of the local economy depends. Alexander (1) suggests that the money that comes into a city enables one to formulate its economic base. The Committee for Economic Development asserts that, ". . . the first step toward meeting the public problems of a metropolitan area is a detailed knowledge of its economic base. Knowledge about the economic base is essential to sound public policy decisions and private investment. . ." (14, p. 31).

Essentially, an economic base study divides an area's economic activity into two segments: (1) that which serves markets outside the area; and (2) that which serves markets within the area. In other words, in this context, one examines the mechanics of regional growth in terms of the "internal" characteristics of the region as well as of its attractiveness for export industries. Or, as suggested by Gunnar Alexanderson, a city's economic activity can be divided between that which is "city-forming" and that which is "city-serving" (3).

An economic base study deals with the demand side of an economy; studies which highlight the supply side of a community's economy would include industry studies, industrial location factor analysis, feasibility studies, and inventories of community assets and liabilities. Again, an economic base or related study must be placed in the context of more extensive regional interactions, as suggested by shift analysis, or some form of input-output analysis such as input-output access or inter-industry transactions.

The process of separating basic or export activity from nonbasic activity can be an extremely difficult task. If one were to be rigid in definitions he would find that products of virtually every firm in the community find their way into both export markets and local markets. It is first necessary to select the unit of measurement for the economic base: appropriate units include income, employment, value added, sales, and others which are used less frequently. Given the unit of measurement, employment for our purposes, it is necessary to allocate the total to export and residentiary activities, respectively. This can be done by direct measure of the various sectors as in a Madison, Wisconsin study (2) or more commonly by an indirect method such as using an assumption approach, or the location quotient approach. These methods will be treated individually in turn.

A. Two-Sector Aggregation: Commodity-producing versus Noncommodity-producing Employment

Perhaps the simplest and yet most frequently used approach to economic base studies is that of arbitrarily assuming what is export and what is local employment. Our initial economic base analysis will fall into this category, for which a "commodity-producing" versus "noncommodity-producing", rather than a basic-nonbasic, dichotomy will be used. The commodity-producing employment is made up of those primary and secondary sectors including agriculture, mining, manufacturing, and contract construction, whereas the noncommodity-producing category consists of the tertiary and quaternary sectors; hence, a simplified two-sector aggregation.

Commodity-producing employment induces employment in noncommodity-producing activities, essentially through the dynamics of the multiplier effect.

Such services as transportation, communication, wholesaling, and retailing are needed to move the raw materials to the manufacturing firms, and ultimately in the transfer of commodities produced to their final markets, either locally or outside the area. The need for commercial and professional and other consumer services follows.

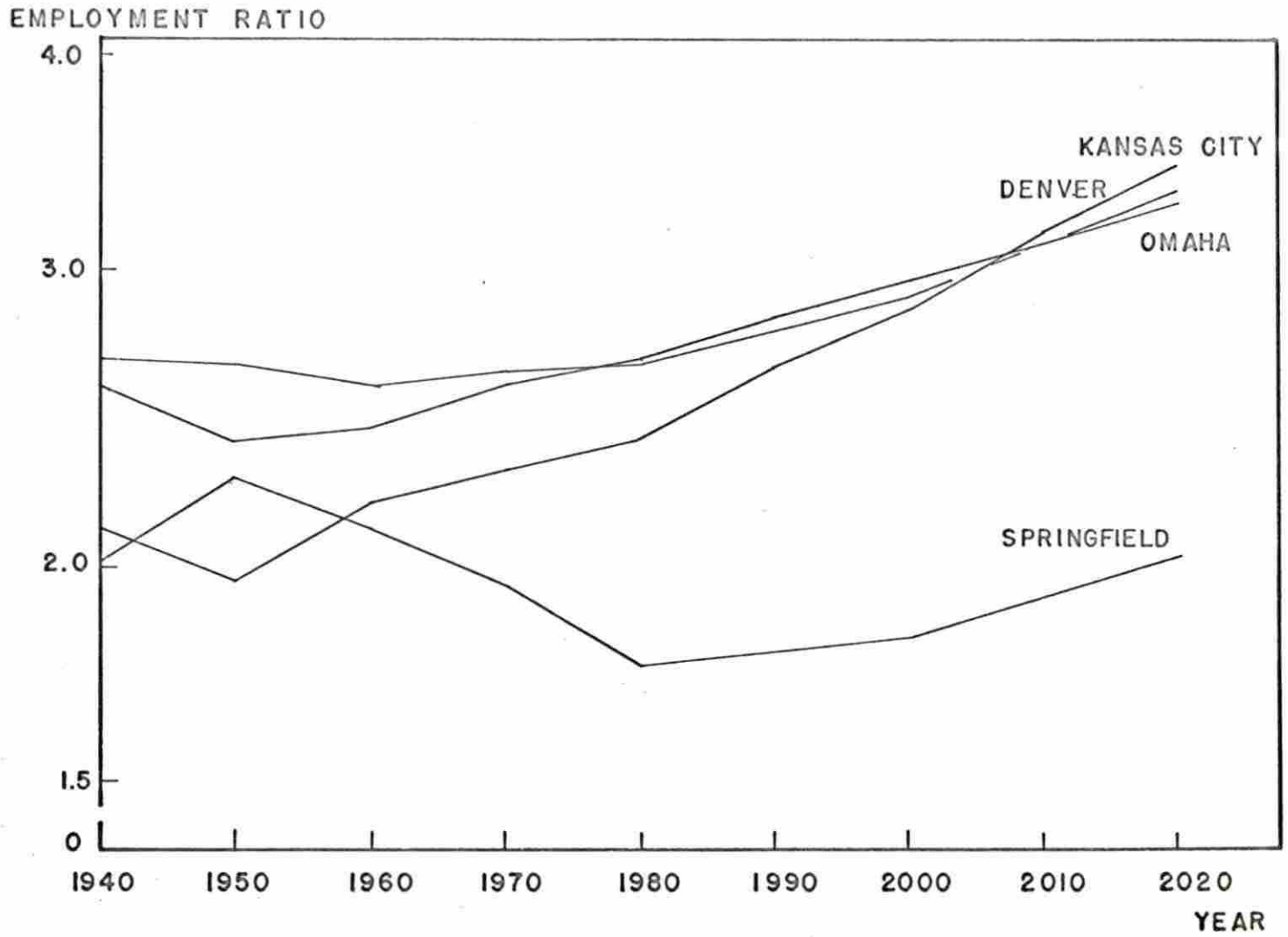
The major commodity-producing employment historically in the Missouri Basin has been agriculture. Historical data shows that agriculture reached a post World War II peak about 1950, and subsequently a decline has been indicated for commodity-producing employment for the Missouri Basin and all its regions (excluding the experience of the Basin's SMSAs).

A noncommodity-producing to commodity-producing ratio in employment is somewhat analogous to the service-basic ratio commonly used in community base studies. Commodity-producing employment for Denver and Springfield is proportionately greater than for Omaha and Kansas City; this suggests that the former two cities place more emphasis on export activity. Figure 13 gives a projection over time of the noncommodity-producing: commodity-producing ratios for selected SMSAs. Note that Denver and Springfield maintain the highest export base throughout the extended period.

Noncommodity-producing to commodity-producing relationships during the historical period 1940-1960 and projected to 2020, are given graphically for the U.S., the Missouri Basin, and selected regions and SMSAs in Figures 14a and 14b.

Two distinct patterns of change are identified. The total Missouri Basin and its sub-regions, with the exception of region 5, reflect the decline in commodity-producing employment (due to decline in agriculture) in the period 1950-1980; and then a sharp increase followed by damped increase in the noncommodity: commodity-producing ratio. In other words, from 1980 on, less commodity-producing employment

Figure 13. Noncommodity-producing: commodity-producing ratios for selected SMSA's, 1940 through 2020.


EMPLOYMENT RATIO
4.0
3.0
2.0
1.5
0
KANSAS CITY
DENVER
OMAHA
SPRINGFIELD
1940
1950
1960
1970
1980
1990
2000
2010
2020
YEAR

is needed to support the noncommodity-producing employment. Thus in the non-metropolitan regions a greater increase is observed in the ratio than occurred in the metropolitan areas. The metropolitan areas are represented by an almost linear relationship between noncommodity-producing and commodity-producing employment for the projected period. Region 5, which more closely follows the metropolitan characteristics than the non-metropolitan ones, is probably influenced by the dominance of Denver. In the later years of the projections, the non-metropolitan areas approach the metropolitan areas in the relationships which exist between the two major employment categories. The projected commodity-non-commodity employment relationship can be illustrated by the Kansas City SMSA which shows a 13 percent increase in noncommodity-producing employment for each 10 percent increase in commodity-producing employment.

B. Location Quotient

Location quotients are widely used to estimate employment involved in export. Generally, a location quotient is a comparison of the proportion of local employment in a particular industry compared with the proportion of national employment in that industry. If the proportions are the same, the employment level in the local community is just enough to service local needs. If the proportion of employment in that industry locally is greater than on the national scale, export employment is assumed to be that proportion which is greater than the national level.

The location quotient, q_{it}, is expressed as a ratio of proportions:

$$q_{it} = \frac{p_{it}}{P_{it}}$$

A location quotient greater than unity suggests a part of employment for that sector would be serving export markets. The larger the quotient, the more

Figure 14a. Noncommodity-producing versus commodity-producing employment relationships for the U.S., the Missouri Basin, and selected subregions.

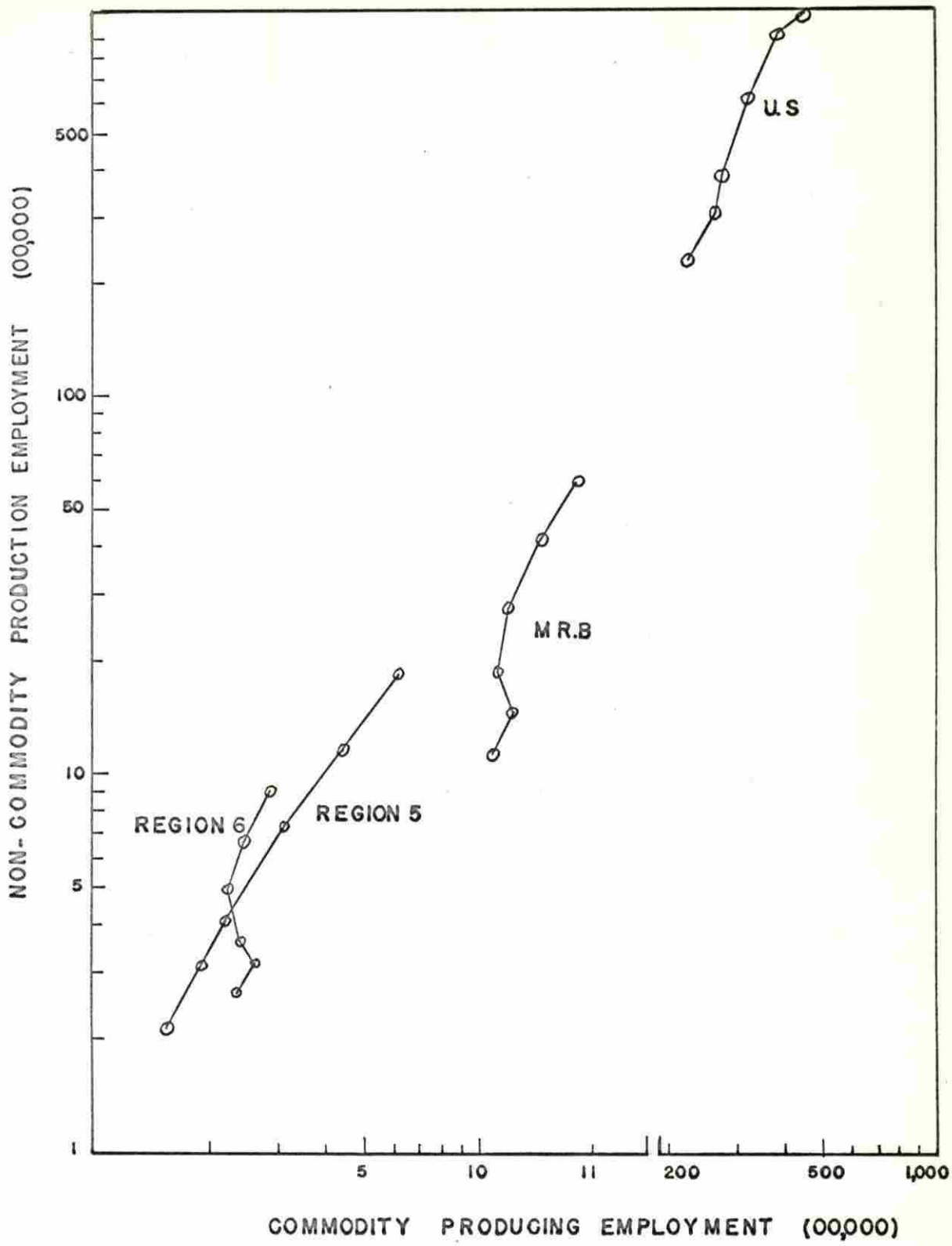
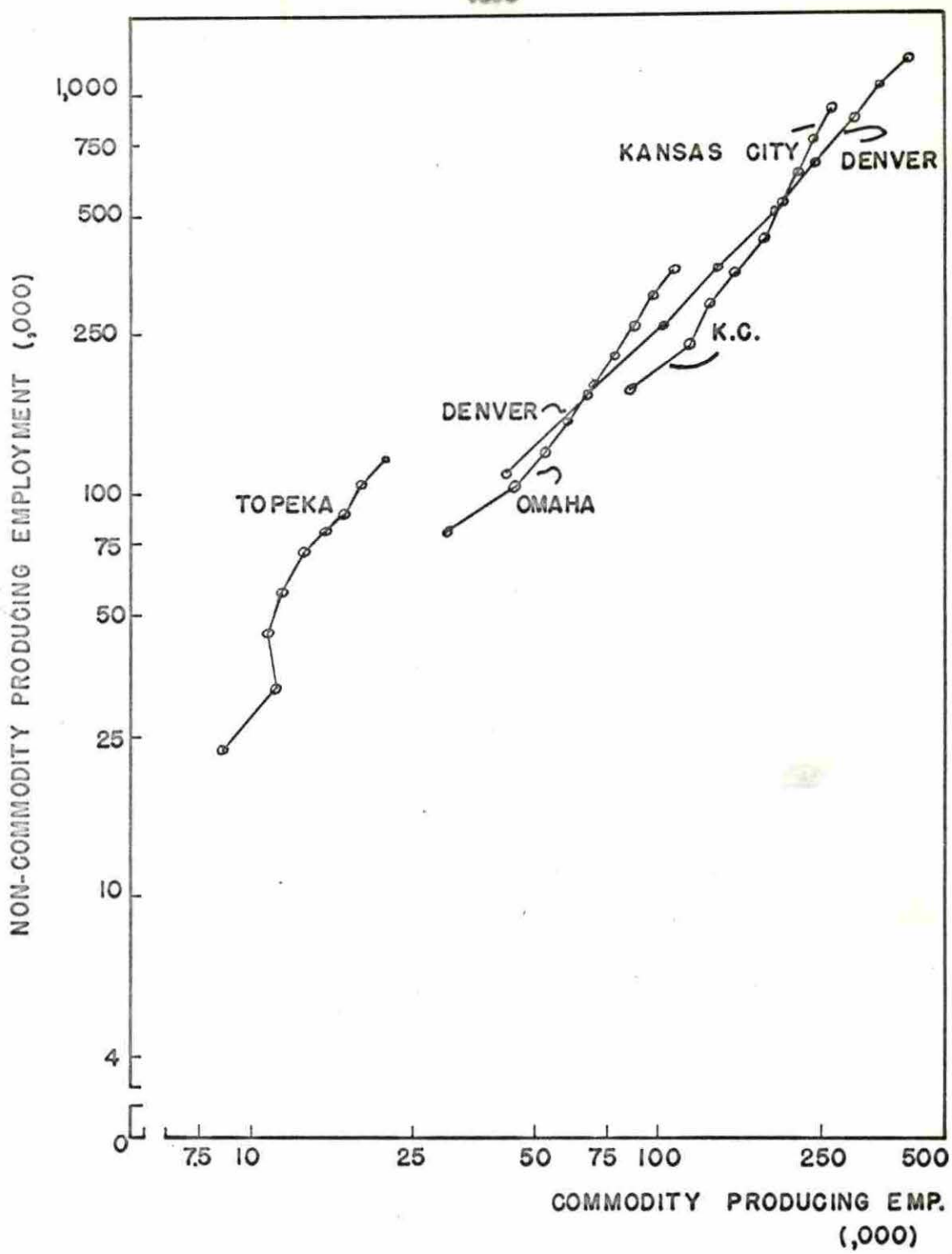

NON-COMMODITY PRODUCTION EMPLOYMENT (00,000)
500
100
50
10
5
1
U.S
M.R.B
REGION 6
REGION 5
5
10
11
200
500
1,000
COMMODITY PRODUCING EMPLOYMENT (00,000)

Figure 14b. Noncommodity-producing versus commodity-producing employment relationships for selected SMSA's.


1,000
750
500
250
100
75
50
25
10
4
0
NON-COMMODITY PRODUCING EMPLOYMENT (,000)
KANSAS CITY
DENVER
K.C.
DENVER
TOPEKA
OMAHA
7.5
10
25
50
75
100
250
500
COMMODITY PRODUCING EMP.
(,000)

significant the export or basic activity.

Another way of viewing the location quotient method as suggested by Tiebout (71, p. 47) would be by the formula:

$$\frac{X}{\text{total local employment}} = \frac{\text{national employment in industry}_i}{\text{total national employment}}.$$

Solving for X determines the numbers which would be employed in industry i in the community if it had just enough to supply its own needs. In other words, X number of workers owe their jobs to the non-basic (local) sector, while those in "excess" of the non-basic workers owe their jobs to the export market or basic sector.

Table 26 summarizes location quotients for the Basin and SMSAs on a twelve-sector basis for 1950 and 1960. Table 27 provides a detailed breakdown of employment by degree of basic activity for Kansas City, using detail employment categories. Industries in which q_i is greater than 1.20 are assumed to have significant basic employment. For location quotients of other Basin SMSA's, see Appendix D.

We have examined location quotients for industries in each of the SMSAs, but with a slight extension of this concept we can estimate the numbers of workers in basic employment, thereby providing a means of ranking basic activity in order of its importance to an area.

First, we determine the employment base for each sector in the form of (X) above:

$$e_{Bt} = \frac{e_{it}}{q_{it}}$$

where

e_{Bt} = employment base,

Table 26. Location quotients for Missouri Basin and SMSAs, 1950 and 1960, for sectors indicating basic activity only.

Sector	Year	Missouri Basin	Kansas City	Denver	Omaha	Lincoln	Topeka
I	1950	2.1742	--	--	--	--	--
	1960	2.5757	--	--	--	--	--
II	1950	--	--	--	--	--	--
	1960	--	--	--	--	--	--
III	1950	--	--	--	--	--	--
	1960	--	--	--	--	--	--
IV	1950	1.8290	1.8244	1.4141	2.3702	1.3664	2.3073
	1960	1.2429	1.8325	1.2335	2.0708	1.2453	2.2075
V	1950	.9849	1.1472	1.3678	1.3434	1.2075	1.2075
	1960	1.0789	1.1429	1.2256	1.4962	1.2744	1.6053
VI	1950	1.1006	1.5374	1.5718	1.6810	1.2241	1.1839
	1960	1.0936	1.4737	1.4386	1.4620	1.0351	1.0205
VII	1950	1.0251	1.2325	1.2206	1.1030	1.2199	1.0865
	1960	1.0843	1.0634	1.0965	1.0169	1.1154	1.0742
VIII	1950	--	1.5529	1.4647	1.9765	1.6176	1.3382
	1960	--	1.3885	1.4053	1.7386	1.4580	1.2662
IX	1950	.9642	1.0285	1.2953	1.0257	1.3876	1.3093
	1960	1.0153	.9442	1.1560	1.0076	1.4504	1.2142
X	1950	1.0734	1.0734	1.3605	1.0082	1.1370	1.1501
	1960	1.0763	.8814	1.1847	1.1034	1.2390	1.2713
XI	1950	.9619	1.0874	1.4910	--	1.6659	1.9484
	1960	1.0282	1.0432	1.4778	--	--	--
XII	1950	1.3289	1.2617	1.0403	1.2349	1.0201	.7718
	1960	.8288	1.5806	.9677	.9578	.6278	1.2680

Table 26. (Continued)

Sector,	Year	Springfield	Sioux City	St. Joseph	Sioux Falls	Billings	Great Falls
I	1950	--	.7978	--	1.1003	--	--
	1960	--	1.0386	--	1.3783	--	--
II	1950	--	--	--	--	.2182	--
	1960	--	--	--	--	1.3564	--
III	1950	--	--	1.0184	--	--	--
	1960	--	--	1.0557	--	--	--
IV	1950	2.1069	1.2977	1.372	.9141	1.8817	1.8779
	1960	1.7807	1.1816	1.3255	1.0755	1.9127	1.4009
V	1950	.9509	.9396	1.0453	1.4000	.9208	1.0755
	1960	1.1203	1.0451	1.1241	1.3308	1.1165	1.3356
VI	1950	1.8966	2.3534	2.0230	2.0948	2.1149	1.3793
	1960	1.5175	1.9591	1.6667	1.9678	2.0439	1.2865
VII	1950	1.3190	1.3428	1.2464	1.2583	1.3838	1.3005
	1960	1.2436	1.2719	1.1154	1.1397	1.3063	1.3023
VIII	1950	--	1.0382	--	1.2176	1.0265	1.1412
	1960	--	.9784	--	1.2470	1.3501	1.2470
IX	1950	1.2248	1.0268	1.0129	1.0213	1.0386	1.0945
	1960	1.0763	1.0115	.9637	1.1260	1.1202	1.1240
X	1950	1.1158	--	--	1.0750	1.4225	1.2039
	1960	1.1644	--	--	1.0559	1.1424	1.4559
XI	1950	--	--	--	--	1.3453	1.1839
	1960	--	--	--	--	.9355	1.3347
XII	1950	--	.7383	.7114	1.2013	1.1342	--
	1960	--	1.0645	1.0099	.8536	.6873	--

Table 27. Summary of location quotients, by industry, for Kansas City SMSA, 1960.

INDUSTRY		LOCATION QUOTIENTS							
		q_i 0.80	0.80 q_i	1.20	1.20 q_i	1.60	q_i 1.60		
(I) 1		0.18	--	--	--	--	--	--	--
2		--	0.19	--	--	--	--	--	--
3		--	0.00	--	--	--	--	--	--
(II) 4		0.18	--	--	--	--	--	--	--
(III) 5		--	--	0.91	--	--	--	--	--
6		--	--	--	--	--	1.34	--	--
7		--	--	--	--	--	1.54	--	--
8		--	--	--	1.11	--	--	--	--
9			0.70	--	--	--	--	--	--
	10	--	0.05	--	--	--	--	--	--
	11	--	--	--	0.91	--	--	--	--
	12	--	--	--	0.92	--	--	--	--
13		--	0.36	--	--	--	--	--	--
14		--	--	--	1.19	--	--	--	--
	15	--	0.68	--	--	--	--	--	--
	16	--	--	--	--	--	--	--	1.68
17		--	0.66	--	--	--	--	--	--
18		--	0.53	--	--	--	--	--	--
19		--	--	--	0.88	--	--	--	--
	20	--	--	--	--	--	--	--	1.68
	21	--	0.34	--	--	--	--	--	--
	22	--	0.76	--	--	--	--	--	--
(IV)23		--	--	--	--	--	--	1.83	--
24	-	--	--	--	--	--	--	--	2.20
25		--	--	--	--	--	1.56	--	--
26		--	--	--	--	--	--	--	1.72
(V)27		--	--	1.15	--	--	--	--	--
28		--	--	--	--	--	1.23	--	--
29		--	--	--	1.05	--	--	--	--
(VI)30		--	--	--	--	1.47	--	--	--

Table 27. (Continued)

INDUSTRY			LOCATION QUOTIENTS							
			q_i 0.80	0.80 q_i 1.20		1.20 q_i 1.60		q_i 1.60		
(VII)	31		--	--	1.06	--	--	--	--	--
	32		--	--	--	0.87	--	--	--	--
	33		--	--	--	0.92	--	--	--	--
	34		--	--	--	1.15	--	--	--	--
(VIII)	35		--	--	--	--	1.38	--	--	--
(IX)	36		--	--	0.94	--	--	--	--	--
	37		--	--	--	1.08	--	--	--	--
	38		--	--	--	1.00	--	--	--	--
	39		--	--	--	0.86	--	--	--	--
		40	--	0.67	--	--	--	--	--	--
		41	--	--	--	1.06	--	--	--	--
	42		--	--	--	1.04	--	--	--	--
	43		--	--	--	0.95	--	--	--	--
		44	--	--	--	1.06	--	--	--	--
		45	--	0.71	--	--	--	--	--	--
		46	--	--	--	0.86	--	--	--	--
		47	--	--	--	1.16	--	--	--	--
(X)	48		--	--	0.88	--	--	--	--	--
(XI)	49		--	--	1.04	--	--	--	--	--
(XII)	50		--	--	--	--	1.58	--	--	--

e_{it} = actual employment.

In the case of a location quotient of unity, the employment base is equal to actual employment.

Basic or "excess" employment can be determined by subtracting the employment base from the actual employment ($e_{it} - e_{Bt}$). If the result is negative, a deficit employment is indicated, implying need of importing for that sector to maintain local balance. See Figure 15 for a graphic example of excess and deficit employment in Kansas City in 1960.

C. Basic-nonbasic Employment Ratio

The basic-nonbasic ratio (sometimes called the basic-service ratio) is a useful tool to describe the changing structure of the economic base of a city or region over time, and is frequently viewed as a possible guide to economic expansion for that region.

The actual determining of the basic employment, by survey, for any city of considerable size is a formidible, if not impossible, task. One of the most common approximation techniques for determining a community's basic-nonbasic ratio is through the use of the location quotient, which was developed earlier. The ratio would be expressed as:

$$B/N = \frac{\text{excess workers}_i}{e_{ij} - \text{excess workers}_i}$$

Basic activity of the Missouri Basin SMSA's is summarized in Table 28 by ranking the four largest sectors in terms of both total employment and basic employment (excess workers) for those industries which are to some measure basic to the community. Sectors considered are non-aggregated prime categories only.

Figure 15. Economic base analysis -- excess and deficit workers for Kansas City SMSA, 1960.


EMPLOYMENT BY INDUSTRY
40
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
34
50
35
48
49
30
6
16
24
45
12
33
40
18
13
2
24 20 16 12 8 4 0 4 8 12 16 20 24
NET DEFICIT (-) EMPLOYMENT (,000)
NET EXCESS (+) EMPLOYMENT (,000)

Table 28. Comparison of rank for total and basic employment involved in basic activity, 1960, for Missouri Basin SMSA's.

Standard Metropolitan Statistical Area	Rank by total employment		Rank by basic employment	
	Industry	Total employment	Industry	Basic employment
Kansas City	Other retail trade	44,474	Trucking service	7,128
	Finance, insurance, etc.	23,577	Wholesale trade	6,597
	Public administration	21,054	Finance, insurance, etc.	6,597
	Wholesale trade	20,522	Other retail trade	6,108
Denver	Other retail trade	37,190	Public administration	8,371
	Public administration	25,892	Fabricated metal industry	7,764
	Contract construction	24,672	Finance, insurance, etc.	5,969
	Finance, insurance, etc.	20,695	Wholesale trade	5,301
Omaha	Other retail trade	16,986	Food and kindred products	10,899
	Food and kindred products	15,786	Railroad and related	6,777
	Finance, insurance, etc.	12,578	Finance, insurance, etc.	5,343
	Contract construction	11,289	Wholesale trade	2,741
Lincoln	Other retail trade	7,197	Educational: government	2,527
	Educational: government	4,886	Railroad and related	1,351
	Public administration	4,278	Public administration	1,290
	Finance, insurance, etc.	3,664	Other retail trade	1,151
Topeka	Other retail trade	5,759	Railroad and related	3,073
	Public administration	4,858	Public administration	2,335
	Railroad and related	3,816	Medical and hospitals	2,155
	Printing, publishing, etc.	1,736	Other retail trade	967

Table 28. (Continued)

Standard Metropolitan Statistical Area	Rank by total employment		Rank by basic employment	
	Industry	Total employment	Industry	Basic employment
Springfield	Other Retail trade	6,169	Other retail trade	1,709
	Wholesale trade	2,455	Railroad and related	1,386
	Food and kindred products	2,350	Food and kindred products	1,017
	Other non-durables	2,287	Other non-durables	1,009
Sioux City	Other retail trade	5,026	Food and kindred products	3,368
	Food and kindred products	4,493	Wholesale trade	1,307
	Wholesale trade	2,669	Other retail trade	1,274
	Medical and hospitals	1,523	Medical and hospitals	482
St. Joseph	Food and kindred products	5,342	Food and kindred products	4,361
	Other retail trade	4,409	Other retail trade	775
	Medical and hospital	1,395	Medical and hospital	487
	Other personal services	1,287	Other personal services	243
Sioux Falls	Food and kindred products	3,845	Food and kindred products	2,933
	Other retail trade	3,638	Wholesale trade	1,070
	Agriculture	1,005	Agriculture	873
	Wholesale trade	2,176	Other retail trade	592'
Billings	Wholesale trade	2,060	Wholesale trade	1,052
	Finance, insurance, etc.	1,660	Railroad and related	675
	Other professional	1,375	Trucking service	550
	Railroad and related	1,106	Finance, insurance, etc.	430
Great Falls	Other retail trade	3,014	Primary metal industries	878
	Contract construction	2,078	Other retail trade	737
	Public administration	1,601	Contract construction	651
	Primary metal industries	1,106	Trucking services	564

For the historical periods, 1950 and 1960, Table 29 indicates a consistent decline in the basic-nonbasic ratio as computed by the location quotient approximation. This suggests that less basic activity will be needed in the future to support a given area, even enough an increasing proportion of this activity actually comes from the noncommodity-producing sectors, as the data used to develop the current ratio will attest.

Plotting the basic-nonbasic ratio against total employment (log) indicates a two-fold change over the historical time period for any one city: (1) a movement to the right due to growth in total employment, and (2) a downward shift of the ratio due to a shift in the city's economic base structure, a decreasing proportion of Basin employment (See Figure 16). For the projected 1975 employment, the slope of the regression line follows the trend but the basic-nonbasic ratio would correspond more meaningfully if each were decreased by approximately 0.10; perhaps this suggests a constant biasing factor in the projections.

D. Regression Analysis

A regression analysis of employment by industry versus total employment for each SMSA by industry will provide some insights into the total metropolitan structure of the Basin; a total economic base approximation. This analysis will use a regression of the form,

$$Y = A X^{B}, \text{ or}$$

$$\text{Log} \quad Y = \text{Log } A + B \text{ Log } X; \text{ where}$$

$Y = e_{it}$ is employment, by industry, in SMSA, and

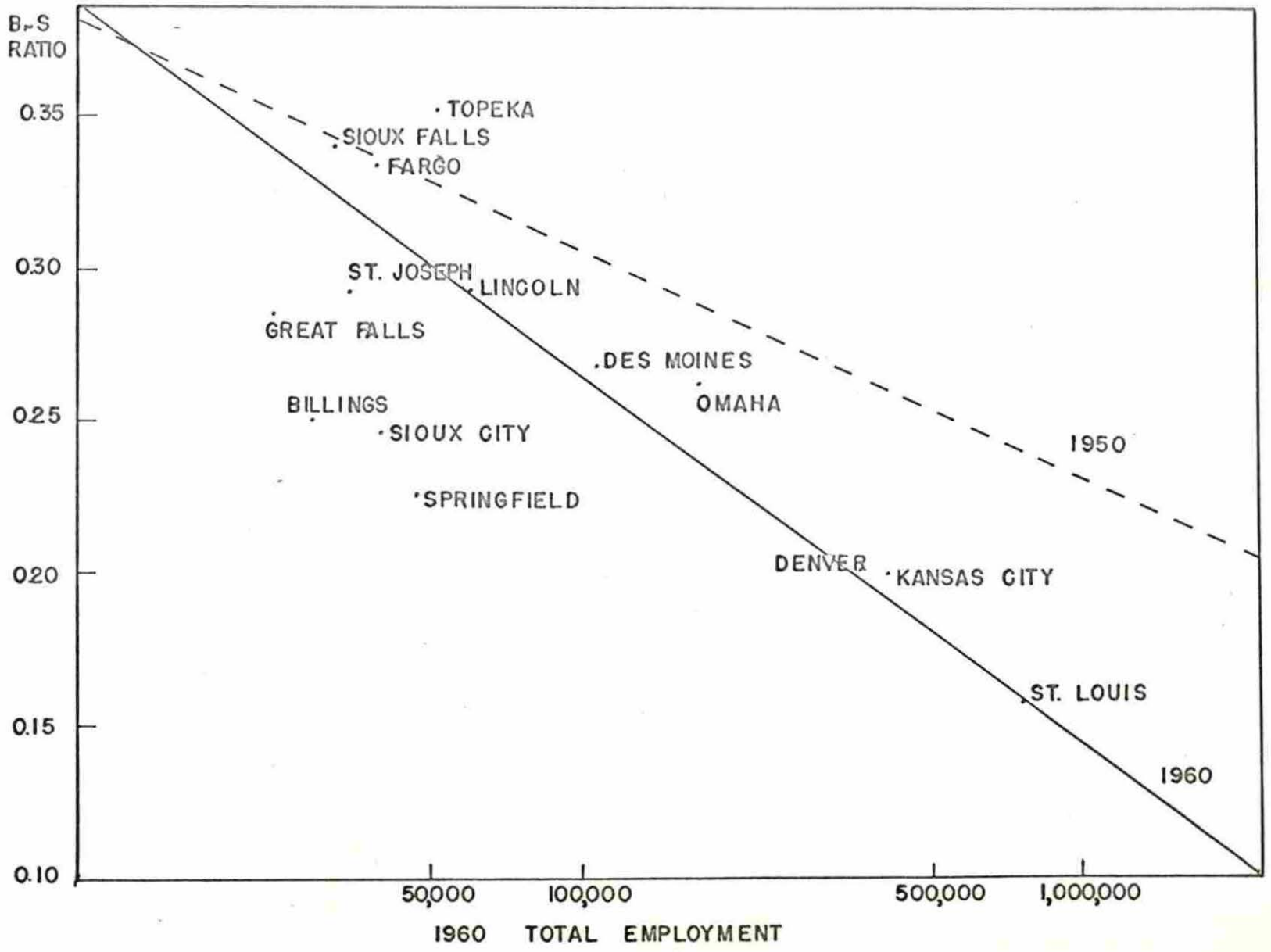
$X = e_{.t}$, the independent variable, is total employment in the SMSA;

B is the dependent variable and A is a constant.

Table 29. Basic-nonbasic ratios for fourteen SMSA's for the years 1950, 1960, and 1975.

SMSA	Basic-nonbasic ratio		
	1950	1960	1975
Kansas City	0.368	0.200	0.252
Denver	0.313	0.210	0.240
Omaha	0.364	0.264	0.238
Lincoln	0.323	0.293	0.340
Topeka	0.453	0.352	0.362
Springfield	0.277	0.225	0.347
Sioux City	0.328	0.270	0.295
St. Joseph	0.360	0.292	0.313
Sioux Falls	0.348	0.339	0.361
Billings	0.308	0.250	0.376
Great Falls	0.348	0.285	0.388
MISSOURI RIVER BASIN	0.287	0.231	0.207
St. Louis	0.234	0.157	0.182
Des Moines	0.302	0.269	0.321
Fargo	0.353	0.334	0.443

Figure 16. Basic-nonbasic employment ratio versus total employment, 1950, 1960, and 1975.


B-S RATIO
0.35
0.30
0.25
0.20
0.15
0.10
TOPEKA
SIOUX FALLS
FARGO
ST. JOSEPH
LINCOLN
GREAT FALLS
DES MOINES
BILLINGS
OMAHA
SIOUX CITY
1950
SPRINGFIELD
DENVER
KANSAS CITY
ST. LOUIS
1960
50,000
100,000
500,000
1,000,000
1960 TOTAL EMPLOYMENT

If B is greater than unity, the slope of the regression line is greater than one (45°), indicating a generally basic industry throughout the Basin SMSA's. A value of B equal to or less than unity suggests a self-sustaining non-basic industry or one dependent on imports from other areas, either outside the SMSA and in its regional hinterland, or from totally outside of the Missouri Basin.

An example of this kind of regression analysis is found in Figure 17, a regression of the manufacturing industry in all Basin SMSA's for 1960; in this case the slope of the regression line is obviously greater than 45°, suggesting that the manufacturing industry in the Basin metropolitan areas is a basic activity. Figure 18 depicts the relative slopes of similar regression lines for the Basin's twelve major sectors in 1960. An over-all picture of a changing economic base for the Basin metropolitan centers overaa twenty-five year time interval is demonstrated by applying the regression analysis to the twelve major sectors (for fourteen SMSA's) for the years 1950, 1960 and 1975. The change in economic base is summarized in the simple tabulation of Table 30.

The underlined sectors have remained in the same position (basic or non-basic) during the twenty-five year period. Communications and utilities, Sector 5, show change from a basic activity in 1950, to a self-supporting non-basic activity in 1960, and to a dependent one in 1975. Sector 8, finance and insurance, a basic activity in 1950, becomes self-supporting non-basic industry in 1960, and 1975. In spite of the movement of some sectors, mining, manufacturing, transportation, and public administration have remained in the aggregate, basic industries for Missouri Basin metropolitan areas (inasmuch as this technique is an appropriate measure).

Figure 17. Regression analysis, manufacturing in Missouri Basin SMSA's, 1960.

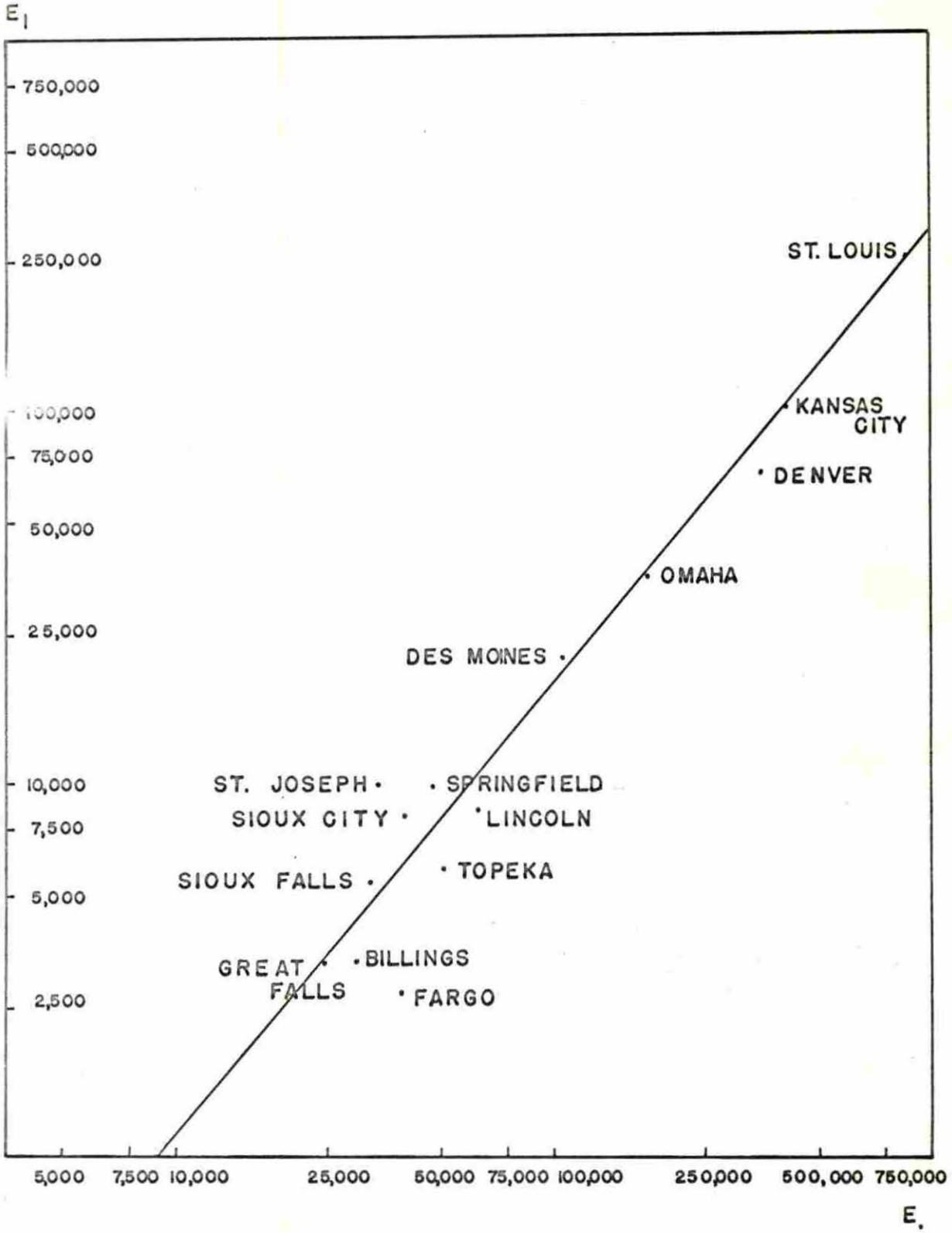

E1
750,000
500,000
250,000
100,000
75,000
50,000
25,000
10,000
7,500
5,000
2,500
ST. LOUIS
KANSAS CITY
DENVER
OMAHA
DES MOINES
ST. JOSEPH
SPRINGFIELD
SIOUX CITY
LINCOLN
SIOUX FALLS
TOPEKA
GREAT FALLS
BILLINGS
FARGO
5,000
7,500
10,000
25,000
50,000
75,000
100,000
250,000
500,000
750,000
E.

Figure 18. Regression analysis, twelve sectors, Missouri Basin SMSA's, 1960.

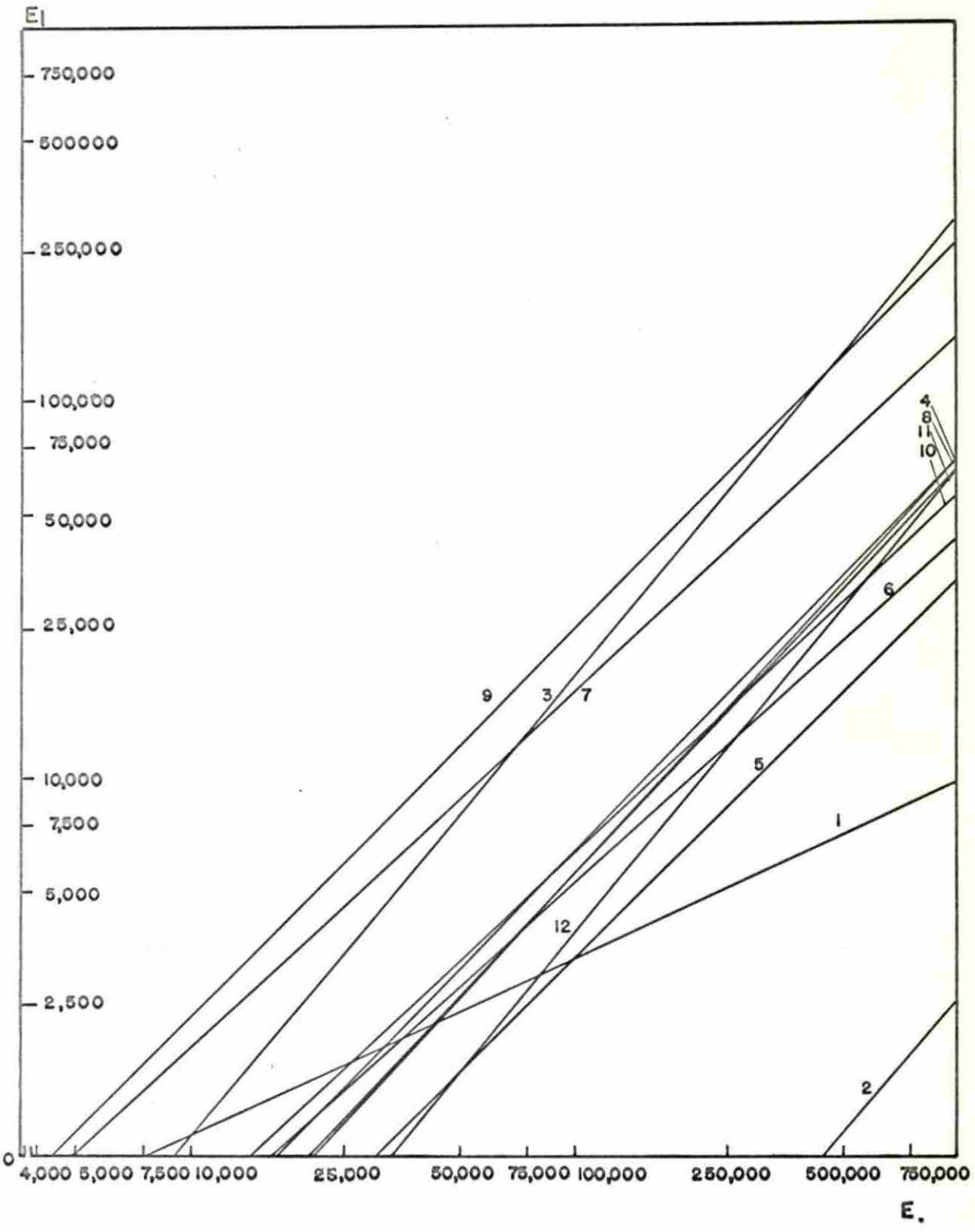

E1
750,000
500000
250,000
100,000
75,000
50,000
25,000
10,000
7,500
5,000
2,500
0
4,000
5,000
7,500
10,000
25,000
50,000
75,000
100,000
250,000
500,000
750,000
E.
1
2
3
4
5
6
7
8
9
10
11
12

Table 30. Summary of regression analysis.

Regression line	Year 1950	1960	1975
B > I	II, III, IV, V, VIII, XI, XII	II, III, IV, VII, XI, XII	II, III, IV, XI, XII
B = I	X	V, VII, VIII, IX	VIII
B < I	I, VI, VII, IX	I, VI, X	I, V, VI, VII, IX, X

VII. ECONOMIC PROJECTIONS

So far, the analysis of Missouri Basin "growth centers" has been made largely on the basis of historical data, primarily for the years 1950 and 1960. If this analysis is to have continued relevant to economic analysis, it must be augmented by economic projections. We will approach this in two stages: short-term projections to 1975, and long-term projections spaced at twenty-year intervals to the year 2020 A.D. The latter will be drawn from population and employment projections previously made by the Office of Business Economics (65). Either stage of projections involves the question of the level of disaggregation to be used in estimating change and future employment levels.

"Because projections of economic aggregates are more widely accepted than the projections of the individual components that make up the aggregates, the latter tend to be biased toward the aggregate growth rates" (65, p. 3). Specific projections of individual sectors of economic change is essential for introducing long-run changes in specific economic growth rates that differ significantly from aggregate growth rates. Without the knowledge generated by specific projections, the result is primarily one valid projection, the aggregate one, with base year differentials contained throughout as components of the aggregate series. Where detailed employment estimates are made, they must be "tied" to the total employment estimates for a particular area in terms of a "control" total.

A. Short-Term Projections

For the short-run projections, three different approaches were used to estimate regional and SMSA employment levels for 1975. The results of these three methods are summarized in Table 31.

First approximation: The first set of projections are based on a simple linear extrapolation of historical data without adjustment, which can be expressed as follows:

$$e_{175} = 1.5\,(e_{160} - e_{150}) + e_{160}$$

In this, the estimates involve a mere projection of actual employment change which occurred in the historical period.

Second approximation: A second set of projections, like the first, is unadjusted and based on historical data, only this time involves the projection of the growth rate, hence an expotential projection in the following form:

$$e_{175} = g_{1(50-60)}^{1.5} \times e_{160}$$

Both A and B are aggregate projections, and as such would provide the control totals for specific sectoral projections.

Third approximation: Unlike the first two, the third set of projections is an adjusted aggregate of the individual economic series.

Projections are made for eleven of the twelve major sectors according to the technique used in the "second approximation above". (Sector 12, Industry not reported showed such radical change in the historic period, that it was projected linearly). These eleven "sector sub-totals" are subsequently used as "control totlas" for projecting the finer detail. The amount of adjustment is based on

Table 31. Comparative total employment projections for 1975 and historic data for U.S., Missouri Basin, and fourteen SMSA's.

Area	Employment				
	1950	1960	1975		
			First approx.	Second approx.	Third approx.
	(000)	(000)	(000)	(000)	(000)
United States	56,435	64,639	76,945	79,241	83,734
Missouri Basin	2,696	2,882	3,191	3,221	3,571
Kansas City	339.8	407.3	508.6	534.6	536.6
Denver	234.2	353.1	531.5	553.8	669.8
Omaha	147.5	173.4	212.3	220.4	230.7
Lincoln	49.1	60.3	77.1	82.0	87.3
Topeka	43.9	50.9	61.3	63.5	66.1
Springfield	38.9	47.3	60.0	63.5	72.5
Sioux City	42.1	39.8	36.5	36.7	38.6
St. Joseph	37.1	34.8	31.3	31.6	33.4
Sioux Falls	29.3	32.3	36.9	37.5	39.9
Billings	21.4	29.5	41.6	47.6	52.0
Great Falls	19.7	24.2	30.8	32.8	35.5
St. Louis	690.6	763.6	873.2	888.0	899.7
Des Moines	94.9	107.6	126.6	129.8	132.8
Fargo	35.1	39.3	45.8	46.8	53.1

(1) original size, (2) degree of change, and (3) reasonableness; the adjusted figures lie somewhere between the "First" or "Second" approximation for that component. The final estimates (Third approximation) will be used in comparison with the more highly refined OBE projections to be discussed subsequently.

Table 32 provides a summary of the adjusted twelve-sector projections for the Missouri Basin and the fourteen SMSA's, together with the appropriate area totals. One will notice that the most radical growth rates are adjusted downward quite drastically, while many of the more graduate rates for component sectors remain as projected. Comparison of average annual growth rates for the projected interval 1960 to 1975 are compared with the historical period, 1950 to 1960, in Table 33.

B. Aggregate Long-Term Projections

The neutral projections as prepared by the Office of Business Economics provide the basis for our long-term projections. The rather sophisticated economic projection model used by OBE include damping factors and adjustments for data limitations. The Missouri Basin employment trends tend to follow aggregate growth patterns with reference to industrial and spatial detail.

Figures 19 and 20 together with Table 34 provide a summary of long-range employment trends for the Missouri Basin and its component sub-regions and SMSA's.

The long-range projections for the sub-regional and SMSA aggregates show trends that are essentially the same as the Basin total projections, with a few exceptions. Employment growth for Denver is at a much higher rate than for the other SMSA's, as is that for Billings. Sioux City lags considerably behind the average, while St. Joseph indicates an actual decline for the period 1960-1980

Table 32. Adjusted 1975 employment projections.

Industry	Missouri Basin	Kansas City	Denver	Omaha	Des Moines	Lincoln	Topeka
I. Agriculture	286,875	2,709	4,869	3,521	1,407	1,174	497
II. Mining	32,211	932	9,873	125	71	52	38
III. Manufacturing	651,981	137,469	163,898	54,103	29,300	12,443	5,567
IV. Transportation	125,783	30,447	20,310	11,519	4,044	2,749	4,044
V. Communication and Utilities	107,293	16,239	18,216	10,401	6,111	3,035	4,165
VI. Wholesale Trade	116,371	24,628	27,524	8,751	6,534	2,200	1,736
VII. Retail Trade	544,669	65,460	87,612	28,517	17,136	11,473	9,617
VIII. Finance, Insurance and Real Estate	197,852	35,523	48,964	17,985	15,863	5,789	4,201
IX. Services	940,137	118,020	169,061	57,684	31,692	33,791	18,324
X. Contract Construction	193,729	19,516	35,017	15,544	5,519	6,434	5,215
XI. Public Administration	213,474	30,368	55,471	9,825	7,773	5,442	6,975
XII. Industry not Reported	161,042	55,336	28,964	12,694	7,381	2,695	5,740
Total	3,571,417	536,647	669,779	230,667	132,831	87,277	66,119

Table 32. (Continued)

Industry	Springfield	Sioux City	St. Joseph	Sioux Falls	Billings	Great Falls	St. Louis	Des Moines	Fargo
I. Agriculture	800	1,519	492	1,942	1,412	1,038	4,865	1,407	3,253
II. Mining	168	12	41	121	1,312	120	1,267	71	2
III. Manufacturing	24,533	7,248	10,120	6,572	7,176	3,816	280,603	29,300	2,849
IV. Transportation	2,709	1,167	1,229	1,586	2,876	915	37,033	4,044	1,862
V. Communication and Utilities	2,430	1,204	1,062	1,234	1,904	1,619	23,165	6,111	2,205
VI. Wholesale Trade	2,296	1,817	1,313	2,342	3,078	1,267	25,969	6,534	2,669
VII. Retail Trade	10,371	6,176	4,278	5,287	8,194	6,132	105,614	17,136	9,051
VIII. Finance, Insurance, and Real Estate	3,101	1,862	1,508	2,743	4,980	2,642	51,149	15,863	4,127
IX. Services	14,967	9,659	7,514	12,999	15,907	10,203	204,079	31,692	19,913
X. Contract Construction	4,394	2,195	1,494	2,149	2,178	3,539	39,344	5,519	3,066
XI. Public Administration	3,119	2,213	1,491	1,004	1,497	3,049	38,671	7,773	2,746
XII. Industry not Reported	3,602	3,581	2,954	1,998	1,496	1,165	87,921	7,381	1,312
Total	72,490	38,653	33,396	39,869	52,010	35,505	899,680	132,831	53,055

Table 33. Average annual percent change historical data (1950-1960) compared with percent change projected data (1960-1975).

Area	Average annual percent change, (1950-1960)	Average annual percent change, (1960-1975)
United States	1.45	2.03
U.S. 212 SMSAs	2.12	
Missouri Basin	0.77	1.60
Kansas City	1.99	2.12
Denver	5.08	5.98
Omaha	1.75	2.20
Lincoln	2.38	2.99
Topeka	1.59	2.00
Springfield	2.16	3.54
Sioux City	-0.53	-0.20
St. Joseph	-0.62	-0.27
Sioux Falls	1.03	1.55
Billings	3.77	5.10
Great Falls	2.25	3.12
Total eleven Basin SMSAs	2.49	3.24
St. Louis	1.06	1.19
Des Moines	1.33	1.57
Fargo	1.22	2.32
Total fourteen SMSAs	1.86	2.42

Figure 19. Long range employment projections, Missouri Basin sub-regions, to 2020.

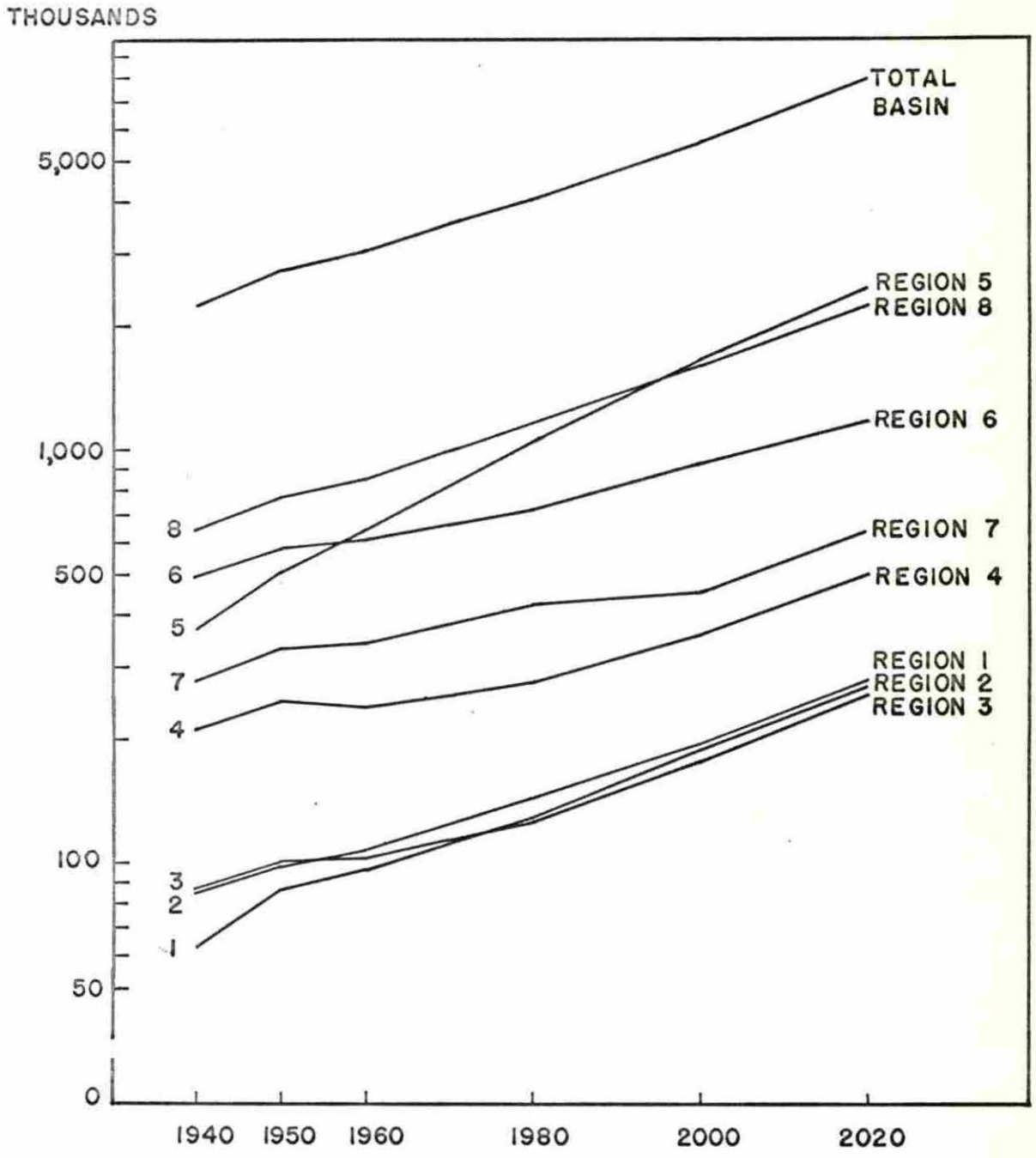

THOUSANDS
5,000
1,000
500
100
50
0
1940
1950
1960
1980
2000
2020
TOTAL BASIN
REGION 5
REGION 8
REGION 6
REGION 7
REGION 4
REGION 1
REGION 2
REGION 3
8
6
5
7
4
3
2
1

Figure 20. Long range employment projections, Missouri Basin SMSA's, to 2020, including comparing short range projections to 1975.

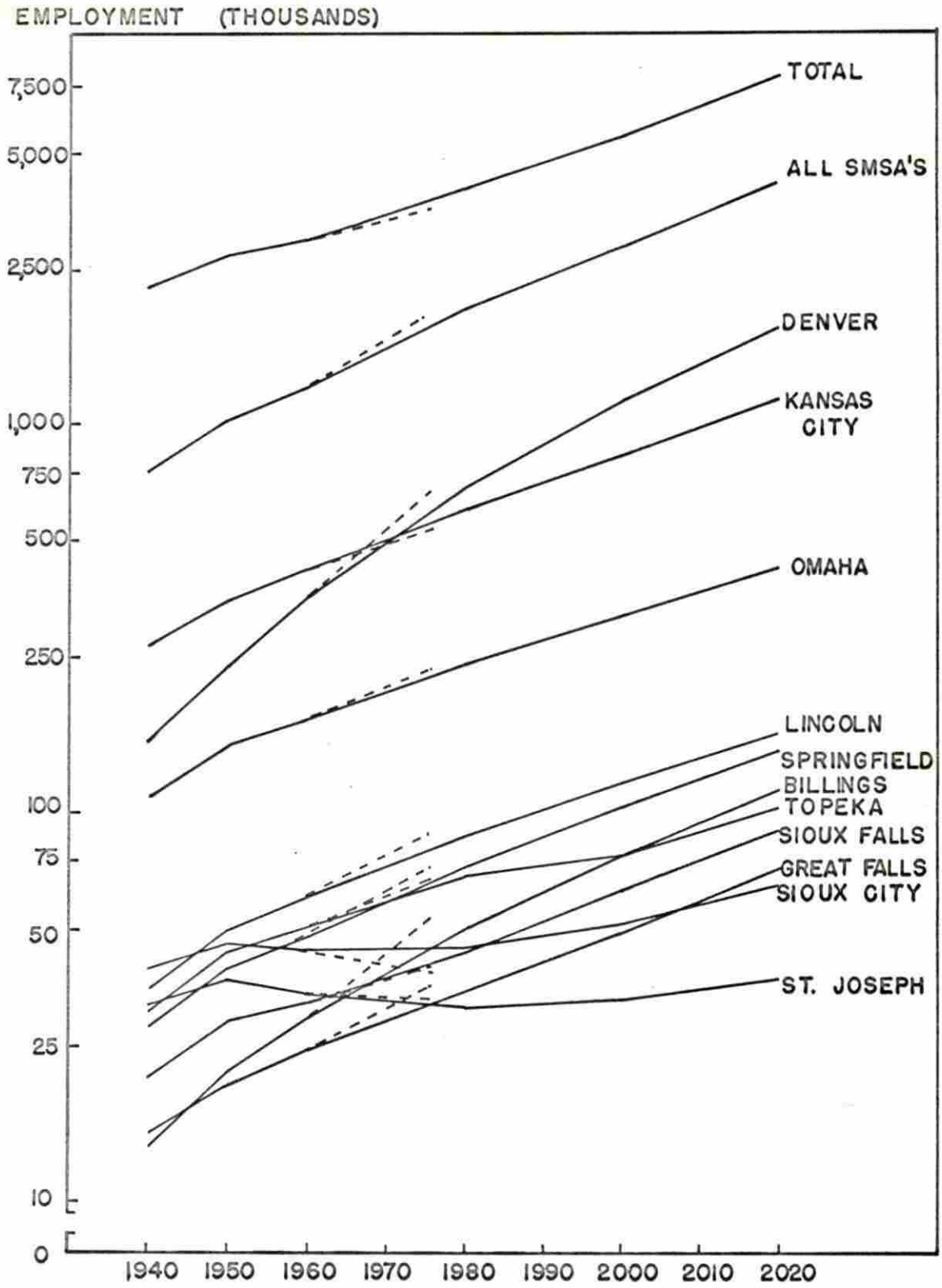

EMPLOYMENT (THOUSANDS)
7,500
5,000
2,500
1,000
750
500
250
100
75
50
25
10
0
1940
1950
1960
1970
1980
1990
2000
2010
2020
TOTAL
ALL SMSA'S
DENVER
KANSAS CITY
OMAHA
LINCOLN
SPRINGFIELD
BILLINGS
TOPEKA
SIOUX FALLS
GREAT FALLS
SIOUX CITY
ST. JOSEPH

Table 34. Summary of long range Missouri Basin employment projections.

Basin Subregion	1940	1950	1960	1980	2000	2020
	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
REGION 1 - Upper Missouri	84.5	98.3	108.5	142.2	195.3	277.6
Great Falls SMSA	15.1	19.7	24.2	34.1	48.9	70.4
SMSA as percent of region	17.80	20.09	22.28	24.37	25.04	25.34
REGION 2 - Yellowstone	62.2	86.7	96.3	129.9	183.0	259.0
Billings SMSA	13.9	21.4	29.5	50.4	74.5	116.3
SMSA as percent of region	22.32	29.68	30.59	38.81	42.92	44.91
REGION 3 - Western Tributaries	84.6	100.6	104.3	129.3	179.2	253.8
REGION 4 - Eastern Tributaries	209.6	248.7	238.3	273.8	355.3	492.9
Sioux Falls SMSA	20.9	29.3	32.3	44.8	62.8	90.6
SMSA as percent of region	9.96	11.79	13.58	16.36	17.69	18.37
REGION 5 - Platte	370.2	506.0	639.1	1046.3	1620.3	2475.0
Denver SMSA	151.8	234.2	353.1	685.9	1132.2	1776.2
SMSA as percent of region	41.02	46.28	55.24	65.55	69.87	71.76

Table 34. (Continued)

Basin Subregion	1940	1950	1960	1980	2000	2020
REGION 6 - Middle Missouri	498.6	579.8	601.1	717.1	916.8	1197.1
Omaha SMSA	112.2	147.4	173.4	237.4	318.8	425.1
St. Joseph SMSA	32.0	37.1	34.8	31.6	32.5	37.3
Sioux City SMSA	39.0	45.8	44.0	44.6	51.7	65.1
SMSA as percent of region	36.75	39.73	41.96	43.72	43.96	44.06
REGION 7 - Kansas	277.0	329.6	343.8	428.3	451.7	635.1
Topeka SMSA	31.8	43.9	50.9	68.1	78.5	103.5
SMSA as percent of region	11.48	13.32	14.80	15.91	17.37	16.3
REGION 8 - Lower Missouri	643.4	766.0	853.2	1173.4	1614.5	2264.3
Kansas City SMSA	269.2	352.4	424.7	602.8	828.1	1158.4
Springfield SMSA	28.3	38.9	47.3	72.5	102.7	144.1
SMSAs as percent of region	46.24	51.09	55.32	57.55	56.65	57.52
Total Missouri Basin	2236.2	2715.5	2984.6	4040.3	5552.0	7885.8
Total eleven SMSA's	749.4	1019.2	1274.4	1957.4	2854.0	4148.1
Eleven SMSAs as percent of Basin	33.51	37.53	42.70	48.45	51.40	52.60

and a very slow rate of growth from 1980 on. As would be expected, the Platte Region sharply exceeds the Basin rates, largely due to the growth which is experienced by Denver. Denver's growth is traceable to favorable industry-mix and regional-share in primary and secondary sectors, which in turn is expanded via the multiplier effect. In 1940, the region ranked third place in terms of total employment, but by 2020 projections indicate that it will have moved to first place. All regions with the exception of Kansas are expected to grow at a consistent rate from 1980 to 2020. The Kansas region shows a relative decline for the first twenty years of the period, but then follows the Basin rates more closely for the final period. The projections suggest that with the passing of time, a considerable rearrangement of ranking of the cities according to total employment will take place (See Table 35).

The assumption of continued urbanization with the metropolitan "growth centers" receiving the largest share of rural-to-urban migration is supported by the summary of projections on the foregoing table. Over time, each SMSA's percentage of regional employment increases as does the aggregate of the eleven SMSAs relative to the Basin. In the historical period the percentage increase gains at an increasing rate, however, in the projected period the percentage increases, but at a decreasing rate. One possible conjecture is the fact that the historical data is adjusted to include employment figures for the most recent (1960) definition of Standard Metropolitan Statistical Areas, whereas the projected employment figures are limited to the number of SMSAs in the base year and doesn't take into account those urban centers which will gain SMSA status in the future. An alternative, perhaps less credible, may be that while urban population (hence employment) will continue to grow at an increasing rate, the large

Table 35. Comparative rank of Basin SMSA's for years 1940, 1960, and 2020, based on total employment.

1940	1960	2020
	(order of largest to smallest)	
Kansas City	Kansas City	Denver
Denver	Denver	Kansas City
Omaha	Omaha	Omaha
Sioux City	Lincoln	Lincoln
Lincoln	Topeka	Springfield
St. Joseph	Springfield	Billings
Topeka	Sioux City	Topeka
Springfield	St. Joseph	Sioux Falls
Sioux Falls	Sioux Falls	Great Falls
Great Falls	Billings	Sioux City
Billings	Great Falls	St. Joseph

metropolitan centers will become less important and the urban population will become more dispursed. Gottman (26) appears to dispel this latter possibility in his discussion of the growth of the Eastern Seaboard "Megalopolis".

C. Four-sector Employment Projections

The employment structure of the Missouri Basin is significantly different from that of the nation, yet for four major sectors of employment -- namely agriculture, manufacturing, other commodity-producing, and noncommodity-producing -- the projected sectoral growth patterns from 1960 to 2020 are similar. Figures 21 and 22 illustrate the almost identical growth rates for the Missouri Basin and the nation in sectors (3) other commodity-producing employment, and (4) noncommodity-producing employment. The Basin's percentage decline in agriculture is less than that of the nation as a whole, and at the same time percentage increase in manufacturing employment is greater than the nation. Thus, the total employment growth rate tends to increase in the Basin relative to the national growth rate.

Generally, each of the eight regions and eleven SMSAs in the Basin tend to follow the aggregate growth patterns for the Basin (see for example the four-sector projections for Kansas City in Figure 23 and for other SMSAs in Appendix E). We will discuss in more detail the variations which occur between sub-regions and SMSAs, treating each sector individually.

1. Agricultural employment

While the emphasis of this study is primarily urban, some discussion of the outlying regions' economic activity is necessary in order to understand the larger region as a whole. Declining Basin agricultural employment trends are somewhat less severe than the national trends. This would indicate an increasing importance

Figure 21. Four-sector employment projections, United States, 1940–2020.

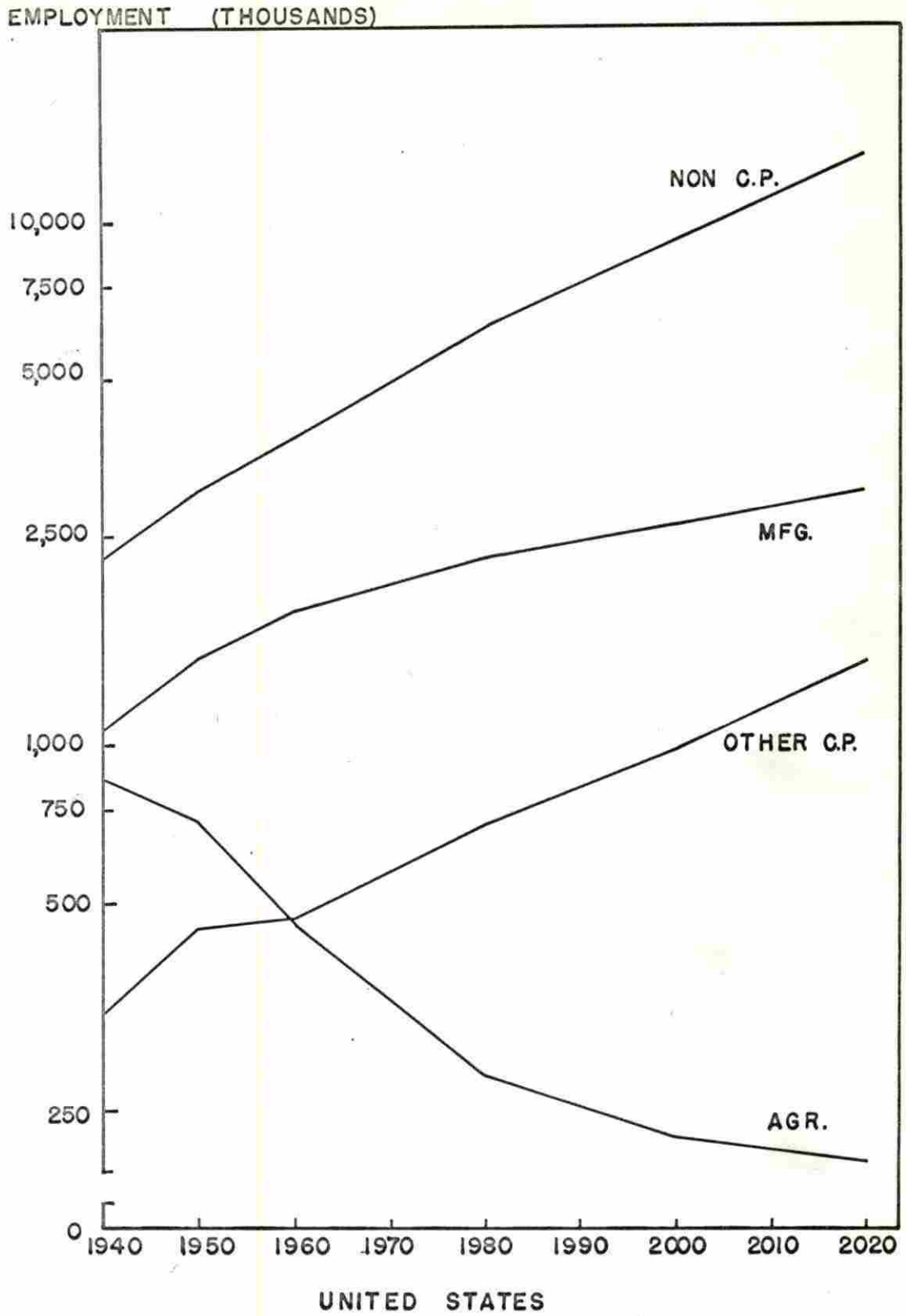

EMPLOYMENT (THOUSANDS)
NON C.P.
MFG.
OTHER C.P.
AGR.
10,000
7,500
5,000
2,500
1,000
750
500
250
0
1940
1950
1960
1970
1980
1990
2000
2010
2020
UNITED STATES

Figure 22. Four-sector employment projections, Missouri Basin, 1940-2020.

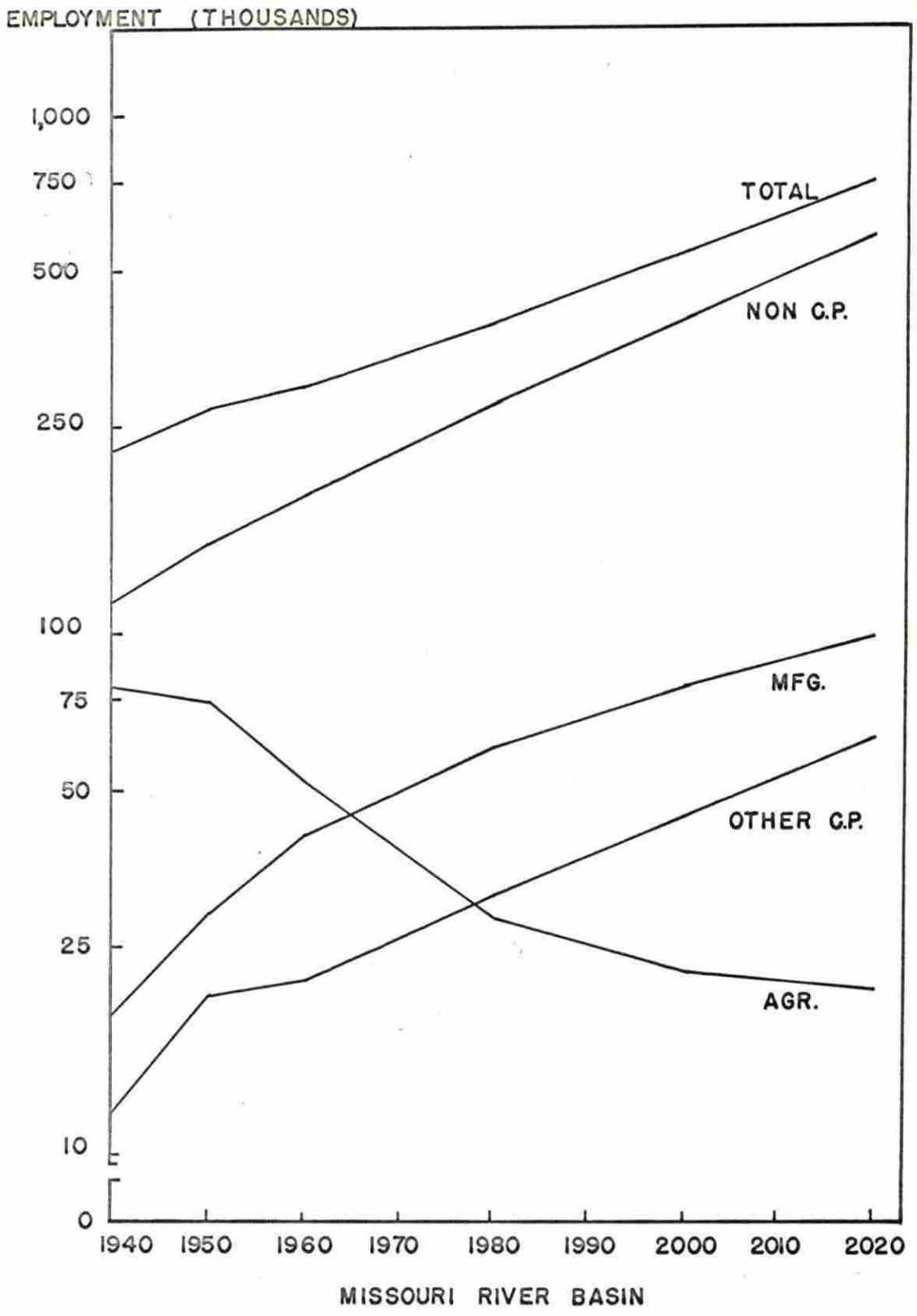
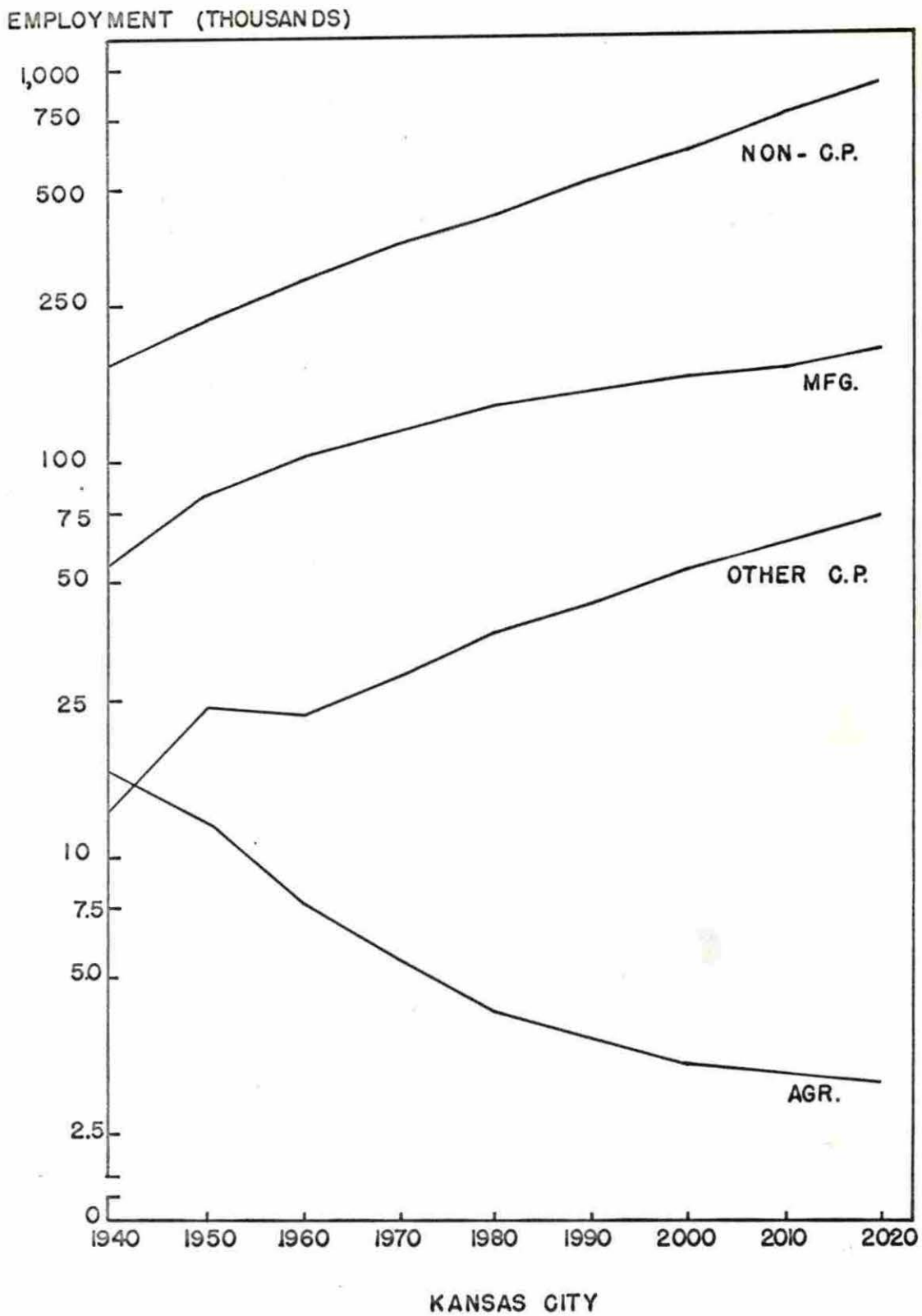

EMPLOYMENT (THOUSANDS)
1,000
750
500
250
100
75
50
25
10
0
TOTAL
NON C.P.
MFG.
OTHER C.P.
AGR.
1940
1950
1960
1970
1980
1990
2000
2010
2020
MISSOURI RIVER BASIN

Figure 23. Four-sector employment projections, Kansas City SMSA, 1940-2020.


EMPLOYMENT (THOUSANDS)
1,000
750
500
250
100
75
50
25
10
7.5
5.0
2.5
0
1940
1950
1960
1970
1980
1990
2000
2010
2020
NON-C.P.
MFG.
OTHER C.P.
AGR.

KANSAS CITY

of agricultural activity in the Missouri Basin relative to the rest of the nation. The historical trends in agricultural employment are dampened in each of the twenty-year projections, starting with the 1960-1980 period. The rates of decline for Regions 2, 5, 6 and 7 are essentially the same as the Basin rates; while for Regions 1, 3 and 4 the decline is less rapid and for Region 8 the decline is more rapid than for the Basin. Region 3 demonstrates an agricultural employment pattern which is in sharp contrast to that of the industry generally. Although the patterns for agricultural employment in the SMSAs are similar to the Basin trends, further discussion of this sector seems unnecessary because of the relative proportion of agricultural employment in the metropolitan centers in comparison with the remaining three sectors.

2. Manufacturing employment

Manufacturing employment for each region in the Basin, except Region 4, starting from 1960, is equal to or greater than the national growth rate in manufacturing. The manufacturing growth rate of the Basin as a whole exceeds that of the nation and within the Basin the projected growth rates for Regions 2 and 5 exceed the Basin growth rate in manufacturing; the growth rate for Region 5 is substantially larger, due at least in part to Denver's projected rapid rate of growth for that sector. Besides Denver, only two SMSAs indicate growth patterns greater than the national rate. Topeka and Sioux Falls employment levels for manufacturing are virtually unchanged for the projected period, while a decline is forthcoming for both Sioux City and St. Joseph.

The manufacturing growth rates for the SMSAs tend to fall below that for their corresponding regions. This gives support to the concept that the development

of a metropolitan center evolves through several stages; the more mature cities have passed through a secondary stage (which includes manufacturing) and into a tertiary and quaternary stage. Despite its diversity, Denver's stage of development (along with Billings and Springfield) perhaps is behind that of the other SMSAs in the Missouri Basin.

3. Other commodity-producing employment

The U.S. and Basin growth rates for other commodity-producing employment are almost identical for the entire period from 1940 to 2020. Of the eight sub-regions, only Regions 2 and 3 are noticeably different from aggregate rates. However the growth rates for the SMSAs in this sector also tend to fall below the Basin and Regional rates. Other commodity-producing employment falls into the secondary stage of urban development along with the manufacturing sector, and includes mining and contract construction.

4. Noncommodity-producing employment

Noncommodity-producing industries, which include the tertiary and quaternary industries, make up the larger dominant part of total employment nationally, and as such account for much of the growth in overall employment, regardless of specific geographical areas. The employment growth rate of this sector for the Missouri Basin is almost identical with the national rate.

Regions 1, 2, 3, 4 and 5 are above the national and Basin growth rates however, Regions 6, 7 and 8 and all SMSAs show lower growth rates than the Basin average. Such differences are difficult to explain in terms of advanced stages of metropolitan growth and also in view of the "basic-service" employment relationships for the Basin which will be discussed subsequently.

Reviewing the growth rates for the three sectors which have been discussed (excluding agriculture) for the twenty-year intervals from 1960 to 2020, one observes the similarity of growth in all Subregions and SMSAs. In every case, St. Joseph and Sioux City tend to lag behind the other growth rates or show actual decline, while the growth patterns for Denver and Region 5 in every case surpass all other areas.

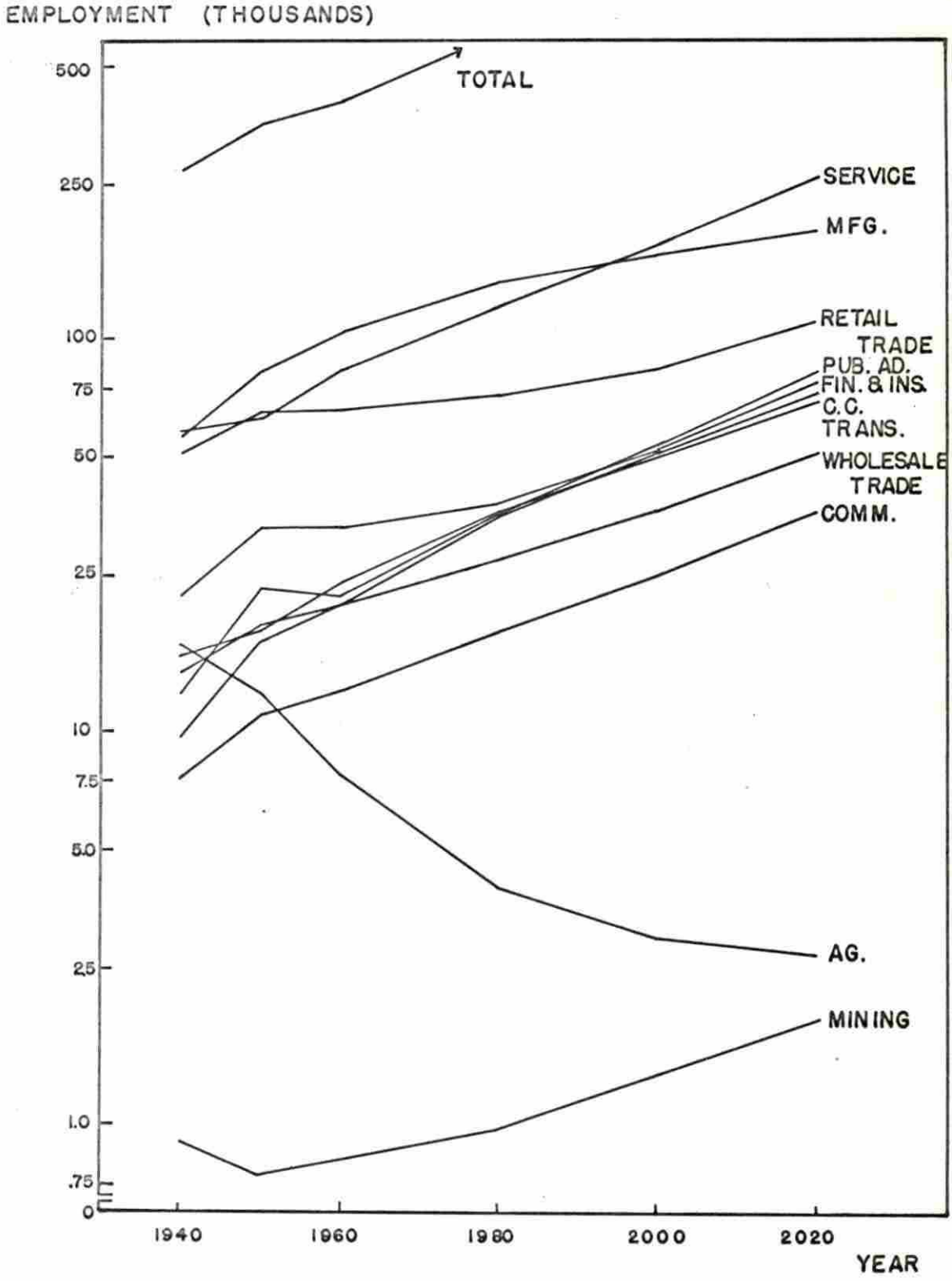
For illustrative purposes, the projected data has been further disaggregated for the two larger Basin SMSAs; Kansas City and Denver (See Figures 24 and 25). The twelve sector disaggregation follows the corresponding four-sector breakdown quite closely with the exception of the retail trade and transportation sectors which lag considerably behind area growth rates for the noncommodity-producing category. The very nature of "industry not reported" discounts its contribution to the analysis. Within manufacturing, printing and publishing, chemical products, electrical machinery, and other durables radically out-distance growth trends of the other categories.

D. Shift Analysis Projections

Shift analysis has been presented in terms of historical data to describe the components of employment shift which have taken place in the Basin, and to demonstrate the corresponding regional share and industry mix relationships. However, shift analysis too can be made an integral part of the Basin projections. The OBE projections for the Basin will provide the basic data for illustrating this application. To repeat a basic form of the shift analysis model:

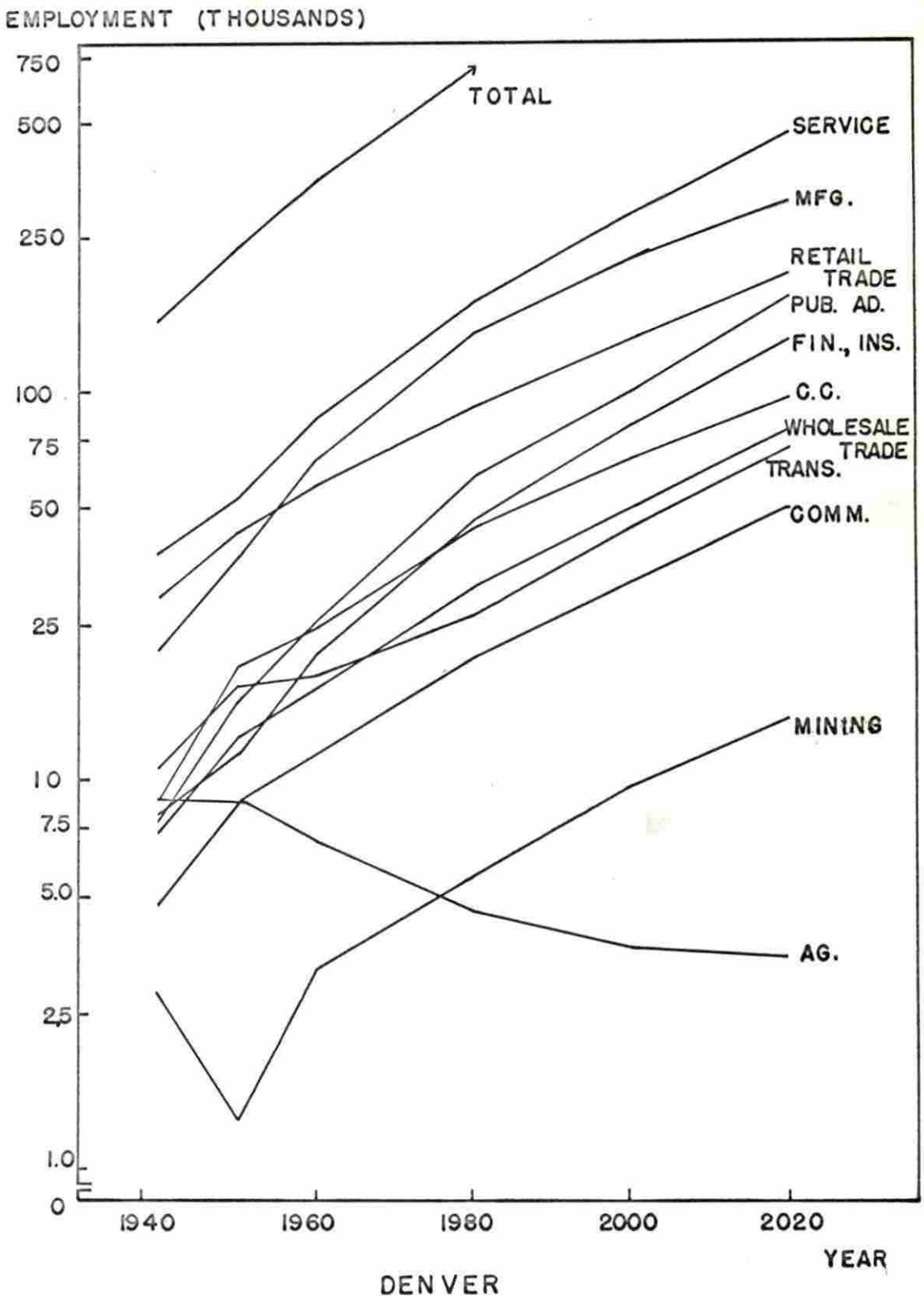
$$e_{it+N} = e_{it}\,(1 + A + B + C)^{\frac{N}{10}}$$

Figure 24. Twelve-sector employment projections, Kansas City SMSA, 1940–2020.


EMPLOYMENT (THOUSANDS)
500
250
100
75
50
25
10
7.5
5.0
2.5
1.0
.75
0
1940
1960
1980
2000
2020
YEAR
TOTAL
SERVICE
MFG.
RETAIL TRADE
PUB. AD.
FIN. & INS.
C.C.
TRANS.
WHOLESALE TRADE
COMM.
AG.
MINING

KANSAS CITY

Figure 25. Twelve-sector employment projections, Denver SMSA, 1940-2020.


EMPLOYMENT (THOUSANDS)
750
500
250
100
75
50
25
10
7.5
5.0
2.5
1.0
0
TOTAL
SERVICE
MFG.
RETAIL TRADE
PUB. AD.
FIN., INS.
C.C.
WHOLESALE TRADE
TRANS.
COMM.
MINING
AG.
1940
1960
1980
2000
2020
YEAR
DENVER

where A, B and C represent the national growth, industrial mix, and regional share coefficients, respectively. The "A" and "B" coefficients are always given for the "nation" whether the basis is, in fact, the United States, or a region such as the Missouri Basin. This leaves the "C" coefficient which must be projected for each region or sub-region under consideration. This model postulates that each coefficient maintains the same value over the entire projection period.

The "A" or national growth coefficient is shown in Figure 26. For this component of growth, the aggregate growth rate for the Basin is expected to lag behind that for the U.S. in the period up to 1990, but beyond that point it is expected to exceed the U.S. rate.

The "B" component of shift analysis or industrial-mix coefficient for four industrial sectors is given in Figure 27 for the U.S., which has been the primary basis for the "nation" for this study. The four employment categories tend to move towards the overall U.S. growth rates in spite of the wide fluctuations experienced during the historical period. This supports the suggestion that sound economic forecasting is characterized by a tendency to follow the mean or aggregate growth pattern. The U.S. equilibrium differential for sector (2), manufacturing, is -0.10. The growth rate for Sector 4 exceeds the respective aggregate growth rates by approximately +0.02, while sectors 3 and 1 are tending towards equilibrium differentials of -0.01 and -0.22, respectively. Since the aggregate growth rates for the U.S. is 0.18 in 2020, the differential of -0.22 for sector (1), agriculture, denotes a net negative growth rate for that sector.

Figure 26. Shift analysis projection, national growth coefficient ("A" effect).

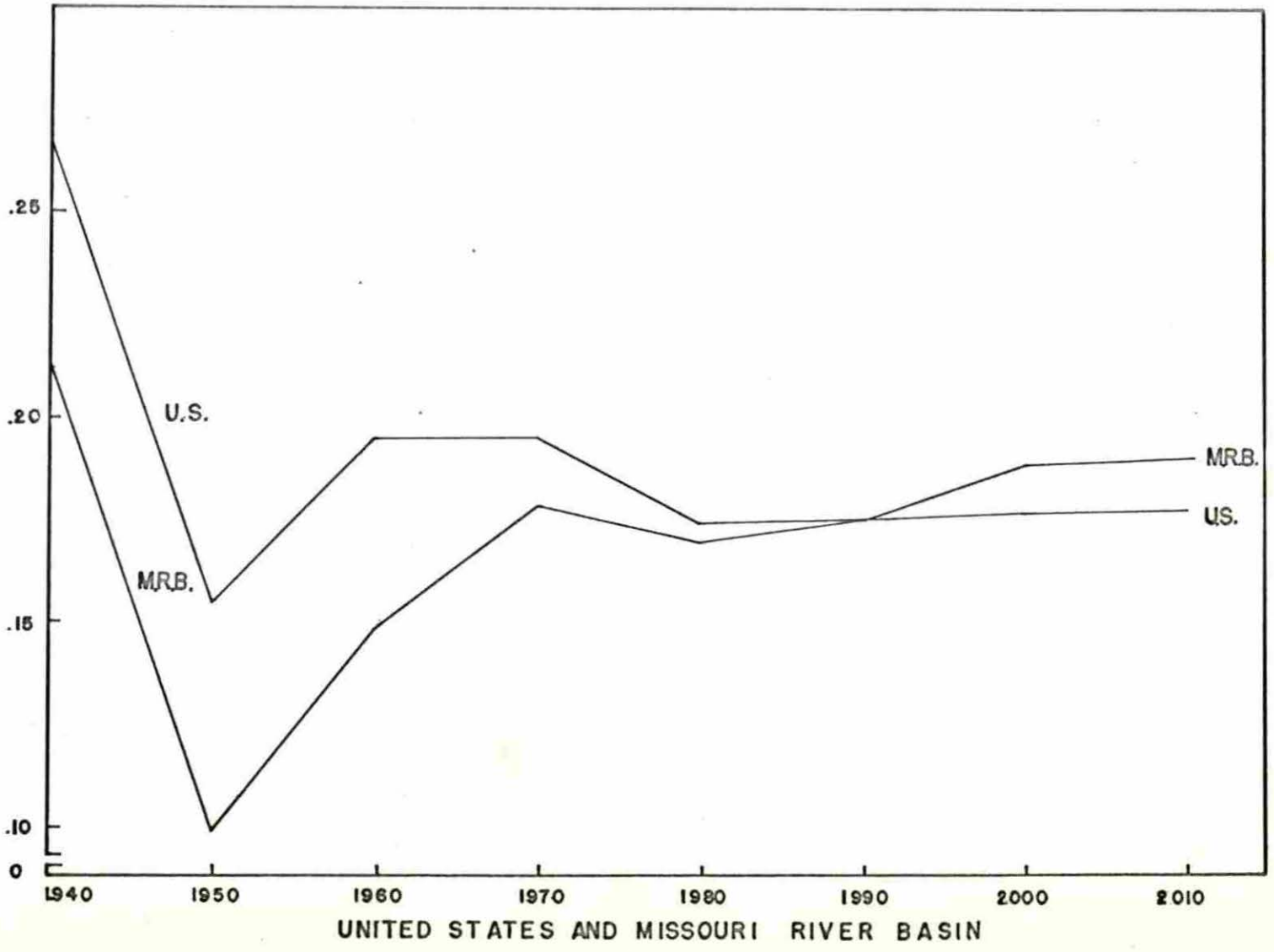
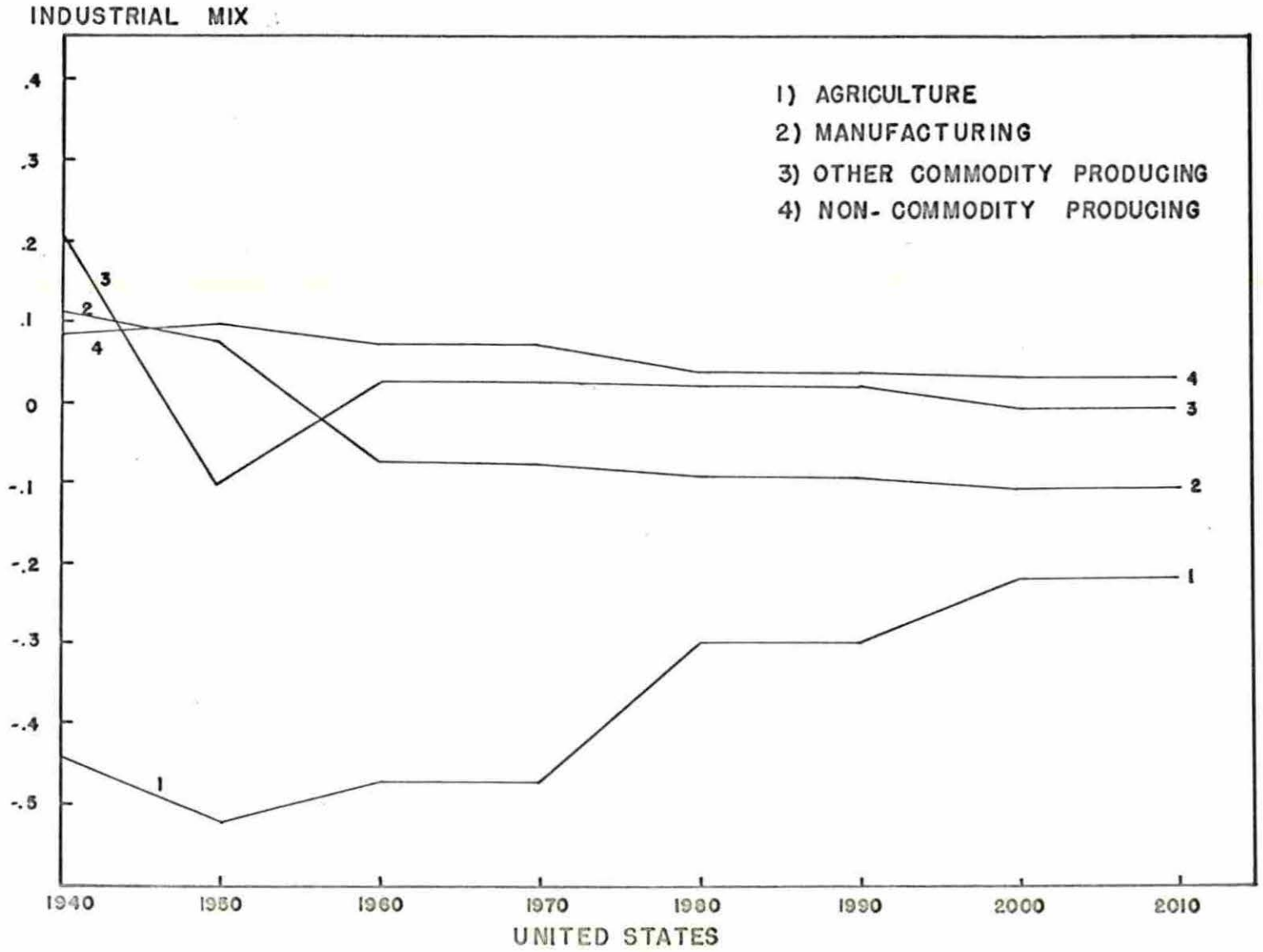
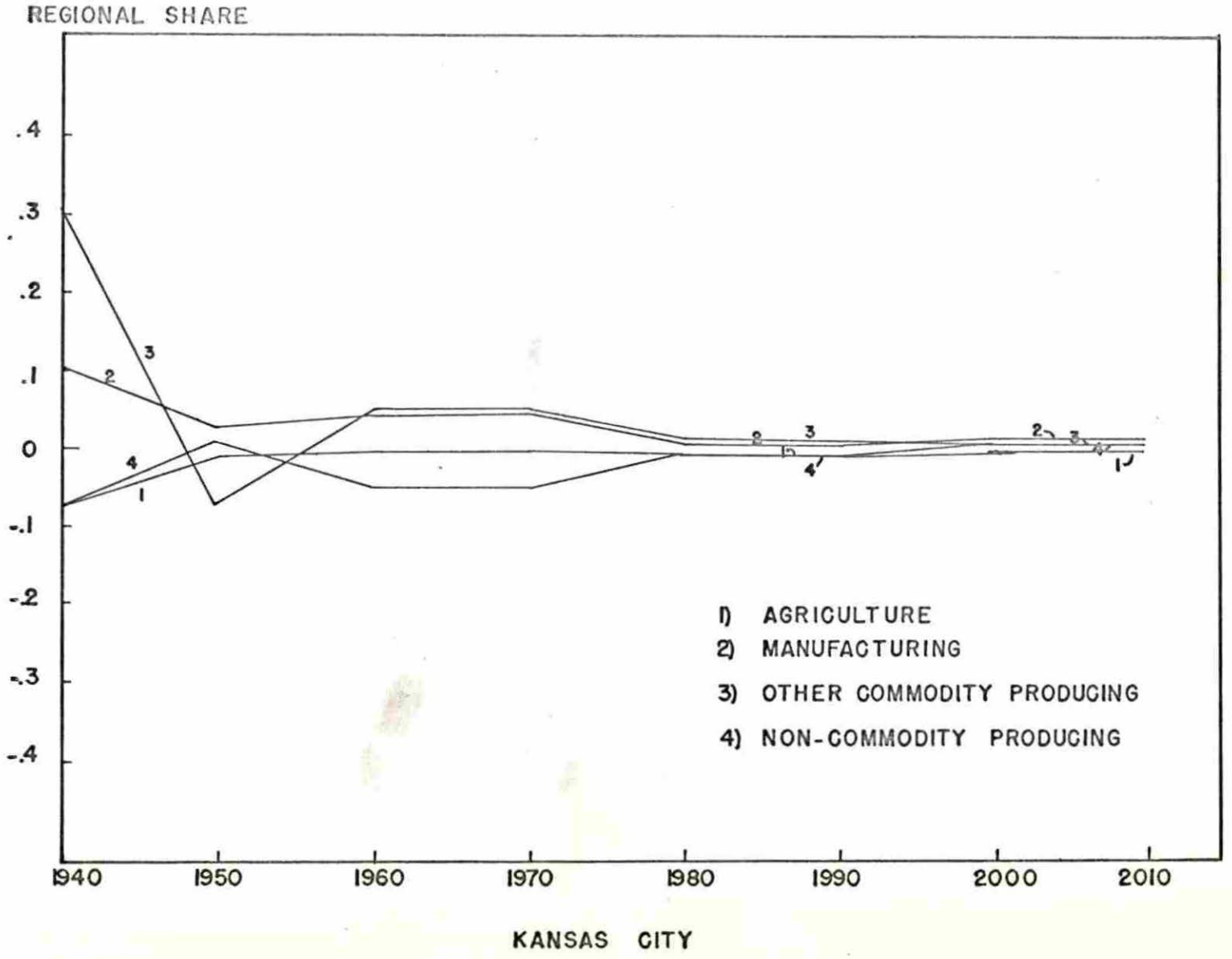

AGGREGATE GROWTH (A)
.25
.20
.15
.10
0
U.S.
M.R.B.
M.R.B.
U.S.
1940
1950
1960
1970
1980
1990
2000
2010
UNITED STATES AND MISSOURI RIVER BASIN

Figure 27. Shift analysis projection, industry mix coefficient ("B" effect).


INDUSTRIAL MIX
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON- COMMODITY PRODUCING
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
-.5
1940
1950
1960
1970
1980
1990
2000
2010
UNITED STATES

The third component of shift analysis, the "C" or regional-share coefficient is illustrated by Figure 28 for Kansas City and Appendix F for the other SMSAs, based on the U.S. as the "nation". Once again, the industry groups tend towards an equilibrium growth rate that approaches the aggregate figure, or at least the Basin or U.S. growth rate for the particular industry. Although most industry groups exhibited wide variance in the "regional-share" coefficients during the historical period, the post-1980 trends are relatively stable. Industry growth rates for some regions persistently differ from the corresponding aggregate rates: above in the case of region 5, and below in the case of region 6. The noncommodity growth rate for region 7 exhibited significant variation from the general growth patterns during the period from 1970 to 1990. For the SMSAs, the industry growth rates vary considerably from the corresponding U.S. rates in nearly every case. Kansas City demonstrated the greatest stability with all four industry growth rates converging on the aggregate growth rate. By differing amounts, each of the four industry growth rates for Denver and Billings tends towards an equilibrium growth above the aggregate rate, i.e., each with a positive equilibrium differential. For Omaha, Lincoln and Sioux Falls, the growth rates for sectors 1 and 2 tend towards the aggregate rates (i.e., zero differential), while in each case sector 3 tended towards a positive equilibrium differential, and sector 4 towards a negative equilibrium differential. Sioux City and Topeka's growth rates for sectors 1, 2 and 4 tend towards a negative equilibrium differential, while the growth rate for sector 3 (other commodity-producing) indicated a slightly positive equilibrium differential. Springfield on the other hand shows a tendency for sectors 2, 3 and 4 towards a positive differential, and with sector 1 tending to a slightly negative equilibrium differential. The growth rates for the four St. Joseph sectors all tend towards a

Figure 28. Shift analysis projection, regional-share coefficient ("C" effect) for Kansas City SMSA, 1940-1960.


REGIONAL SHARE
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
1940
1950
1960
1970
1980
1990
2000
2010
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON-COMMODITY PRODUCING
KANSAS CITY

highly negative equilibrium differential.

Shift analysis is best used in an evaluative framework for historical data or independently obtained estimates of future regional economic activity. Shift analysis is not meant to be a substitute for more rigorous and detailed economic or engineering studies of particular industries. The need for feasibility studies and the factor analysis approach to industrial location and investment decision-making will always exist, however helpful the kinds of development planning tools presented here may be.

Projections based on limited historical information, by a simple extrapolation of a rather short term linear trend, or even a longer term nonlinear projection, can yield fantastically high estimates for new and rapidly growing industries, especially in the more isolated geographic areas. Another limitation, "nonexisting but potentially feasible industrial developments may be extremely difficult to anticipate because of the lack of historical data (49, p. 200)". Shift analysis can set the stage for a thorough study of manpower needs and availability, especially in light of ever-changing technology, on both a national and regional basis.

VIII. SUMMARY OF ECONOMIC CHANGE IN THE MISSOURI BASIN

Viewing the Basin as a whole, its economy is characterized by low per capita income levels, net out-migration of population, and generally a declining position relative to the nation. However, quite a different picture is seen when the Region's urban areas are examined independently.

The Region's metropolitan areas show employment growth equal to or greater than that of the nation, and in some cases greater than the national urban growth. Hence, much of the future growth of the Region will result from that of its metropolitan areas. Figure 29 summarizes the relative growth rates of the Region's spatial components. The wide diversity of growth is explained, at least in part, by the corresponding octant chart, Figure 30. The more rapidly growing cities appear in more desirable octants, whereas those experiencing decline are in less desirable octants.

The summary matrix for employment growth, Figure 31, demonstrates the percentage increase in employment for 1960 over 1950 (1950=100) for all sectors which meet three growth criteria: (1) growth rate of an individual industry for a particular area is greater than the national growth rate for that industry, (2) growth rate of an individual industry for a particular area is greater than the national growth rate for all industries, and (3) growth rate of an individual industry for a particular area is greater than the average growth rate for that area. Conditions for which certain industries in each area show relatively higher growth rates than a standard which meets the above criteria are overwhelmingly in a dynamic octant position. The shaded sectors of Figure 31 indicate a favorable combination of industry-mix and regional-share and appear in octants 1 or 2 of the area's octant chart.

Figure 29. Employment growth summary for U.S., Missouri Basin, and fourteen SMSA's, 1950-1960.

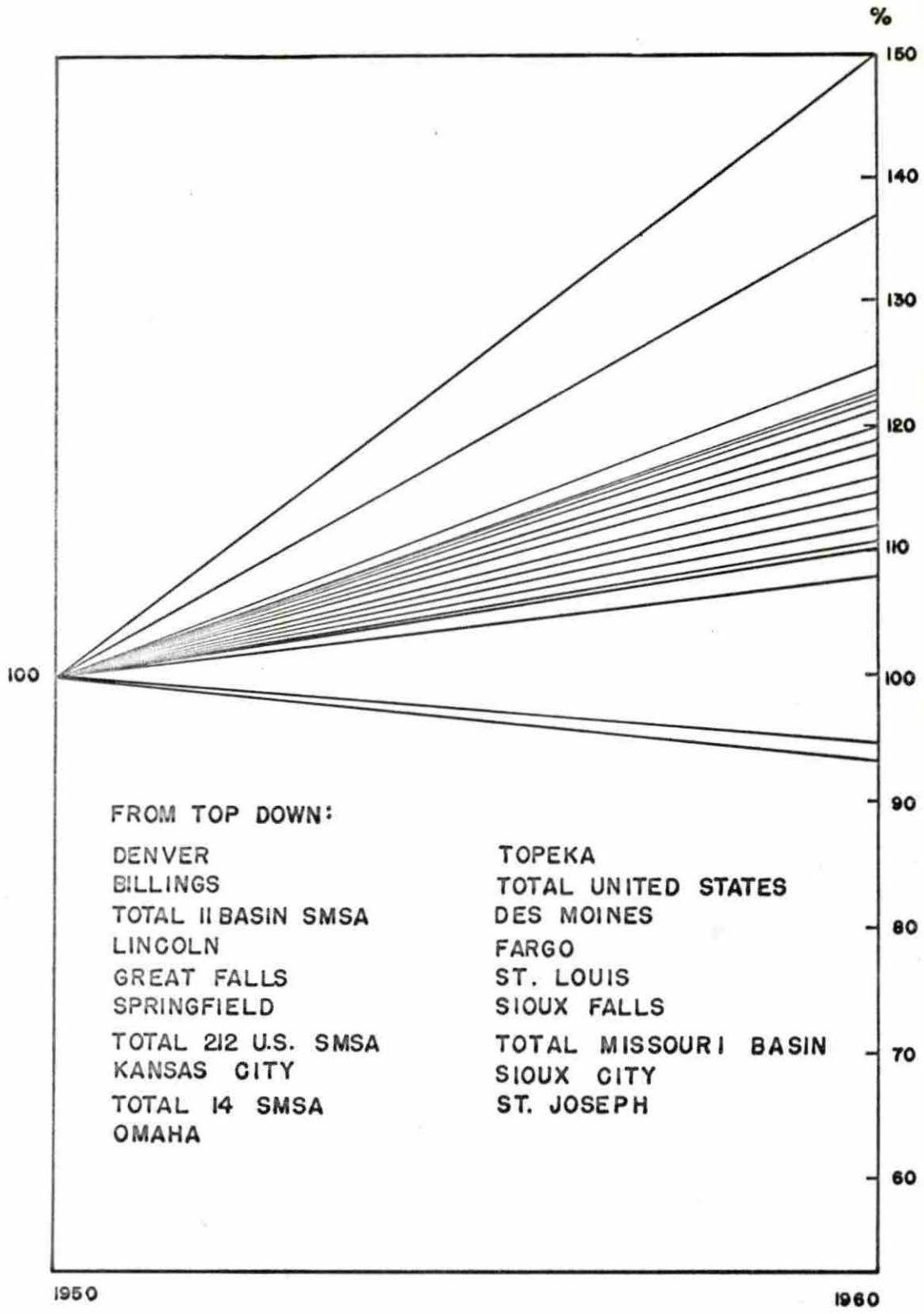

%
150
140
130
120
110
100
90
80
70
60
100
1950
1960
FROM TOP DOWN:
DENVER
BILLINGS
TOTAL II BASIN SMSA
LINCOLN
GREAT FALLS
SPRINGFIELD
TOTAL 212 U.S. SMSA
KANSAS CITY
TOTAL 14 SMSA
OMAHA
TOPEKA
TOTAL UNITED STATES
DES MOINES
FARGO
ST. LOUIS
SIOUX FALLS
TOTAL MISSOURI BASIN
SIOUX CITY
ST. JOSEPH

Figure 30. Octant chart for all Basin SMSAs.

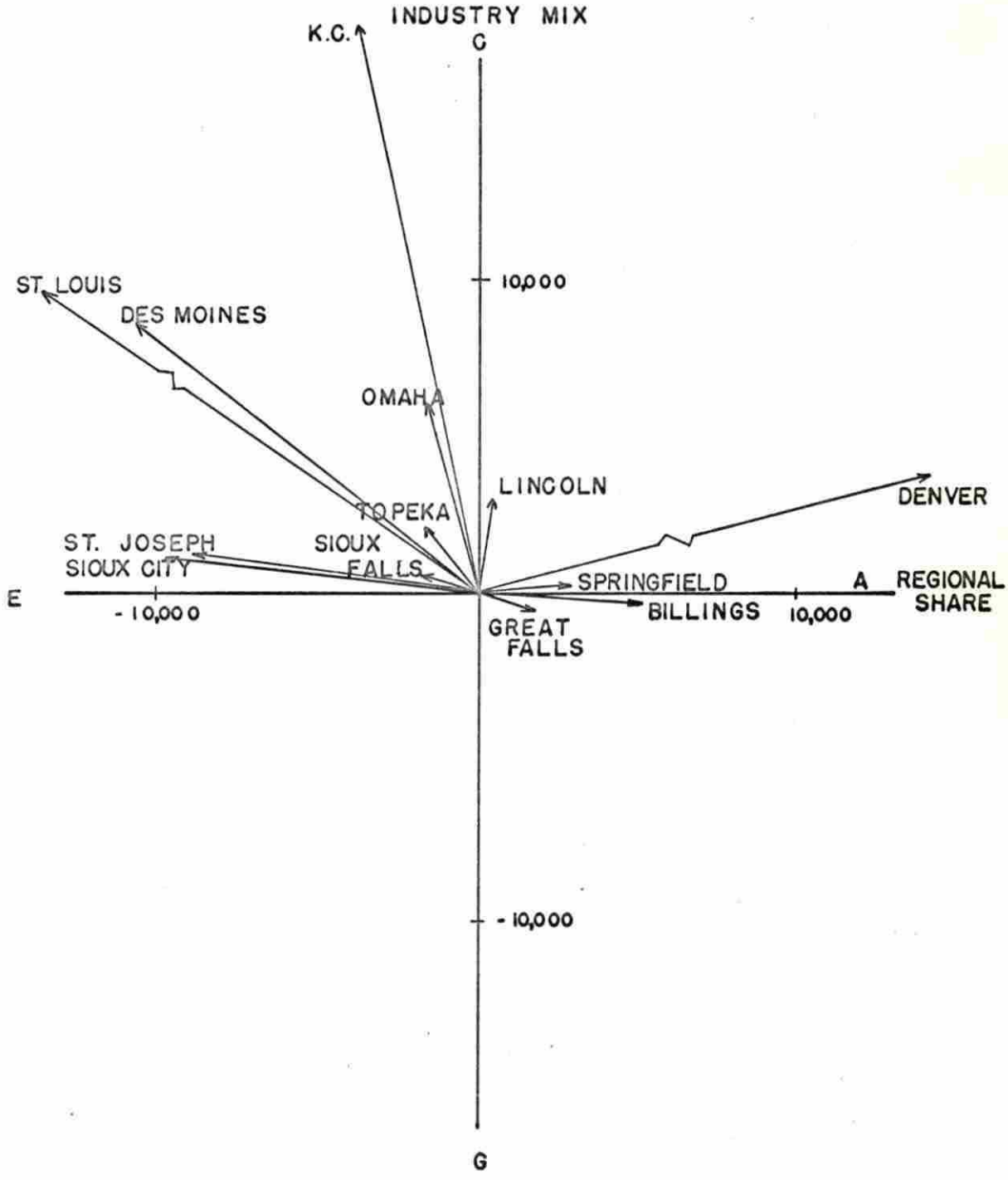
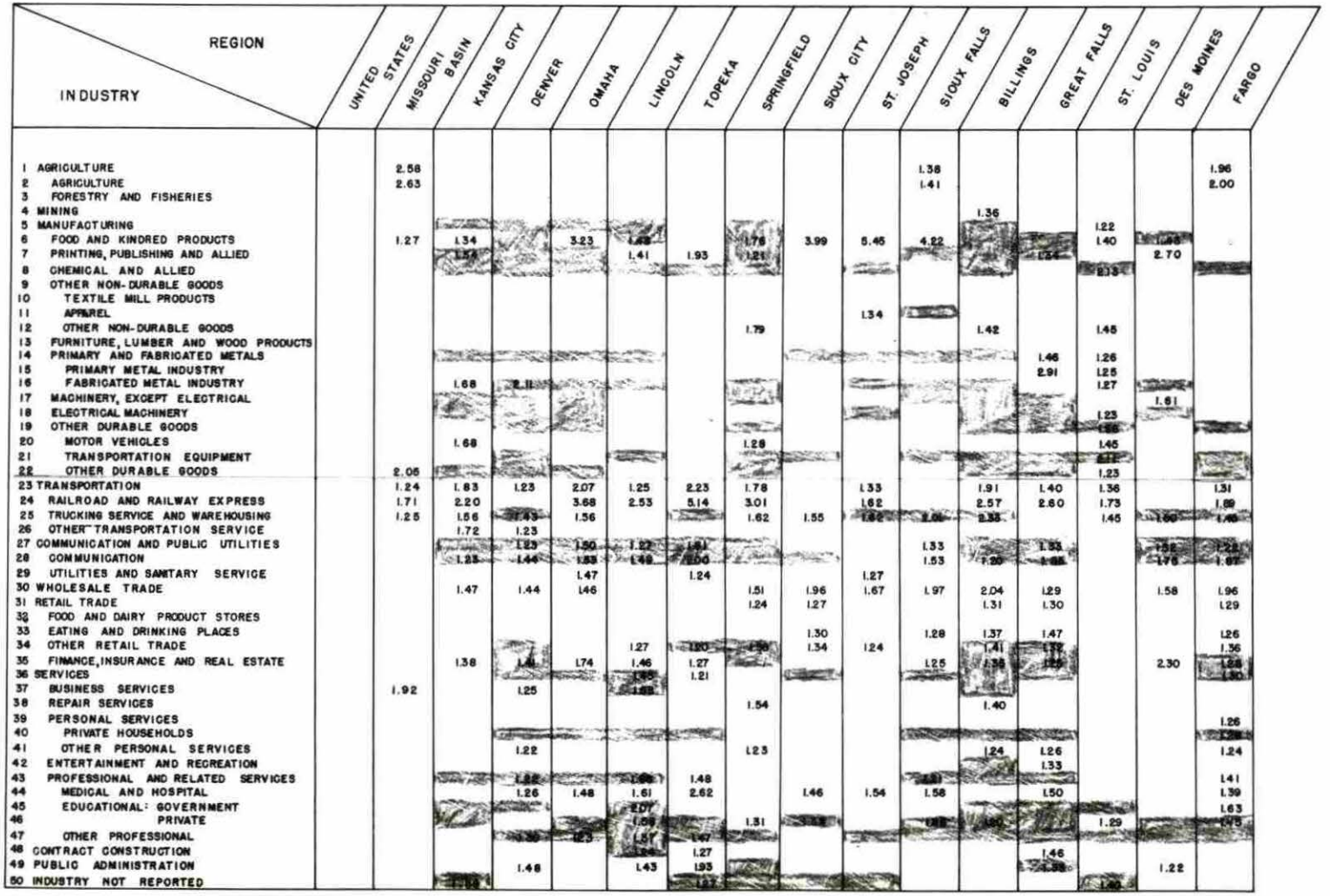

INDUSTRY MIX
K.C.
C
10,000
ST. LOUIS
DES MOINES
OMAHA
LINCOLN
DENVER
TOPEKA
ST. JOSEPH
SIOUX CITY
SIOUX FALLS
SPRINGFIELD
A
REGIONAL SHARE
E
-10,000
BILLINGS
10,000
GREAT FALLS
-10,000
G

Figure 31. Summary Matrix: percent change for 50 sectors, 1950–1960, U.S., Missouri Basin and 14 SMSAs, which meet three-fold growth criteria. Shaded area represents Octant positions 1 and 2.

INDUSTRY \ REGION	UNITED STATES	MISSOURI BASIN	KANSAS CITY	DENVER	OMAHA	LINCOLN	TOPEKA	SPRINGFIELD	SIOUX CITY	ST. JOSEPH	SIOUX FALLS	BILLINGS	GREAT FALLS	ST. LOUIS	DES MOINES	FARGO
AVERAGE	114.54	107.70	119.87	150.79	117.50	122.80	115.89	121.63	94.68	93.77	110.32	137.70	122.50	110.58	113.34	112.21
1 AGRICULTURE	61.84															
2 AGRICULTURE	61.61															
3 FORESTRY AND FISHERIES	74.55				143.59	189.89			187.50			166.67	131.25		560.00	
4 MINING	70.25	114.75		248.00		129.63		177.50			140.38	517.95				
5 MANUFACTURING	119.25	139.76	123.34	180.55	132.13	130.10		182.80				165.84				
6 FOOD AND KINDRED PRODUCTS	123.03					218.06		146.24				149.92	156.58		138.71	
7 PRINTING, PUBLISHING AND ALLIED	132.25	140.62	155.98	155.90	135.62			135.74			148.06	154.18	193.44			
8 CHEMICAL AND ALLIED	133.65	154.14	138.39	159.89	153.75	402.88	582.16	211.93		141.58		202.56		116.30		480.00
9 OTHER NON-DURABLES	97.87					139.53	150.05	308.67			214.46	164.63	152.63			
10 TEXTILE MILL PRODUCTS	77.72															
11 APPAREL	108.89	130.85							119.88		200.00	1733.33	150.00			
12 OTHER NON-DURABLES	105.93					144.74	155.61	98.55			253.57	159.09	160.00		146.94	
13 FURNITURE, LUMBER AND WOOD PRODUCTS	89.23				122.04											
14 PRIMARY AND FABRICATED METALS	123.84		181.24	427.18	137.71	175.61			149.97	150.53	151.16	189.25				
15 PRIMARY METAL INDUSTRY	103.37					124.00			132.62	116.67						
16 FABRICATED METAL INDUSTRY	152.47		295.46	772.17	190.75	203.21		171.89		169.83	162.93	195.24			166.09	
17 MACHINERY, EXCEPT ELECTRICAL	126.09		130.66	171.54	163.08			440.70			146.50	225.86	220.41			
18 ELECTRICAL MACHINERY	172.69	193.43	256.52	405.98	1047.56					174.74		414.29	544.64		221.35	
19 OTHER DURABLE GOODS	131.72			193.12	132.22			181.21				250.94	230.77	151.65		185.62
20 MOTOR VEHICLES	98.26							224.50	130.58				320.00	124.69		122.22
21 TRANSPORTATION EQUIPMENT	200.84	369.80		1884.69		572.58		204.35	1450.00		566.67	1200.00	1700.00	259.77		2284.67
22 OTHER DURABLE GOODS	127.13	151.71	144.73	163.75	141.70			132.56				246.98	204.17			166.12
23 TRANSPORTATION	92.75															
24 RAILROAD AND RAILWAY EXPRESS	67.65															
25 TRUCKING SERVICE AND WAREHOUSING	130.56			153.30			164.53			140.21	150.99	144.95			133.09	142.30
26 OTHER TRANSPORTATION	102.82															
27 COMMUNICATION AND PUBLIC UTILITIES	114.86	118.83			131.49	130.23	154.45	143.75				187.87	152.58		137.53	144.07
28 COMMUNICATIONS	115.36	119.28	130.39		136.78	149.74	192.84	138.56	140.05			204.07	295.83		119.64	164.09
29 UTILITIES AND SANITARY SERVICE	114.42	118.41			124.50		119.46	146.79				181.20			121.19	
30 WHOLESALE TRADE	112.62															
31 RETAIL TRADE	82.14															
32 FOOD AND DAIRY PRODUCT STORES	101.43												127.47			123.30
33 EATING AND DRINKING PLACES	106.52															
34 OTHER RETAIL TRADE	117.42						118.23						126.64			
35 FINANCE, INSURANCE AND REAL ESTATE	140.37	143.04		177.86				146.05				222.22	164.10			167.25
36 SERVICES	134.26			187.65	136.59	150.41					142.87	174.16	147.46			481.74
37 BUSINESS SERVICES	212.62					259.29										
38 REPAIR SERVICES	89.44															
39 PERSONAL SERVICES	111.36					140.50					142.90	163.73	165.91			149.36
40 PRIVATE HOUSEHOLDS	119.72	141.28		158.34	121.66	202.72	120.60				197.89	302.36	345.50			191.65
41 OTHER PERSONAL SERVICES	104.17															121.67
42 ENTERTAINMENT AND RECREATION	101.91											121.30				
43 PROFESSIONAL AND RELATED SERVICES	157.00		164.11	181.78	171.09	156.28					172.61	207.76	160.35			
44 MEDICAL AND HOSPITALS	170.10															
45 EDUCATIONAL: GOVERNMENT	164.19		198.52	217.32		165.07						217.21	184.12	181.85		
46 PRIVATE	160.61				177.29	182.54	162.35		175.00	173.50	192.34	200.63	164.57		174.09	280.23
47 OTHER PROFESSIONAL	142.22		239.29	308.76	258.72	264.07	276.24	273.29	195.32	238.15	268.05	380.89	248.88	218.39	236.02	286.96
48 CONTRACT CONSTRUCTION	110.35				123.77	128.79	123.18	122.20					142.62		123.77	119.41
49 PUBLIC ADMINISTRATION	127.34	128.23	127.86	166.19				193.06					185.89			
50 INDUSTRY NOT REPORTED	309.26		406.61	397.07			514.65	348.90	386.75	341.48				329.00		

The summary matrix for basic employment, Figure 32, includes those sectors which have been shown to have a location quotient of greater than 1.20, suggesting significant export-related or basic employment for that sector. This "basic" employment emerges the critical factor of this analysis. The most important aspect of basic employment is found in the commodity-producing sectors, i.e., the primary and secondary categories. On the fifty-sector basis these would include sectors 1 through 22. Again, those sectors with favorable octant positions, octants 1 and 2, are indicated by the shaded areas. This is critical inasmuch as one will readily note that the pertinent basic activity is not supported by a favorable regional-share and industry-mix position. The teritary and quaternary sectors are not considered significant here, since "service" employment growth is dependent on primary and secondary sectors where "basic" employment is the critical factor. Basic employment growth gives rise to growth in nonbasic or service industries through the dynamics of the multiplier effect.

Figure 32. Summary Matrix: location quotients for sectors with significant basic employment. Shaded area represents octant pocitions I and 2.


REGION
INDUSTRY
UNITED STATES
MISSOURI BASIN
KANSAS CITY
DENVER
OMAHA
LINCOLN
TOPEKA
SPRINGFIELD
SIOUX CITY
ST. JOSEPH
SIOUX FALLS
BILLINGS
GREAT FALLS
ST. LOUIS
DES MOINES
FARGO
1 AGRICULTURE
2 AGRICULTURE
3 FORESTRY AND FISHERIES
4 MINING
5 MANUFACTURING
6 FOOD AND KINDRED PRODUCTS
7 PRINTING, PUBLISHING AND ALLIED
8 CHEMICAL AND ALLIED
9 OTHER NON-DURABLE GOODS
10 TEXTILE MILL PRODUCTS
11 APPAREL
12 OTHER NON-DURABLE GOODS
13 FURNITURE, LUMBER AND WOOD PRODUCTS
14 PRIMARY AND FABRICATED METALS
15 PRIMARY METAL INDUSTRY
16 FABRICATED METAL INDUSTRY
17 MACHINERY, EXCEPT ELECTRICAL
18 ELECTRICAL MACHINERY
19 OTHER DURABLE GOODS
20 MOTOR VEHICLES
21 TRANSPORTATION EQUIPMENT
22 OTHER DURABLE GOODS
23 TRANSPORTATION
24 RAILROAD AND RAILWAY EXPRESS
25 TRUCKING SERVICE AND WAREHOUSING
26 OTHER TRANSPORTATION SERVICE
27 COMMUNICATION AND PUBLIC UTILITIES
28 COMMUNICATION
29 UTILITIES AND SANITARY SERVICE
30 WHOLESALE TRADE
31 RETAIL TRADE
32 FOOD AND DAIRY PRODUCT STORES
33 EATING AND DRINKING PLACES
34 OTHER RETAIL TRADE
35 FINANCE, INSURANCE AND REAL ESTATE
36 SERVICES
37 BUSINESS SERVICES
38 REPAIR SERVICES
39 PERSONAL SERVICES
40 PRIVATE HOUSEHOLDS
41 OTHER PERSONAL SERVICES
42 ENTERTAINMENT AND RECREATION
43 PROFESSIONAL AND RELATED SERVICES
44 MEDICAL AND HOSPITAL
45 EDUCATIONAL: GOVERNMENT
46 PRIVATE
47 OTHER PROFESSIONAL
48 CONTRACT CONSTRUCTION
49 PUBLIC ADMINISTRATION
50 INDUSTRY NOT REPORTED

IX. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

This study has been primarily concerned with developing one aspect of an information system at the regional level for purposes of public and private industrial development planning. Such an information system provides understanding of economic trends within a particular region as well as estimates of future levels of economic activity, hence a basis for public and private investment decisions.

The study focused attention on employment change in Metropolitan areas, the "growth centers" of the Missouri River Basin, as the primary indicator of economic growth. The data for the historical time period 1950-1960 were primarily from secondary sources, including the U.S. Bureau of Census (74-93).

With industrial growth nationally as the standard of comparison, employment change was analyzed for the total Basin, eight hydrological sub-regions, and fourteen SMSAs. Employment data were selected on a two-digit SIC basis, which yielded thirty-nine prime industrial sectors. These were in turn aggregated into twelve major one-digit sectors. The larger aggregation provided basis for the greatest portion of the analysis, however, the detail was used as illustrative material in several selected cases.

One analytical tool was the shift-share model, which was augmented by use of economic base analysis and a series of economic projections. For the most part, empirical results are expressed in terms of the first objective -- to find those areas and sectors of primary economic growth for the historical and projected periods.

As was suggested by the summary matrix for employment growth (Figure 31), over eighty percent of those categories experiencing growth meeting the three-fold criteria appeared in octants 1 or 2 of the shift-share analysis. Even a higher

percentage would hold if only primary and secondary activities were considered. However, less than 30 percent of those activities which could be regarded as basic appeared in the positive octants. This would suggest that the primary growth has been in non-basic activities, which further suggests, that attention should be given those activities which show growth potential and provide basic employment for the area. Currently, basic activity is largely in declining industries. It should be kept in mind that where high growth appears in tertiary and quaternary activities it is largely due to multiplier dynamics.

While projections are useful for the analysis, those which go beyond 1975 are severely limited. While relative growth can be approximated, estimated absolute levels are highly speculative and really depend to a large extent on the endogenous variables such as public policy and programs, and those exogenous variable which include the state of the national economy and patterns of human behaviour and effect of regional amenities on the specific area.

Information which this (shift-share) approach generates is based on the spatial allocation of national economic growth, assuming that the underlying non-basic relationships were established for the nation as a whole. Such an assumption suggests that projections in the short-run are feasible, but long-run projections will not maintain realistic basic-nonbasic relationships. In actuality, basic-nonbasic ratios were not computed for the nation as a whole, but were estimated for the specific metropolitan areas and regions of the Missouri Basin.

Projections for future levels of economic activity and growth are essential for decision-making in terms of policy which has long-run implications. An ever-present need exists for the refinement of present information systems and the development of imaginative systems which will provide in a measure for the future needs.

Access, both in terms of inputs and markets, has been a key to understanding much of the Region's growth experience. Those areas with an abundance of resources frequently lack the facilities for distribution and conversely. Public investment should focus on problems of access to both inputs and markets to maintain levels of economic growth which have been experienced. Attention should be given to those industries which have shown rapid growth on a national basis, especially where these appear in a favorable octant for a given area; these could be developed to a level where they would support basic employment.

The kinds of information which have been generated by this analysis are needed by public and private managers and planning organizations. At least investment decisions from these quarters need to be made on knowledge of those growing and/or declining sectors of a particular area. It may be well for much of public attention to be focused on matters of access in terms of regional development planning.

Such regional analysis has been traditionally demand oriented for the private manager, through specific studies of industry needs, factor analysis, benefit-cost analysis, economic analysis (which is focused on rates of return for a given investment); on the other hand, public management studies are largely supply-oriented as seen in studies of economic growth indicators, industry feasibility studies, intersectoral accounting systems (input-output), land use studies, and regional planning which may include programs such as transportation systems. The goal of a regional information system would be to provide the kinds of data which could be utilized by either of the traditional approaches, and yet one that would encompass both through fact finding and information distribution.

While traditional economic theory stresses the tendency of firms to move to optimal locations, the explicit recognition of inertia implies that at any one time

manufacturers can recognize degrees of dissatisfaction with their present location without overtly taking steps to change the situation. Mueller contends that ". . . the measurement of prevailing attitudes is essential for a correct current assessment of likely locational trends" (52, p. 19).

The use of employment data in the study of economic growth has particular implications with regard to problems of regional manpower development. Shift-share evaluation tends to emphasize those industrial sectors which anticipate increased manpower needs in the future. This kind of information is of particular value to manpower training and education, as well as to state and local employment agencies.

This analytical technique could readily be expanded to include employment data by occupation which would demonstrate inter-occupational employment shifts, in addition to the inter-sectoral employment shifts, which have occurred within the region. Either of these approaches to understanding an area's employment characteristics could serve to isolate aggregate or structural sources of unemployment within the particular area.

North suggests that ". . . the timing and pace of an economy's development has been determined by : (1) the success of its export sector, and (2) the characteristics of the export industry and the disposition of the income received from the export sector " (56, p. 1). He also suggests that the kinds of factors which appear most important in sustained economic growth subsequent to the export sector might include the natural endowment of the region, the character of the export industry, and changes in technology and transfer costs. The Western world has traditionally placed high value on education investment as a conscious effort for realizing continued economic growth. Regional amenities, though essentially impossible to quantify for

analysis, may be the major determinants of future industrial expansion in the U.S. Graham supports this idea by suggesting that climate is largely responsible for the depopulation of the interior United States and the recent employment and income shifts to the South and Southwest (27).

While the current economic status of a region or metropolitan area can be discussed in terms of its historical development, estimations of its future economic position must be qualified by a consideration of policy or instrument variables. Even with an effective information system available on which investment decisions could be made, expectations about the future development of an area should be designed around alternative plans of action -- dependent upon both public and private leadership, particularly in terms of investment.

Consideration should also be given to the effectiveness of specific programs designed for stimulating economic growth. Allowances for changing demand and technology, as well as for changing relationships and determinants of urban growth, must be kept in mind to maintain flexibility in any growth model.

In spite of the several analytical techniques which have been applied to this study, the resulting body of information is highly descriptive and very definitely lacks the kind of refinement which would tie the results together into a more meaningful understanding of those interdependencies which exist within the Missouri Basin. This could best be accomplished by the use of an inter-industries transactions table for each of the SMSAs and their corresponding regions, in terms of spheres of influence rather than the hydrological regions of the study. An input-output model for the entire basin would be highly complex, yet would provide the kind of synthesis which appears to be lacking in the study. This would be an excellent extension of the research which has gone into this project.

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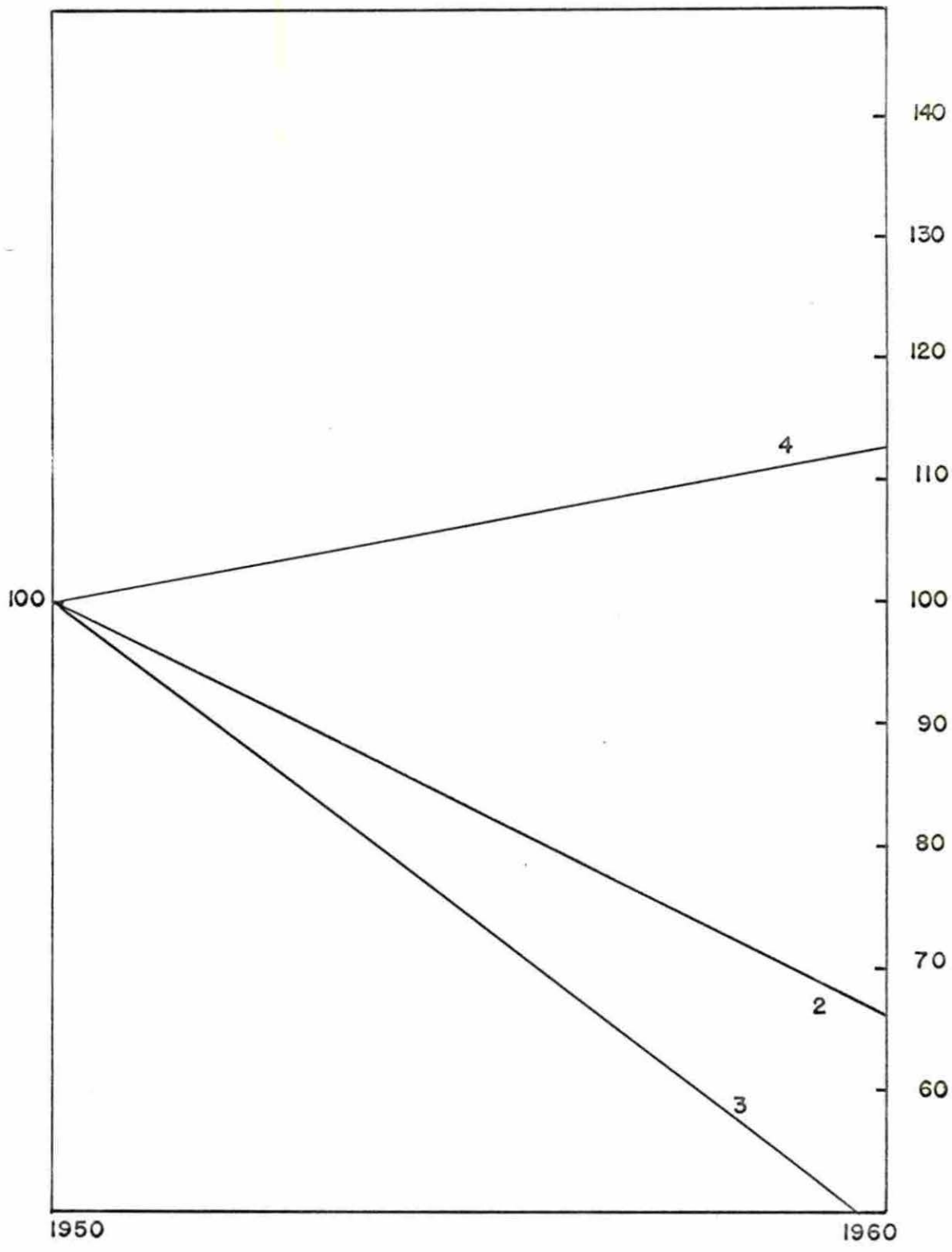
To my wife, Linda, for her patience and understanding, I am indeed grateful.

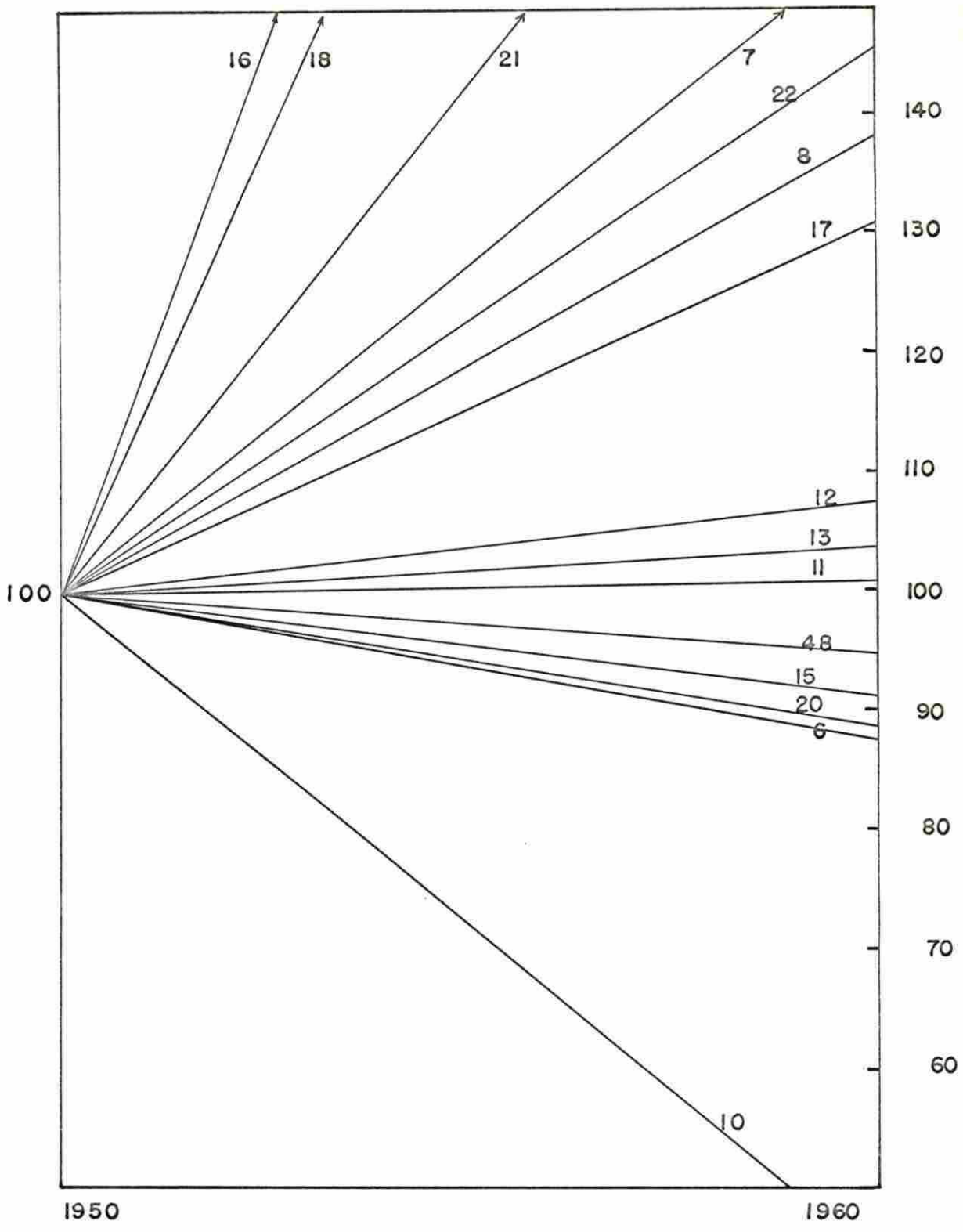
XII. APPENDIX A: GROWTH CHARTS

Figure A.1. Employment growth, 1950–1960, for primary sectors, Kansas City SMSA.



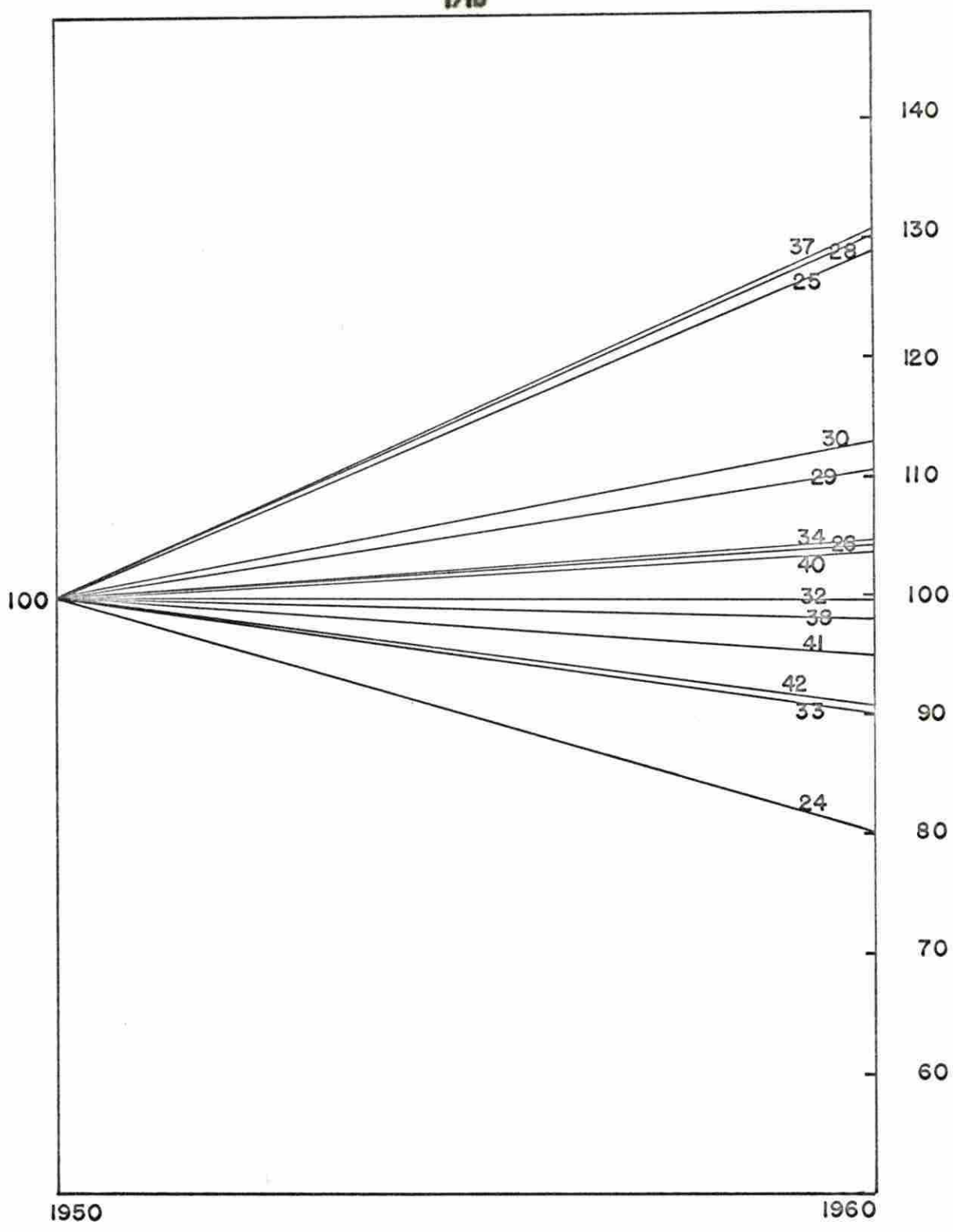
KANSAS CITY PRIMARY SECTORS

Figure A.2. Employment growth, 1950-1960, for secondary sectors, Kansas City SMSA.



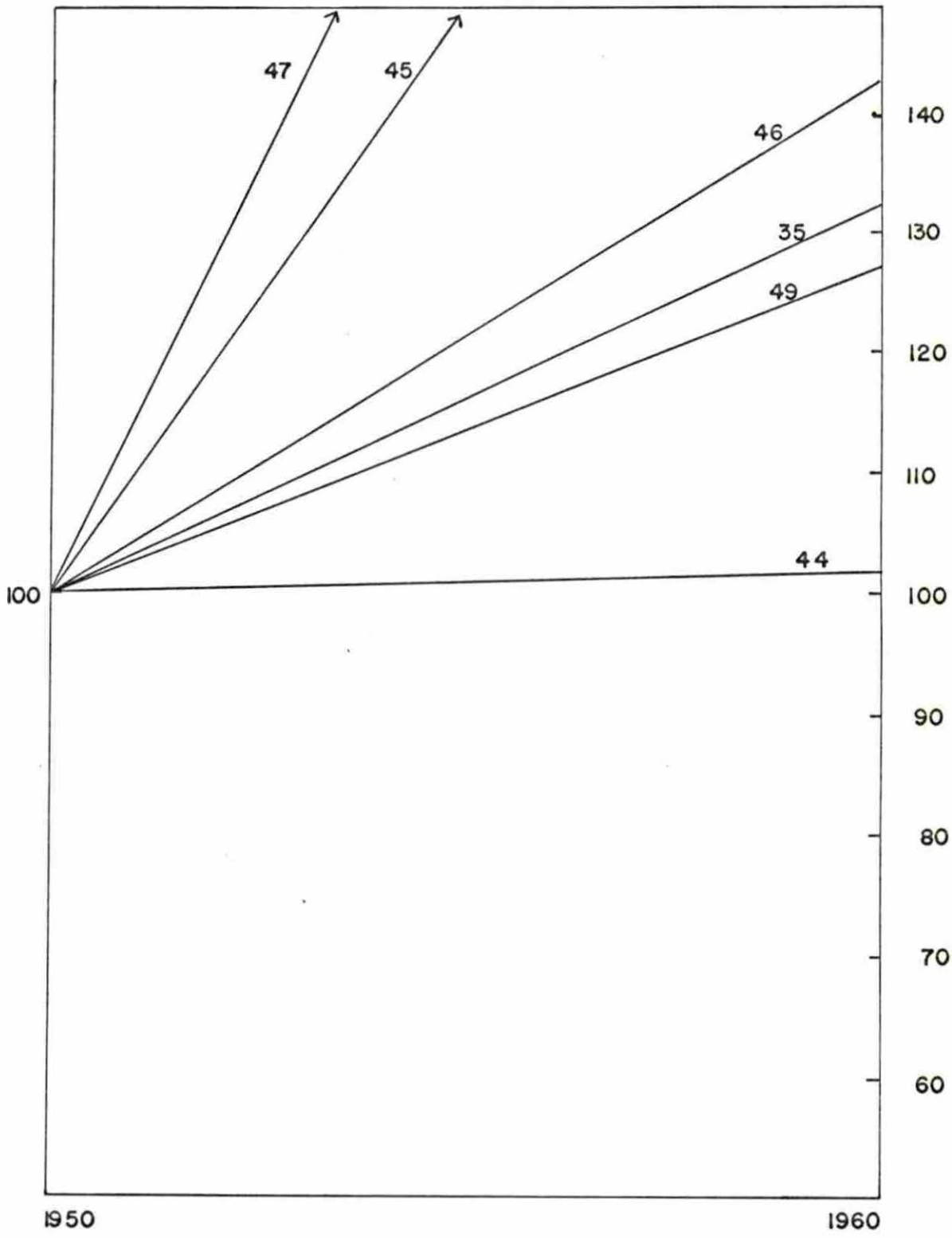
KANSAS CITY — SECONDARY SECTORS

Figure A.3. Employment growth, 1950–1960, for tertiary sectors, Kansas City SMSA.



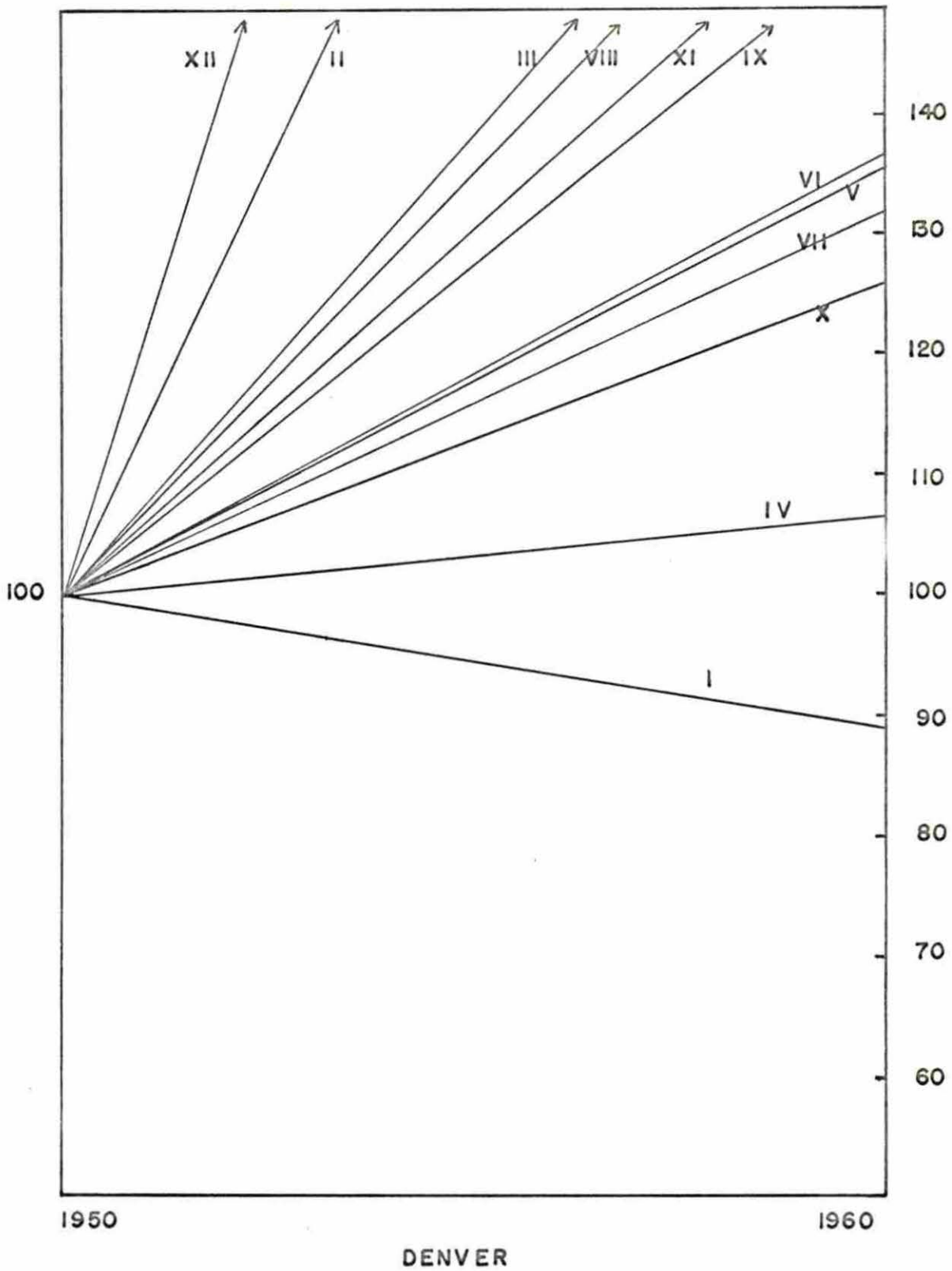
KANSAS CITY — TERTIARY SECTORS

Figure A.4. Employment growth, 1950–1960, for quaternary sectors, Kansas City SMSA.



KANSAS CITY — QUARTERNARY SECTORS

Figure A.5. Employment growth, 1950-1960, for twelve major industrial sectors, Denver SMSA.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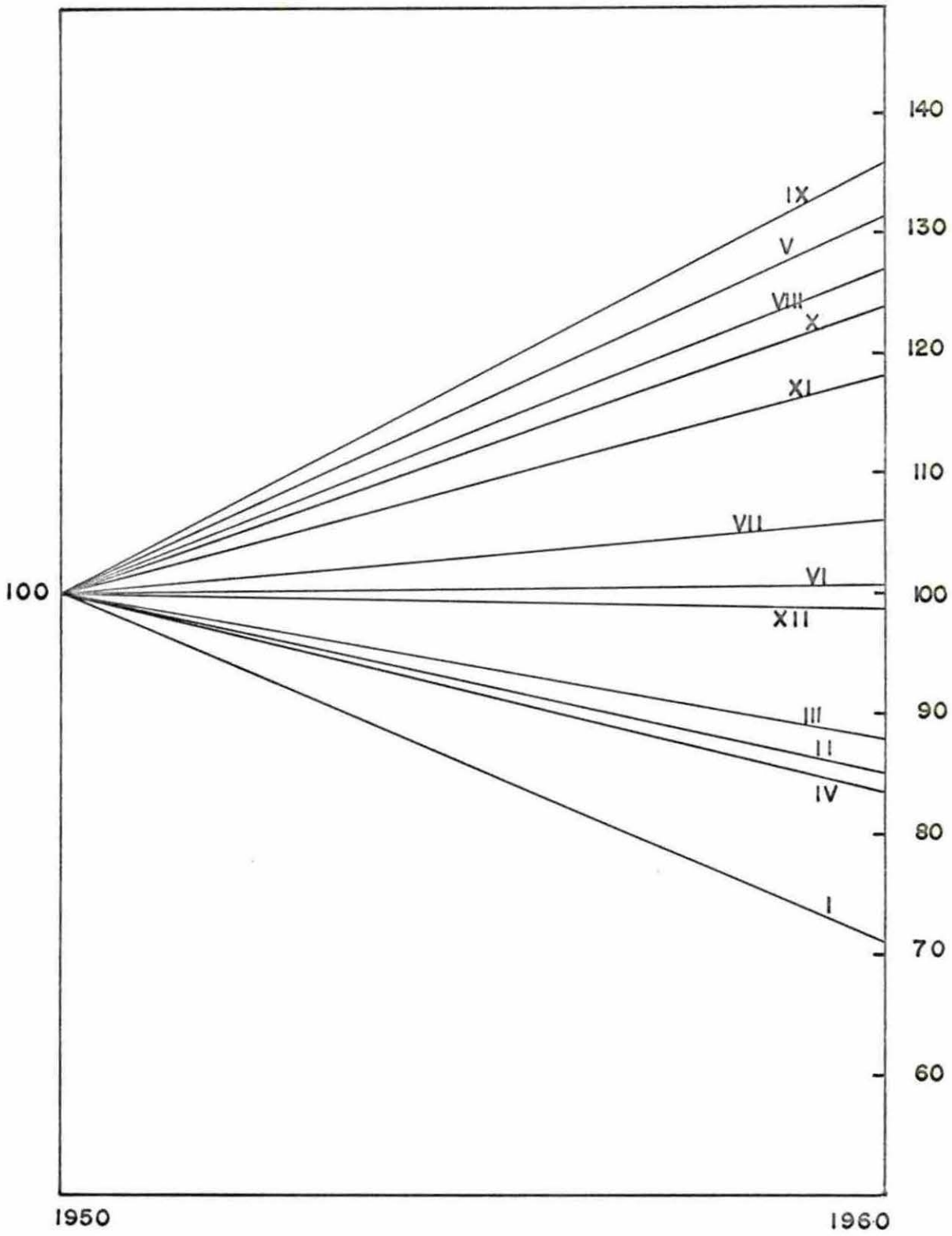
1960

DENVER

Figure A.6. Employment growth, 1950–1960, for twelve major industrial sectors, Omaha SMSA.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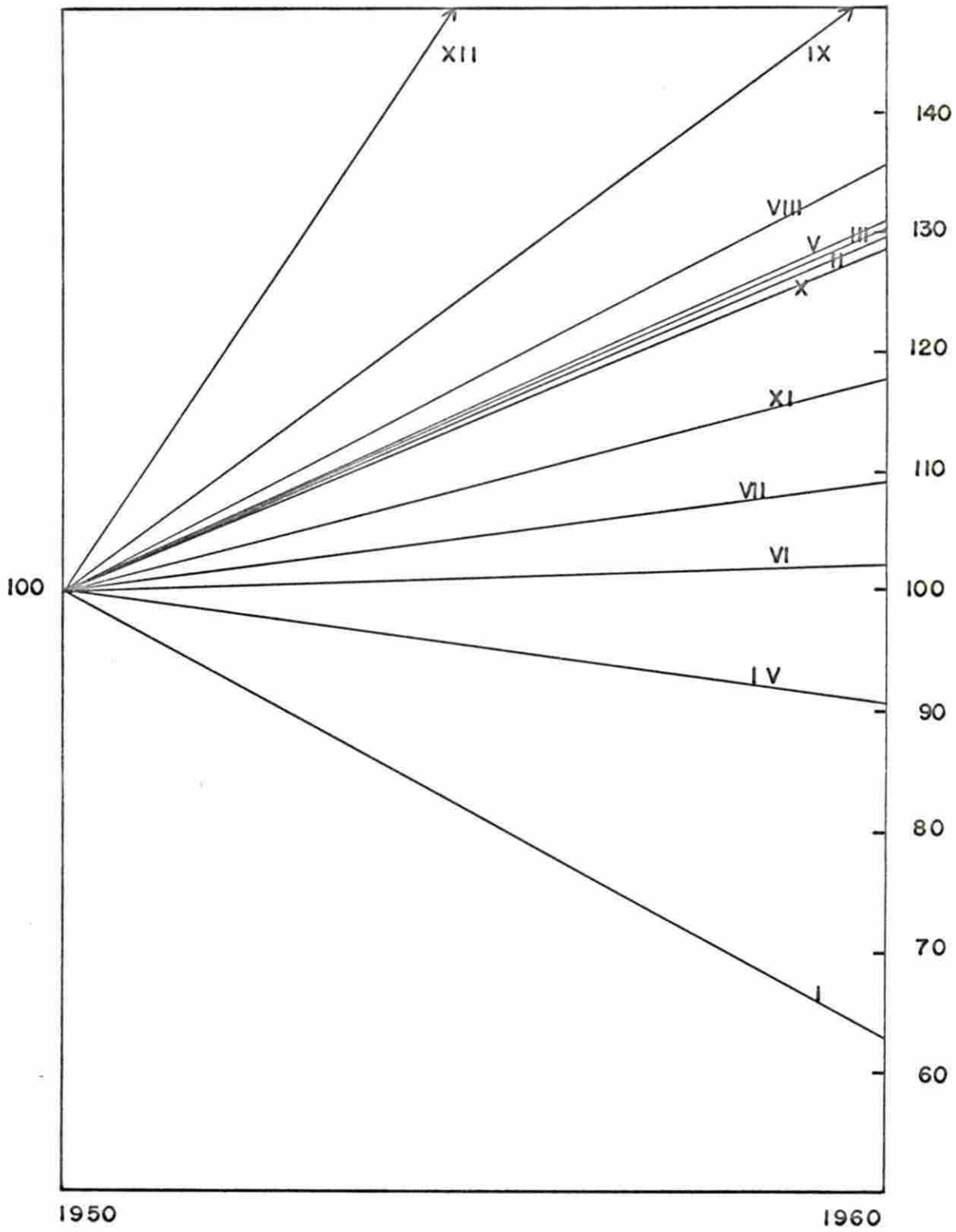
OMAHA

Figure A.6. Employment growth, 1950–1960, for twelve major industrial sectors, Lincoln, SMSA.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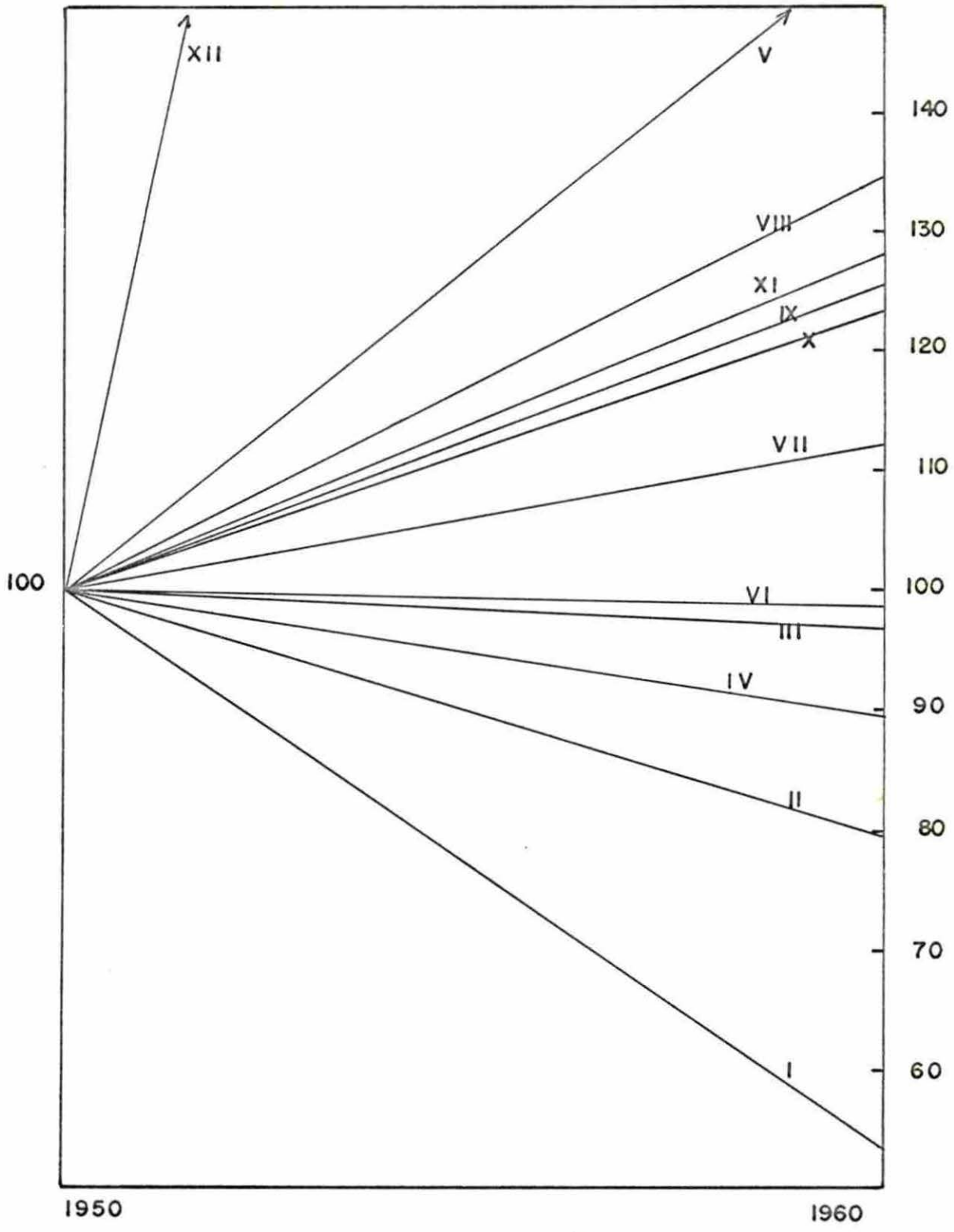
LINCOLN

Figure A.7. Employment growth, 1950-1960, for twelve major industrial sectors, Topeka SMSA.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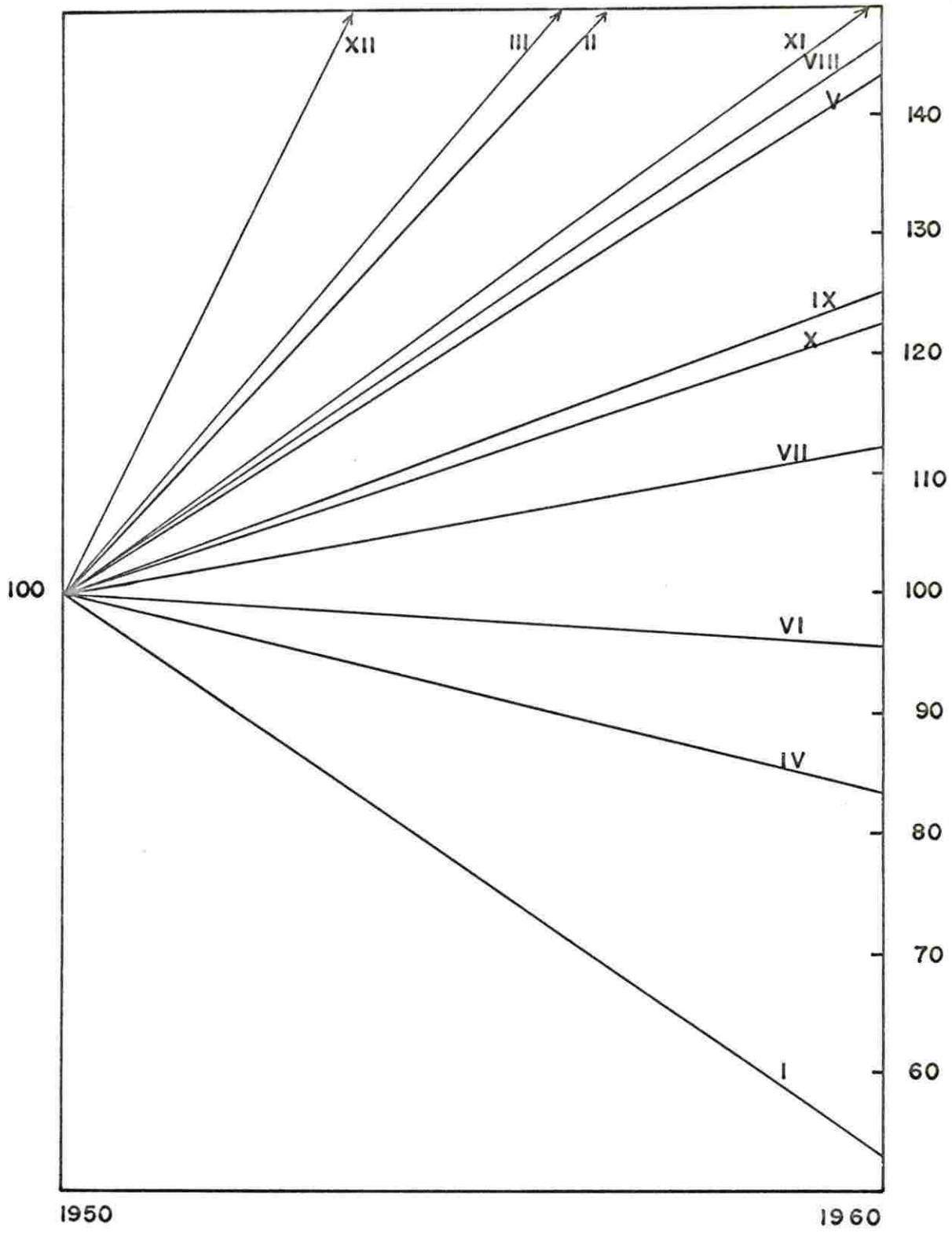
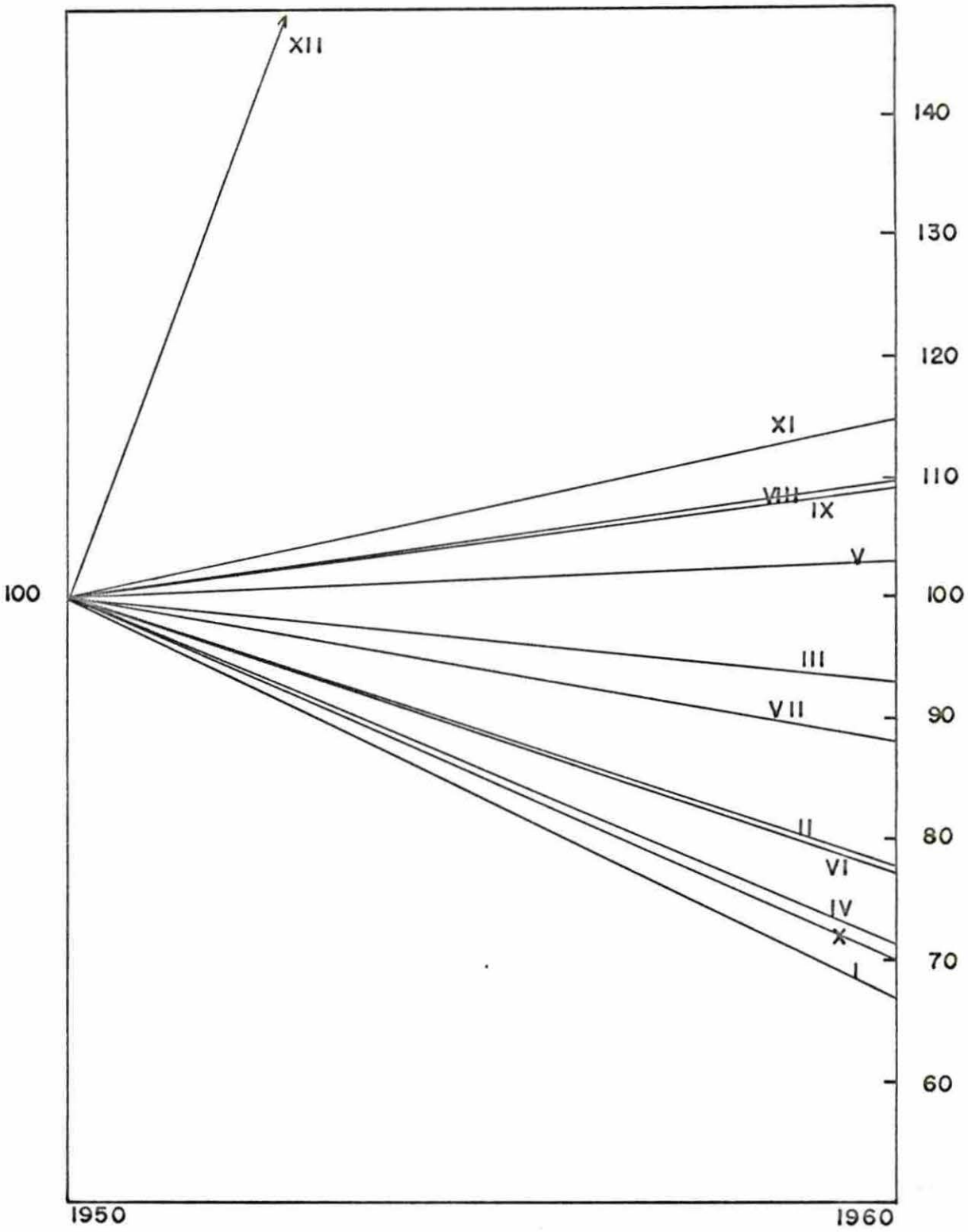
TOPEKA

Figure A.8. Employment growth, 1950-1960, for twelve major industrial sectors, Springfield SMSA.



SPRINGFIELD

Figure A.9. Employment growth, 1950–1960, for twelve major industrial sectors, Sioux City SMSA.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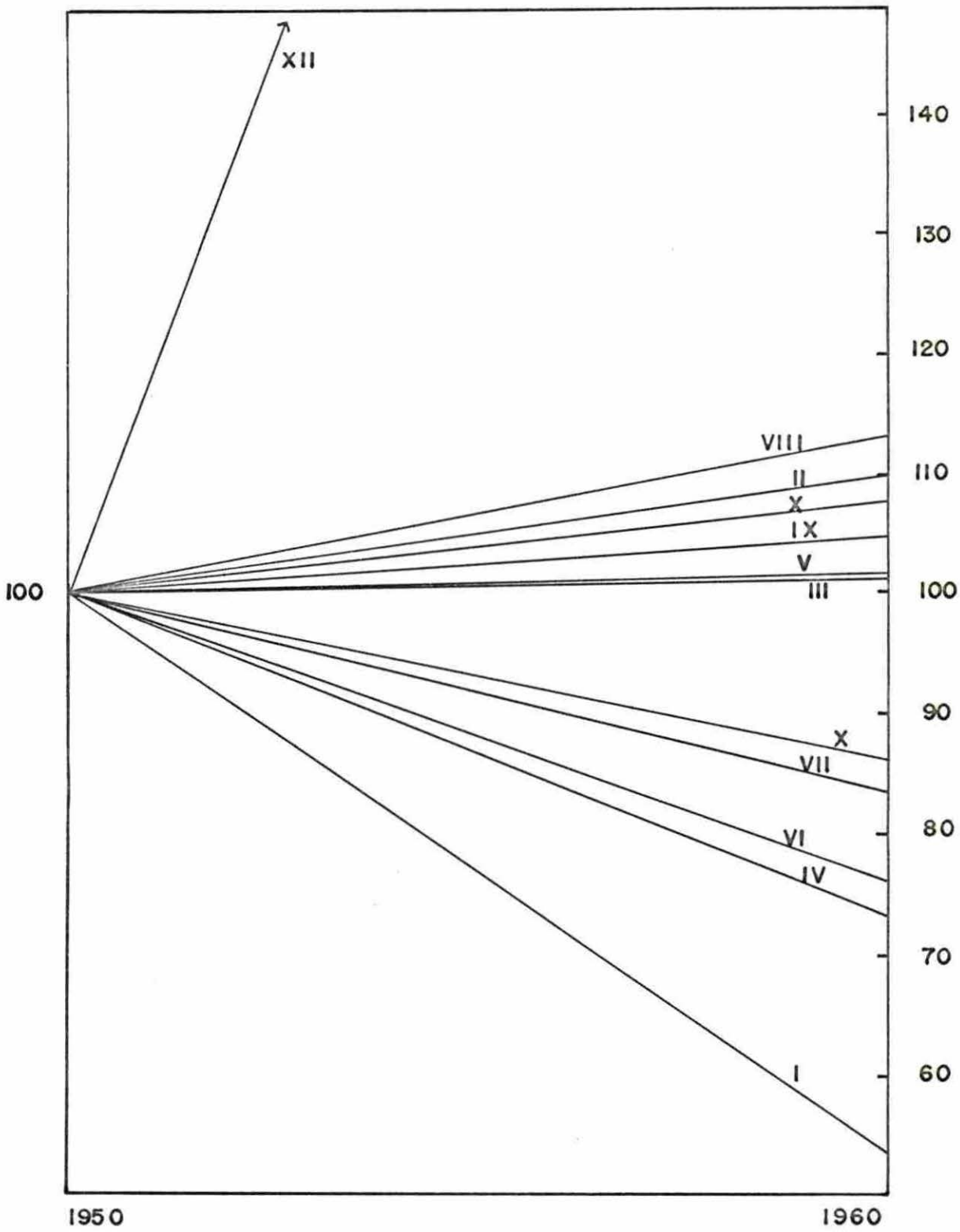
SIOUX CITY

Figure A.10. Employment growth, 1950–1960, for twelve major industrial sectors, St. Joseph SMSA.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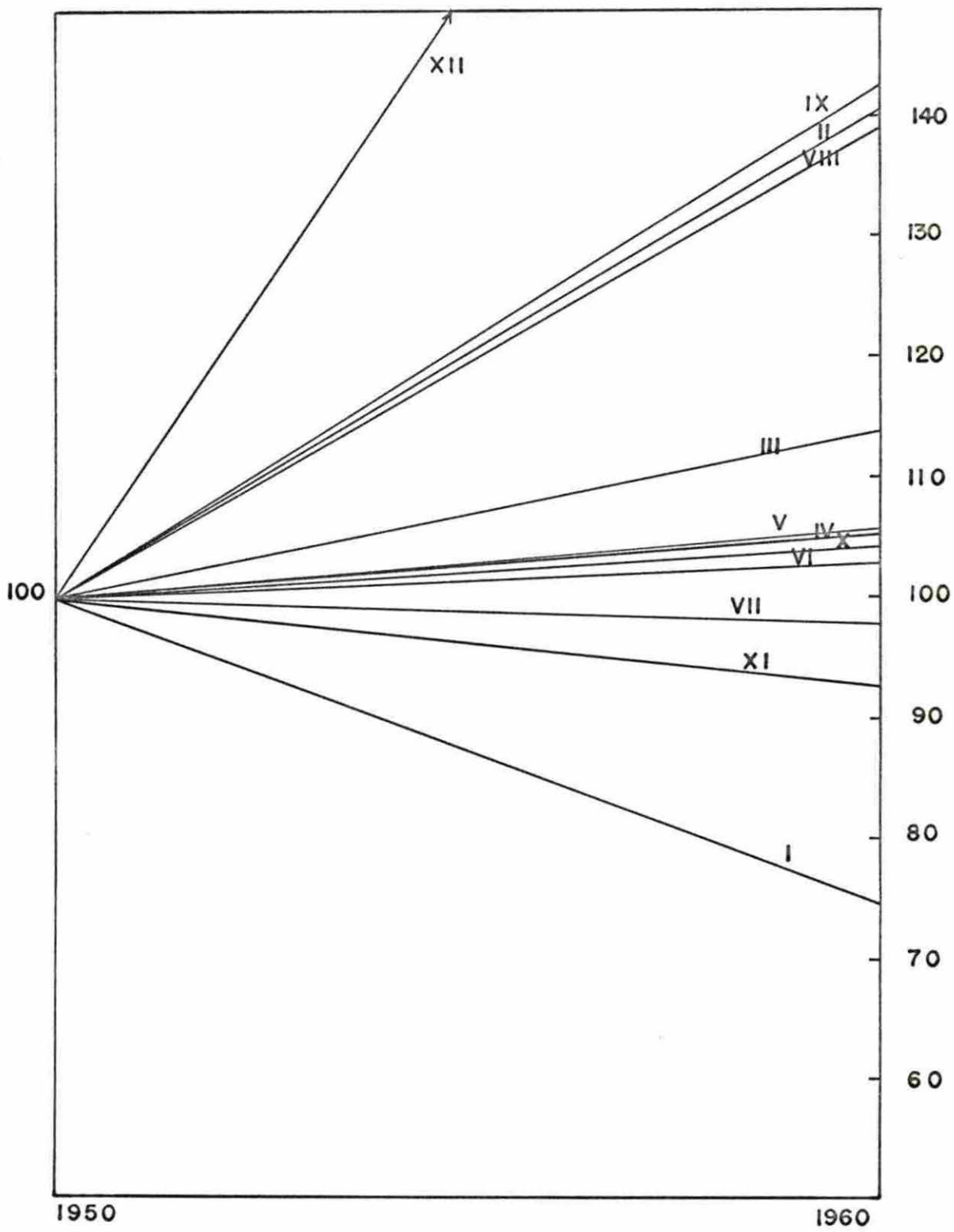
1950
1960

ST. JOSEPH

Figure A.11. Employment growth, 1950-1960, for twelve major industrial sectors, Sioux Falls SMSA.


XII
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140
130
120
110
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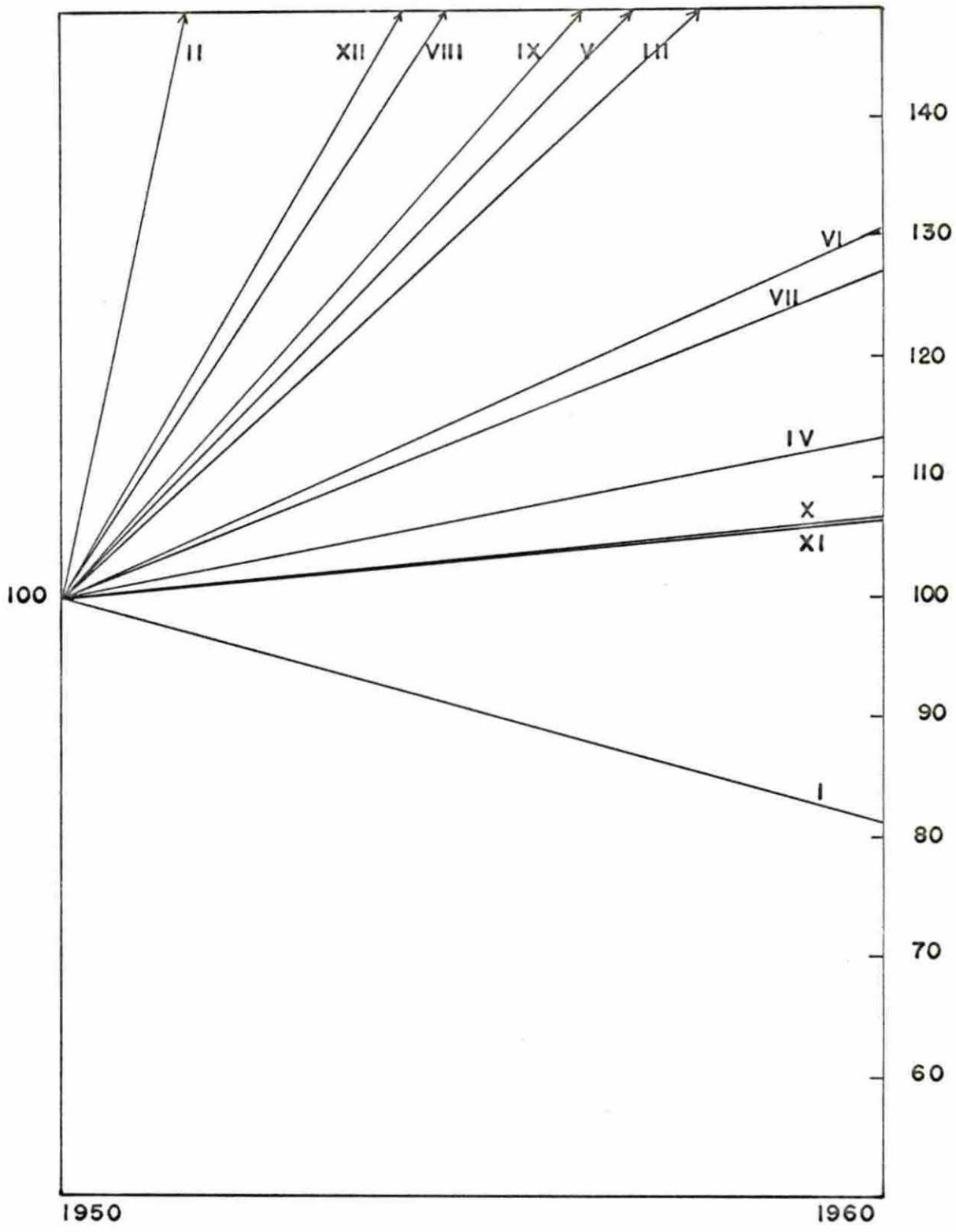
80
70
60
1950
1960

SIOUX FALLS

Figure A.12. Employment growth, 1950-1960, for twelve major industrial sectors, Billings SMSA.


II
XII
VIII
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III
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XI
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140
130
120
110
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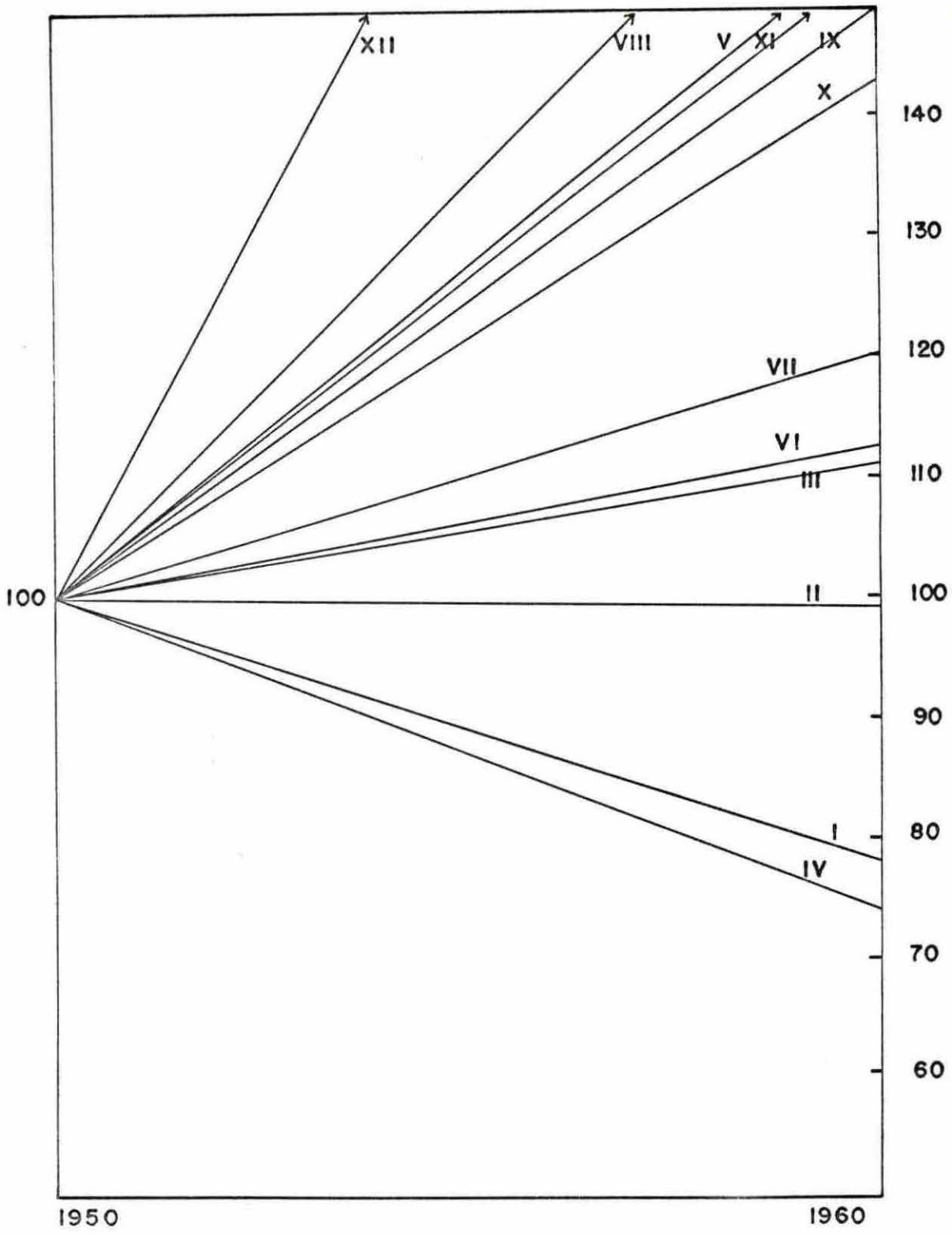
90
80
70
60
1950
1960

BILLINGS

Figure A.13. Employment growth, 1950-1960, for twelve major industrial sectors, Great Falls SMSA.


XII
VIII
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XI
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X
VII
VI
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II
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IV
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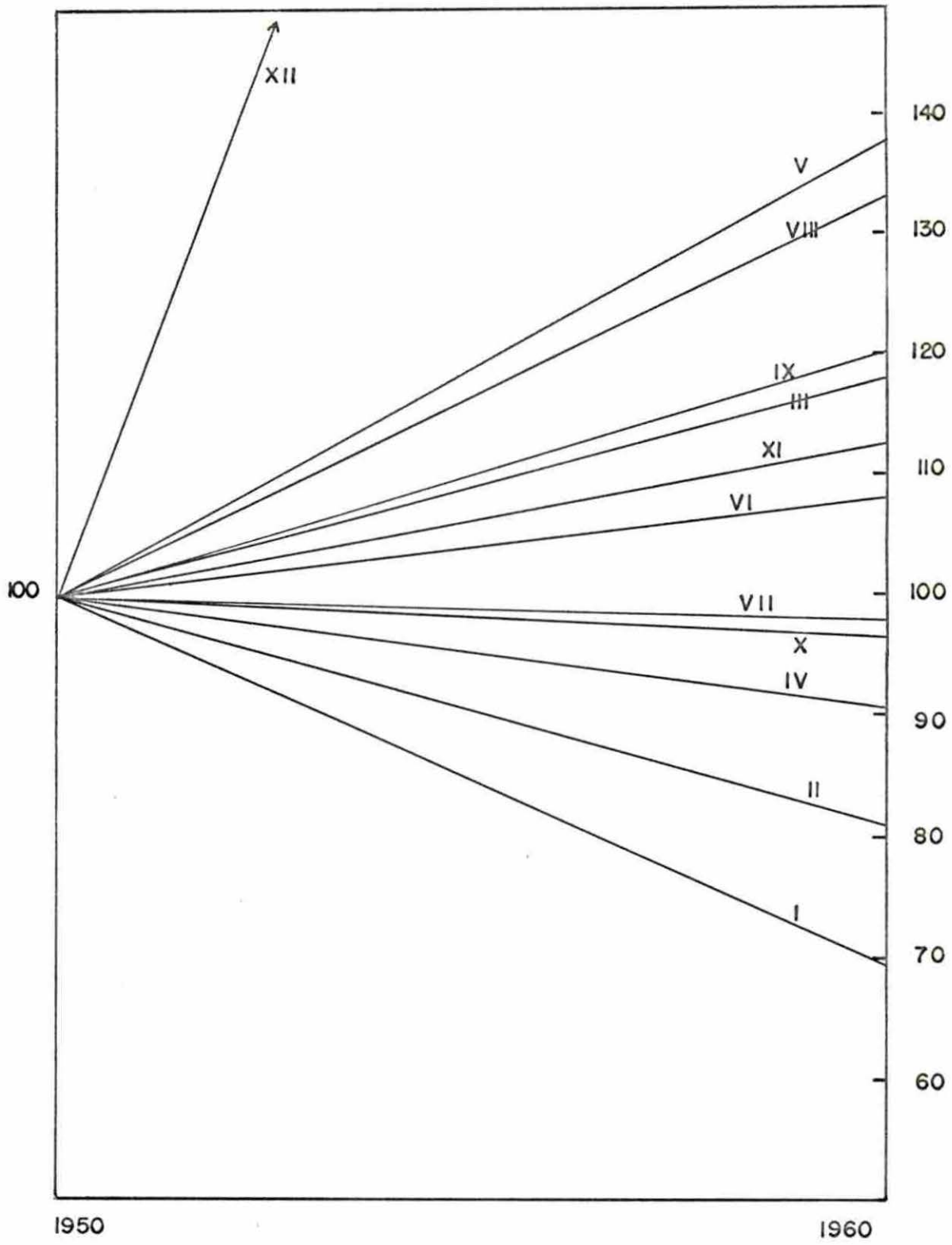
130
120
110
100
90
80
70
60
1950
1960

GREAT FALLS

Figure A.14. Employment growth, 1950-1960, for twelve major industrial sectors, Des Moines SMSA.


XII
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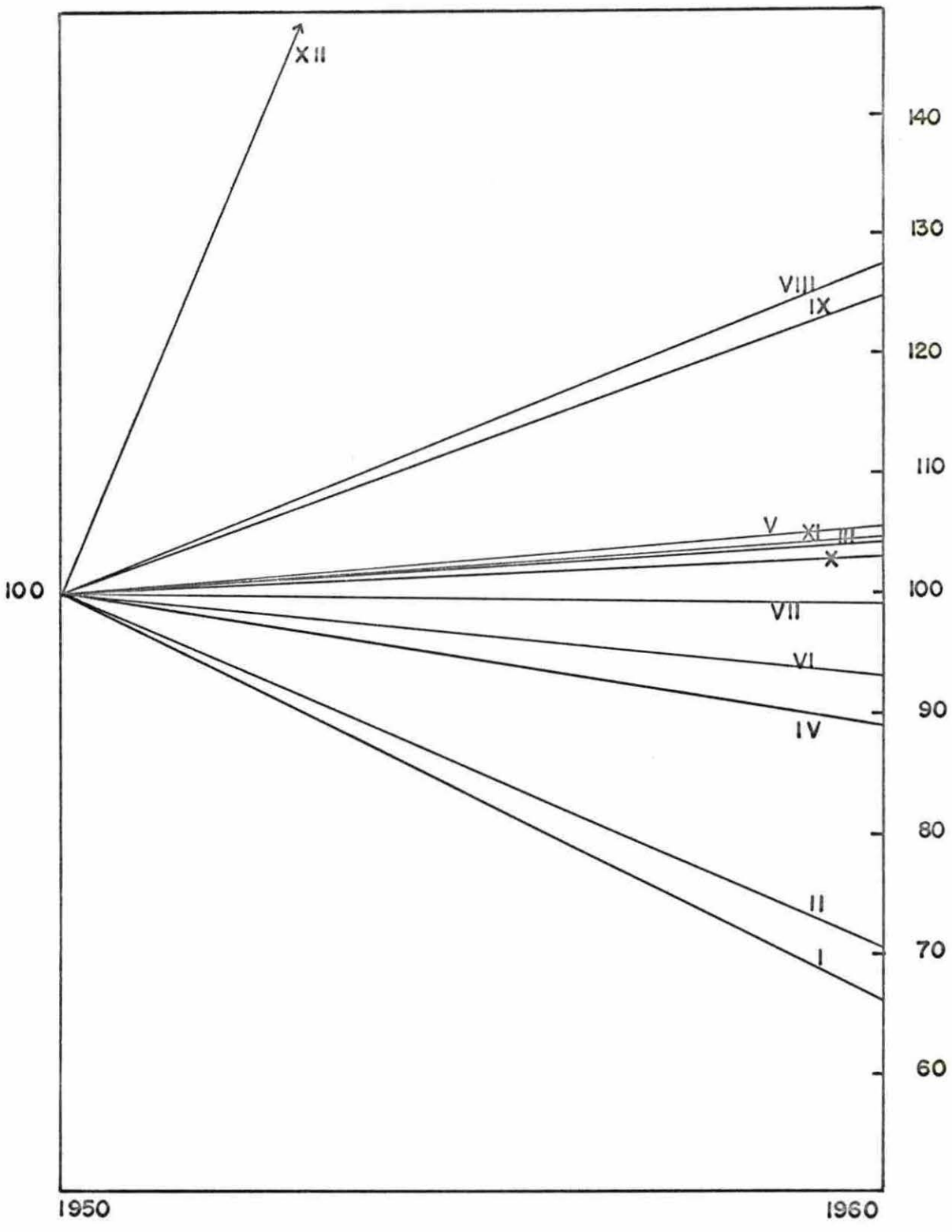
90
80
70
60
1950
1960

DES MOINES

Figure A.15. Employment growth, 1950-1960, for twelve major industrial sectors, St. Louis SMSA.


XII
VIII
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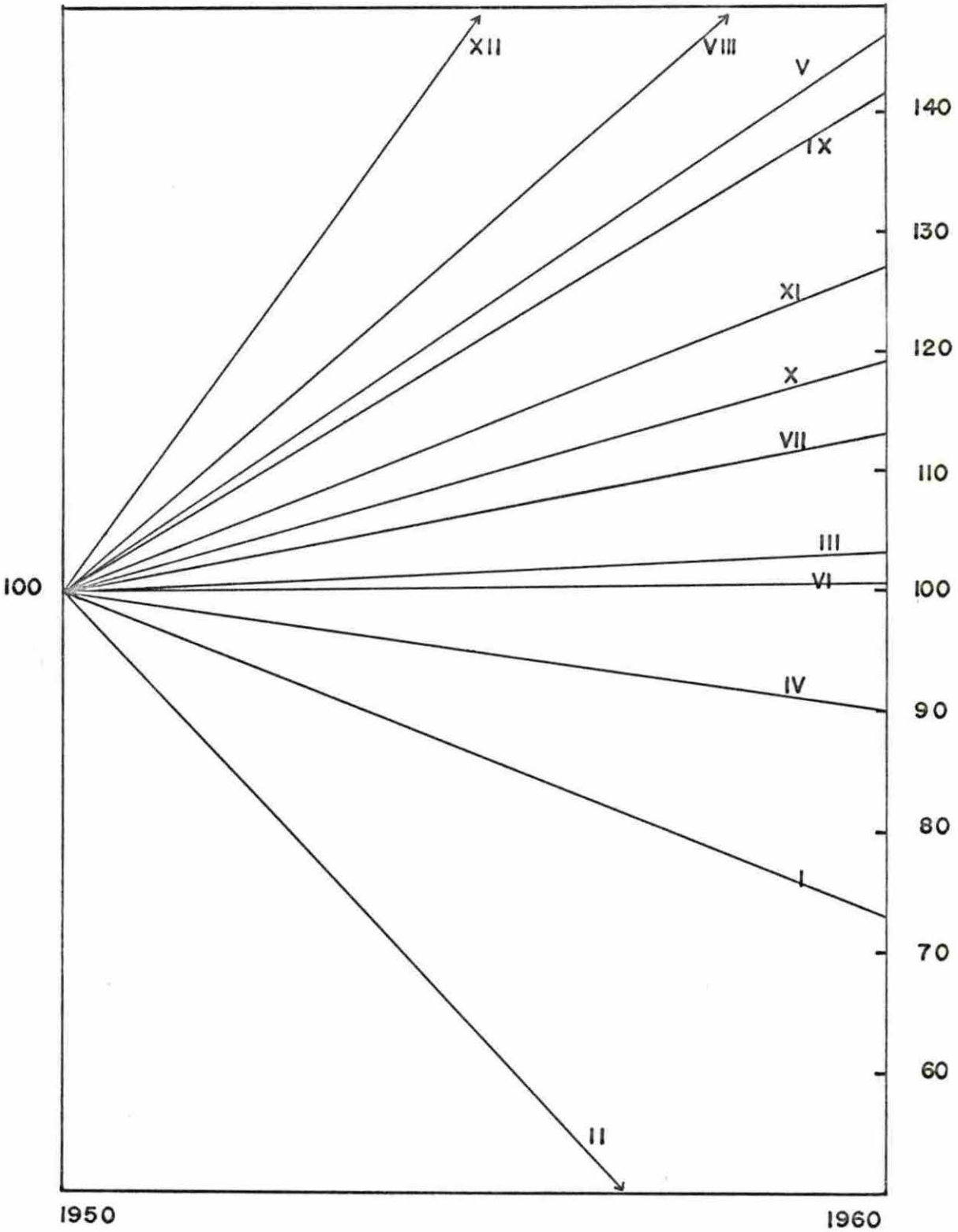
60
100
1950
1960

ST. LOUIS

Figure A.16. Employment growth, 1950-1960, for twelve major industrial sectors, Fargo SMSA.


XII
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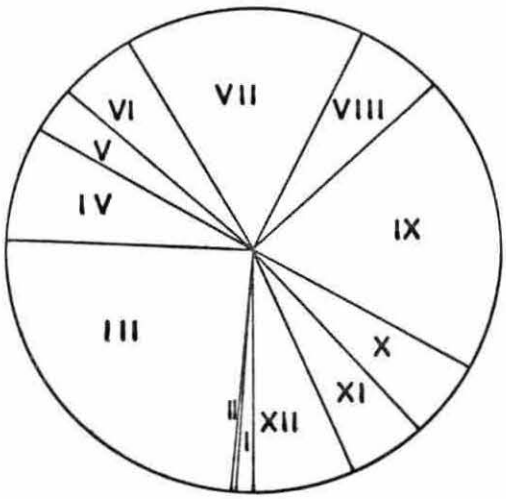
1950
1960

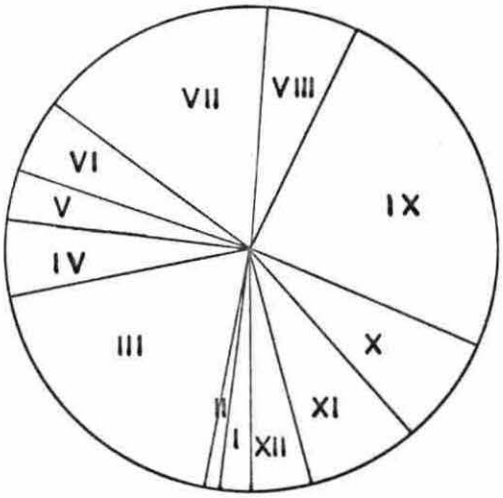
FARGO

XIII. APPENDIX B: EMPLOYMENT STRUCTURES

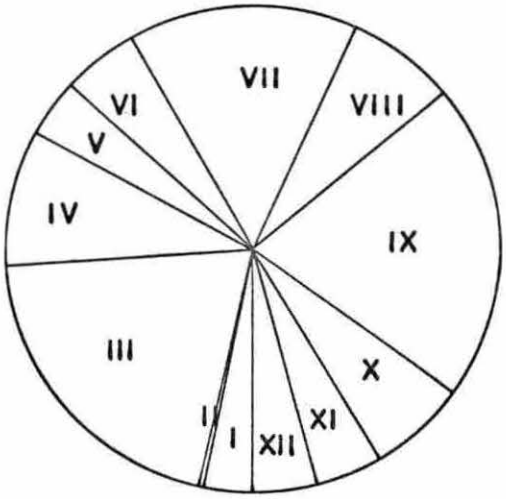
Figure B.L. 1960 Employment structures, Kansas City, Denver, Omaha, and Lincoln.



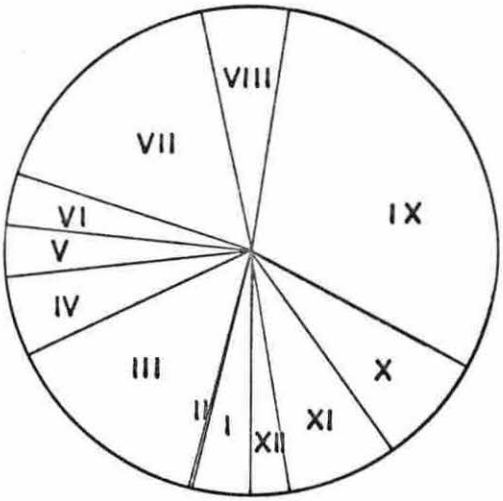
KANSAS CITY



DENVER

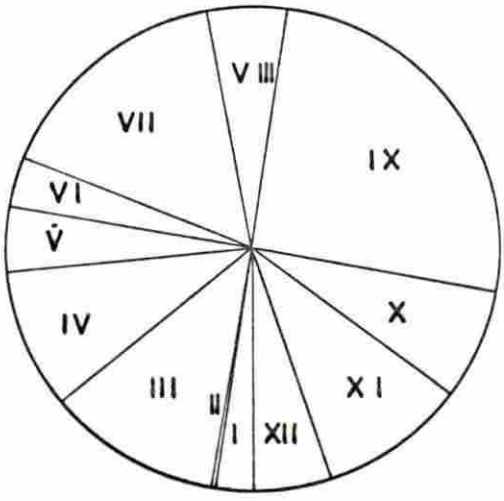


OMAHA

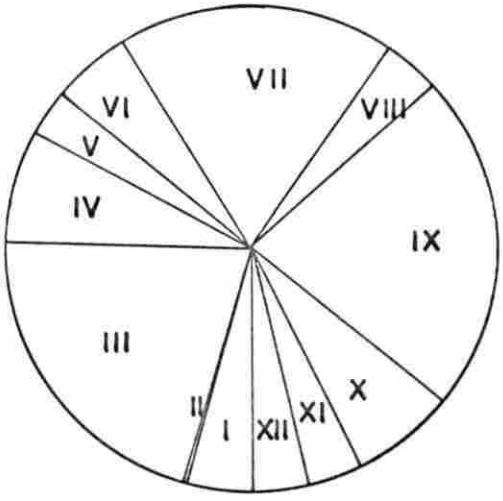


LINCOLN

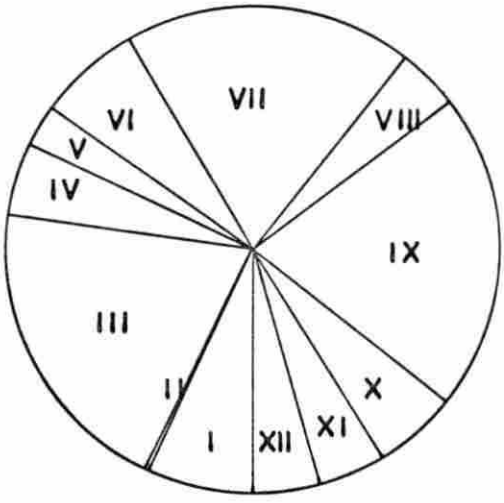
Figure B.2. 1960 employment structures, Topeka, Springfield, Sioux City, and St. Joseph.



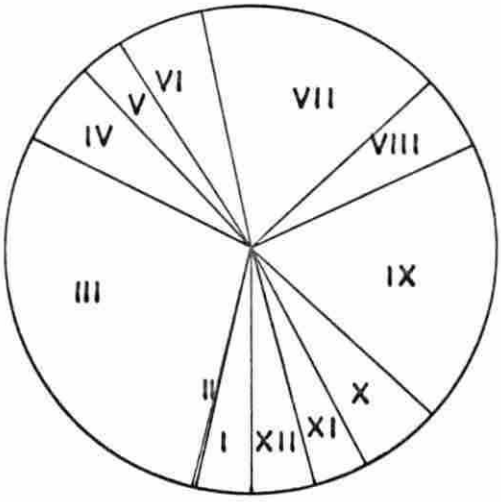
TOPEKA



SPRINGFIELD

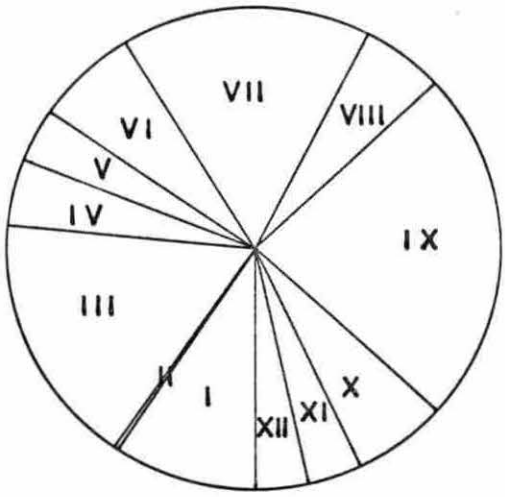


SIOUX CITY

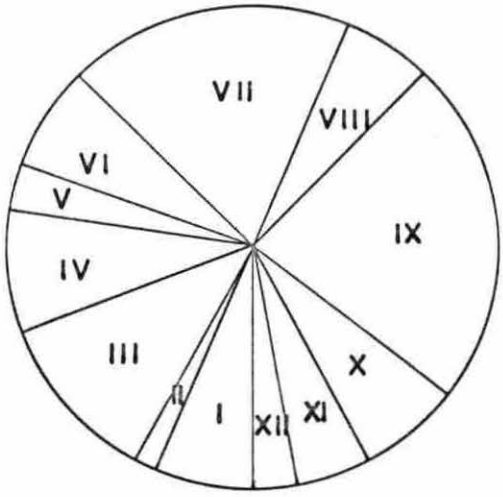


ST. JOSEPH

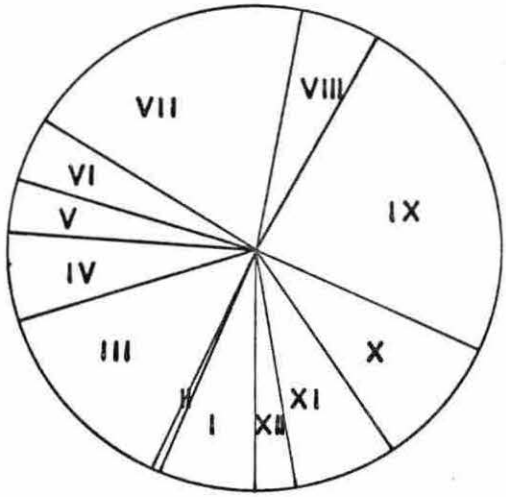
Figure B.3. 1960 employment structures, Sioux Falls, Billings, and Great Falls.



SIOUX FALLS



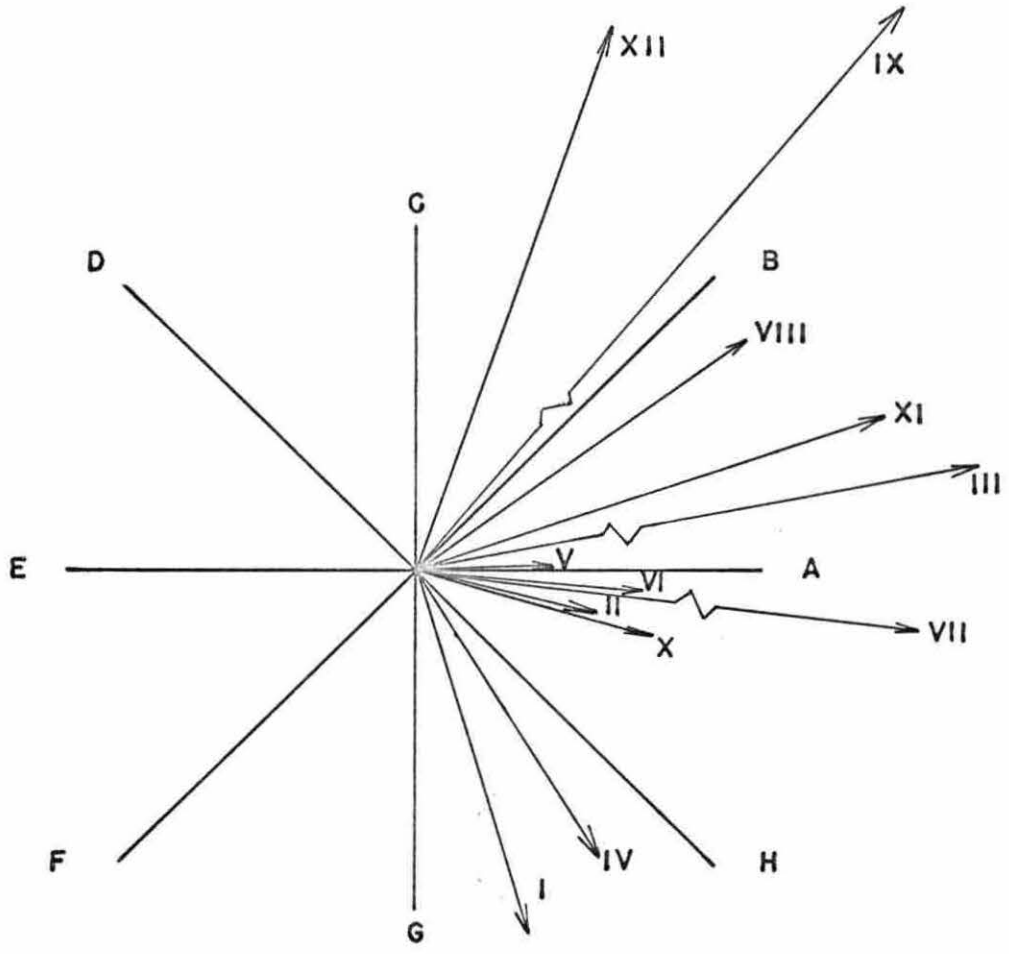
BILLINGS



GREAT FALLS

XIV. APPENDIX C: OCTANT CHARTS AND COMPONENTS OF CHANGE

Figure C.1. Octant chart for Denver SMSA, based on twelve industrial sectors, 1950–1960.

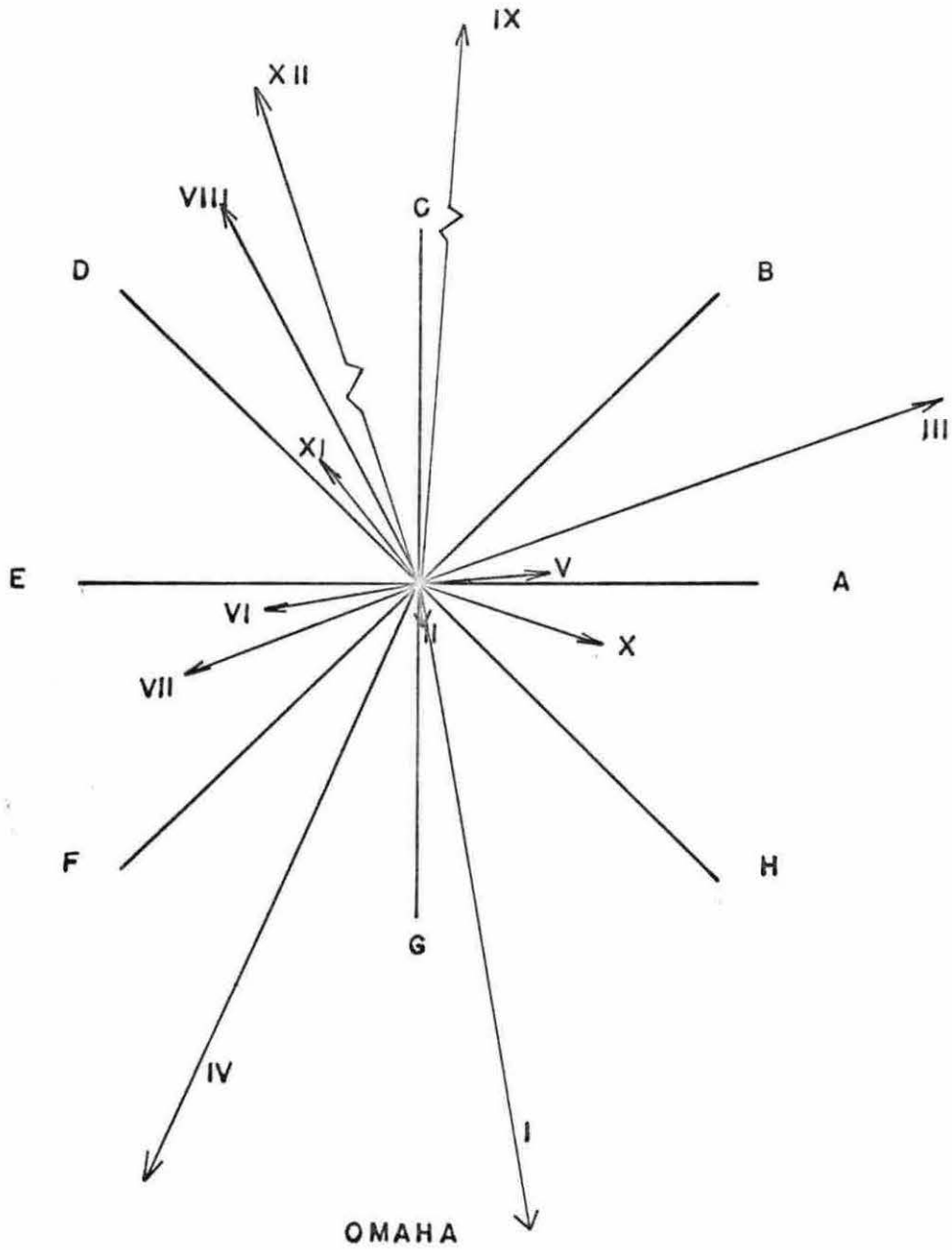


DENVER

Table C.1. Components of employment change, Denver, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.1691	1,286	-4,663	1,496	-1,880	-3,167
II	Mining	-0.4429	1.7775	193	- 588	2,359	1,964	1,771
III	Manufacturing	0.0471	0.6130	5,440	1,762	22,936	30,140	24,698
IV	Transportation	-0.2179	0.1377	2,522	-3,779	2,388	1,131	-1,391
V	Communication and Utilities	0.0032	0.2086	1,234	27	1,771	3,032	1,798
VI	Wholesale Trade	-0.0192	0.2321	1,861	- 246	2,971	4,586	2,725
VII	Retail Trade	-0.0240	0.2046	6,292	-1,039	8,853	14,108	7,814
VIII	Finance, Insurance and Real Estate	0.2583	0.3719	1,695	3,010	4,334	9,040	7,344
IX	Services	0.1972	0.2329	7,890	10,700	12,638	31,226	23,338
X	Contract Construction	-0.0419	0.1594	2,841	- 819	3,114	5,136	2,295
XI	Public Administration	0.1284	0.3881	2,265	2,000	6,047	10,312	8,047
XII	Industry not Reported	1.9472	0.6981	528	7,070	2,535	10,133	9,605
	Total			34,043	17,060	67,832	118,928	84,892

Figure C.2. Octant chart for Omaha SMSA, based on twelve industrial sectors, 1950–1960.


IX
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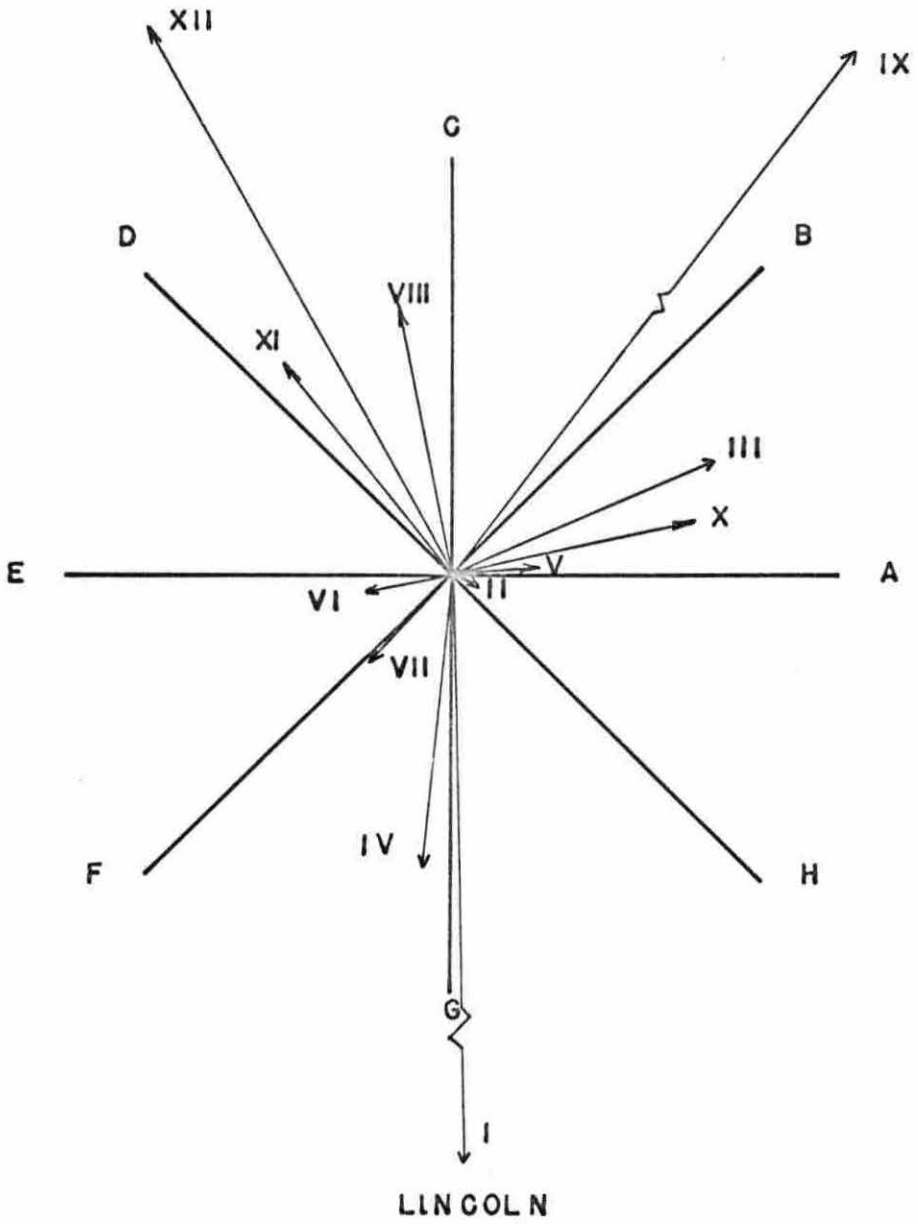
I
OMAHA

Table C.2. Components of employment change, Omaha, 1950-1960.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.0930	1,200	-4,348	767	-2,381	-3,581
II	Mining	-0.4429	0.1441	27	- 84	27	- 29	- 57
III	Manufacturing	0.0471	0.1288	3,920	1,270	3,472	8,663	4,742
IV	Transportation	-0.2179	-0.0968	2,663	-3,991	-1,773	-3,101	-5,764
V	Communication and Utilities	0.0032	0.1663	763	17	872	1,652	889
VI	Wholesale Trade	-0.0192	-0.1203	1,254	- 166	-1,037	51	-1,203
VII	Retail Trade	-0.0240	-0.0611	3,582	- 591	-1,505	1,486	-2,096
VIII	Finance, Insurance and Real Estate	0.2583	-0.1346	1,441	2,560	-1,334	2,667	1,226
IX	Services	0.1972	0.0113	3,932	5,333	306	9,572	5,639
X	Contract Construction	-0.0419	0.1342	1,326	- 382	1,224	2,168	842
XI	Public Administration	0.1284	-0.0934	944	833	- 606	1,171	227
XII	Industry not Reported	1.9472	-0.6168	394	5,271	-1,670	3,995	3,601
	Total			21,437	6,045	-1,575	25,914	3,085

Figure C.3. Octant chart for Lincoln SMSA, based on twelve industrial sectors, 1950–1960.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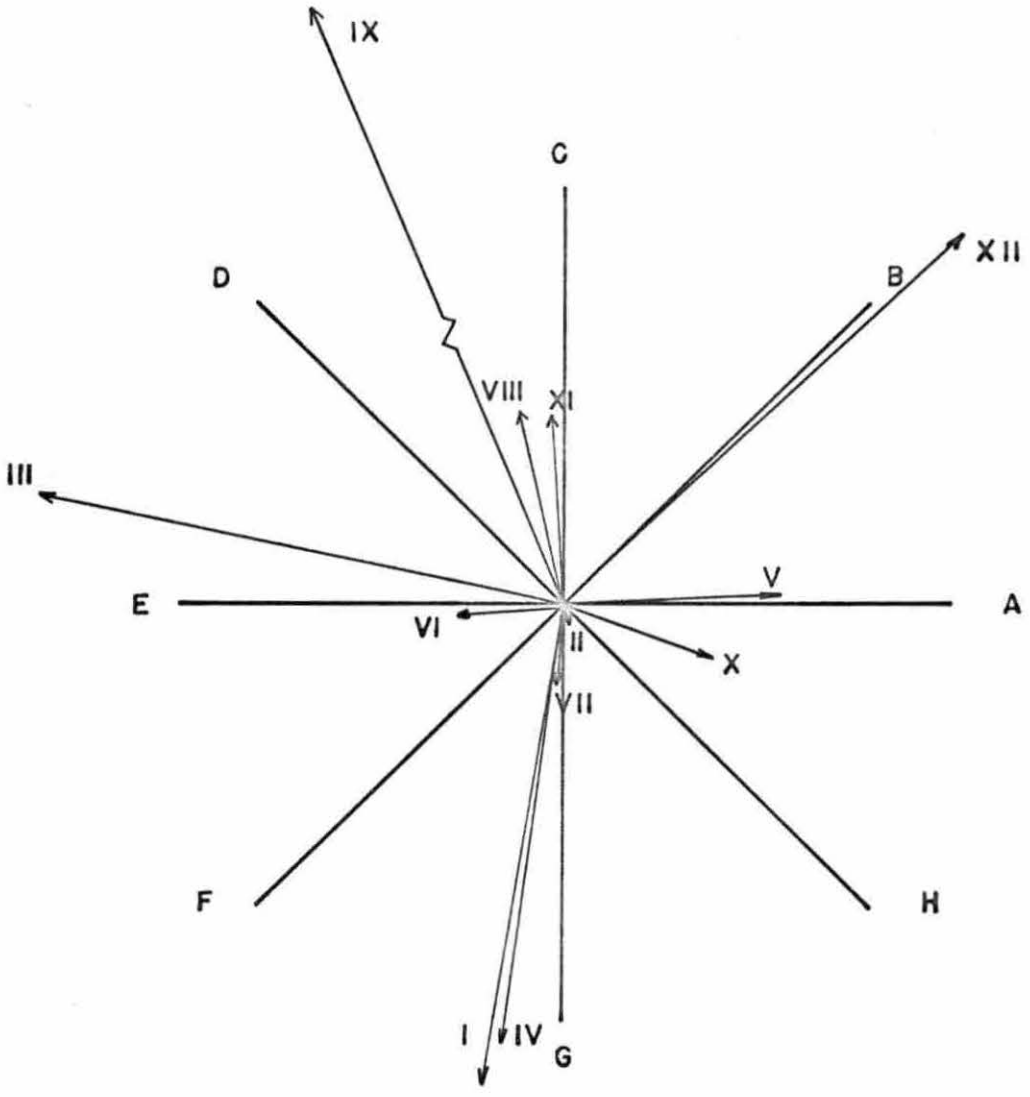
G
I
LINCOLN

Table C.3. Components of employment change, Lincoln, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.0156	533	-1,934	57	-1,343	-1,877
II	Mining	-0.4429	0.5938	4	- 12	16	8	4
III	Manufacturing	0.0471	0.1085	937	304	699	1,940	1,003
IV	Transportation	-0.2179	-0.0211	511	- 766	- 74	- 329	- 840
V	Communication and Utilities	-0.0032	0.1537	228	5	241	474	246
VI	Wholesale Trade	-0.0192	-0.1056	304	- 40	- 221	43	- 261
VII	Retail Trade	-0.0240	-0.0224	1,317	- 217	- 203	897	- 420
VIII	Finance, Insurance and Real Estate	0.2583	-0.0472	393	698	- 127	963	571
IX	Services	0.1972	0.1615	1,771	2,502	1,967	6,139	4,469
X	Contract Construction	-0.0419	0.1844	497	- 143	630	984	487
XI	Public Administration	0.1284	-0.0998	530	468	- 364	634	104
XII	Industry not Reported	1.9472	-1,0512	109	1,457	- 786	779	671
	Total			7,134	3,723	331	11,189	4,054

Figure C.4. Octant chart for Topeka SMSA, based on twelve industrial sectors, 1950-1960.

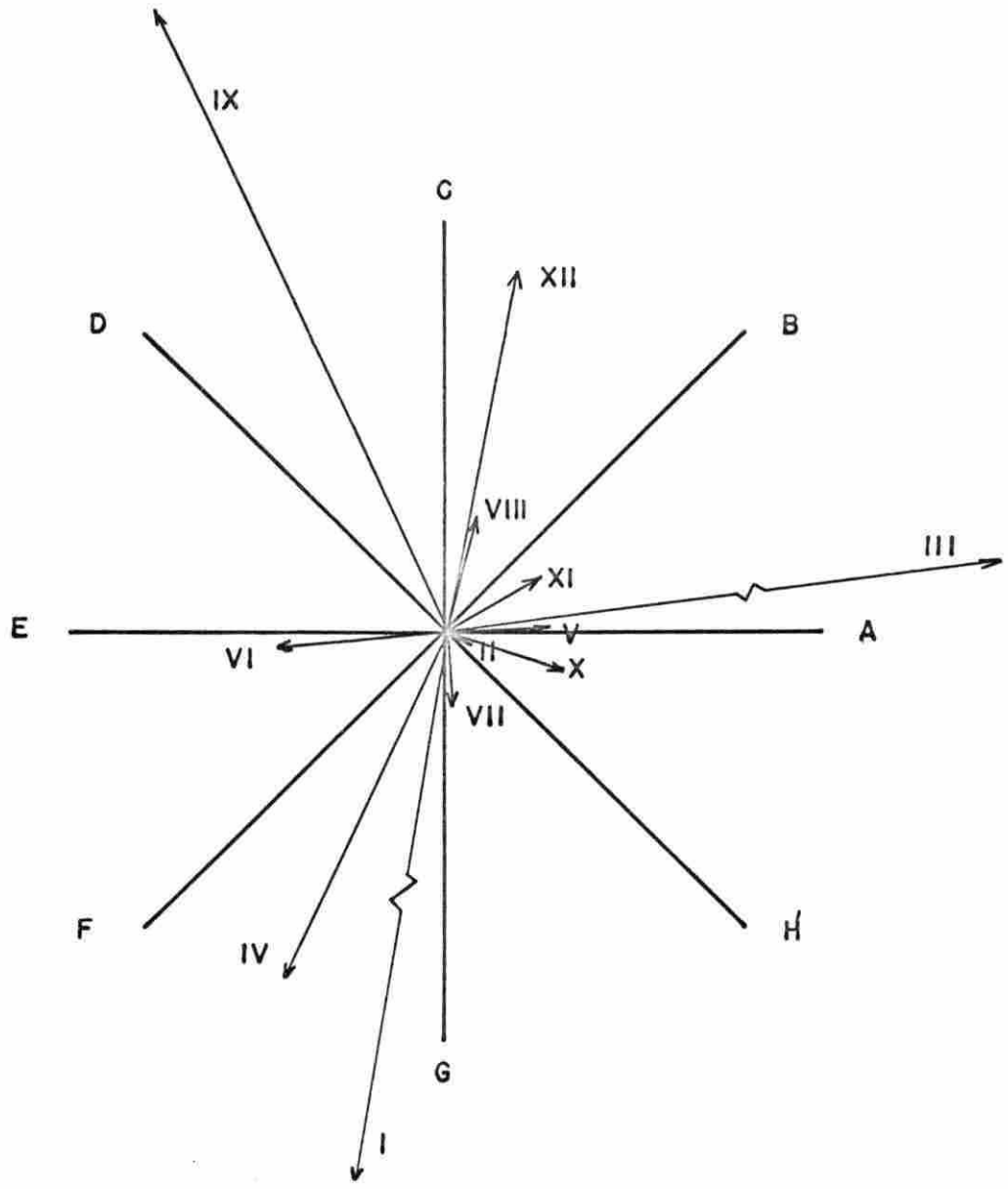


TOPEKA

Table C.4. Components of employment change, Topeka, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	-0.0837	346	-1,254	- 199	-1,107	-1,453
II	Mining	-0.4429	0.0916	10	- 30	6	- 14	- 24
III	Manufacturing	0.0471	-0.2235	876	284	-1,346	- 187	-1,062
IV	Transportation	-0.2179	-0.0307	772	-1,157	- 163	- 548	-1,320
V	Communication and Utilities	n 0.0032	0.3959	204	4	556	765	560
VI	Wholesale Trade	-0.0192	-0.1422	263	- 35	- 257	- 29	- 292
VII	Retail Trade	-0.0240	-0.0001	1,050	- 173	- 1	876	- 174
VIII	Finance, Insurance and Real Estate	0.0583	-0.0570	290	516	- 114	692	402
IX	Services	0.1972	-0.0821	1,494	2,026	- 843	2,676	1,183
X	Contract Construction	-0.0419	0.1283	450	- 130	397	718	267
XI	Public Administration	0.1284	-0.0011	555	490	- 4	1,041	486
XII	Industry not Reported	1,9472	2.0539	73	983	1,037	2,094	2,020
	Total			6,383	2,013	-1,418	6,977	595

Figure C.5. Octant chart for Springfield SMSA, based on twelve industrial sectors, 1950-1960.

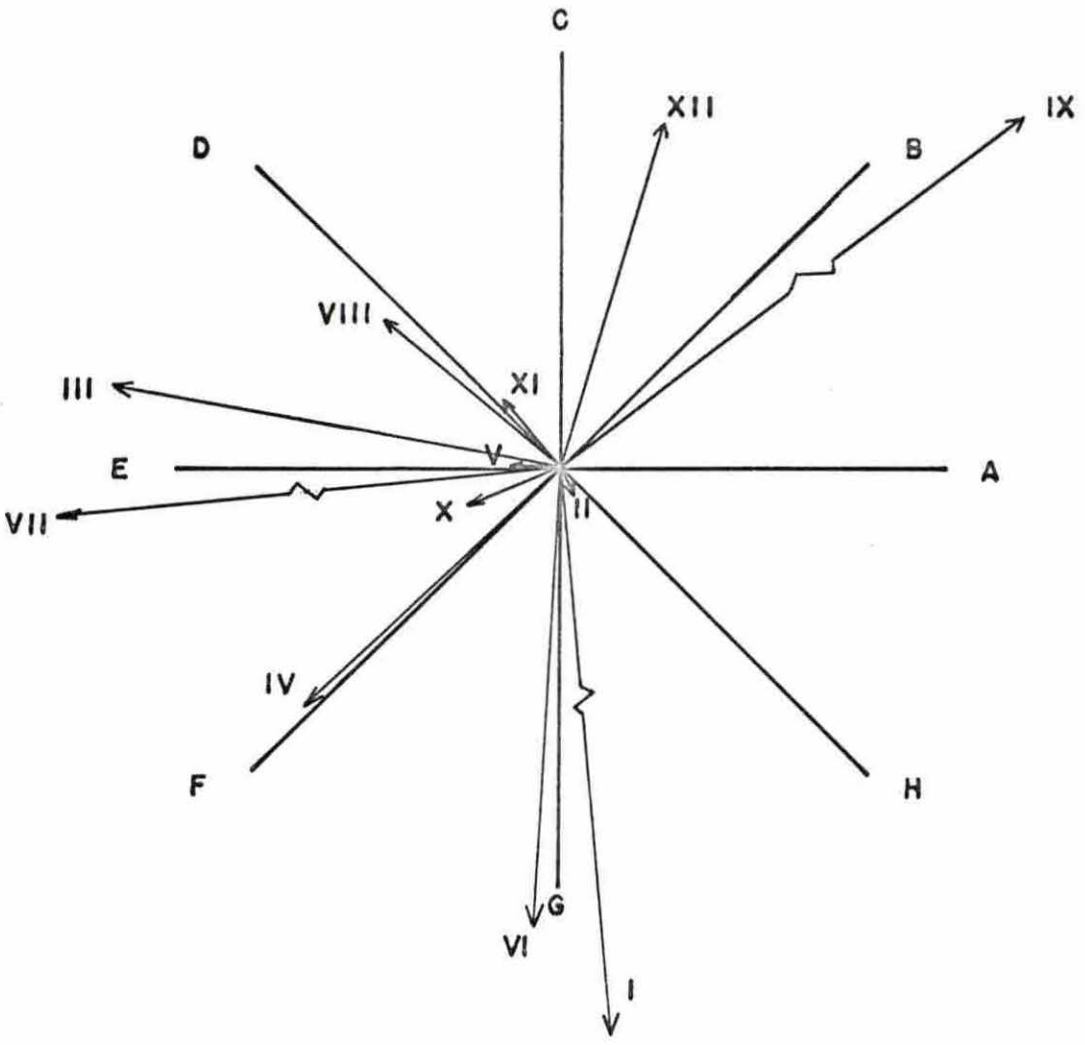


SPRINGFIELD

Table C.5. Components of employment change, Springfield, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	-0.0818	552	-1,999	- 310	-1,758	-2,309
II	Mining	-0.4429	1.0725	6	- 18	43	31	25
III	Manufacturing	0.0471	0.6355	790	256	3,451	4,496	3,707
IV	Transportation	-0.2179	-0.0958	624	- 936	- 411	- 723	-1,347
V	Communication and Utilities	0.0032	0.2887	143	3	283	429	286
VI	Wholesale Trade	-0.0192	-0.1698	373	- 49	- 436	- 112	- 485
VII	Retail Trade	-0.0240	0.0010	1,130	- 187	8	951	- 179
VIII	Finance, Insurance and Real Estate	0.2583	0.0568	175	311	68	554	379
IX	Services	0.1972	-0.0900	1,239	1,681	- 767	2,153	914
X	Contract Construction	-0.0419	0.1185	387	- 112	315	591	203
XI	Public Administration	0.1284	0.2166	167	148	249	564	397
XII	Industry not Reported	1.9472	0.4064	72	968	202	1,242	1,170
	Total			5,660	18	2,741	8,418	2,759

Figure C.6. Octant chart for Sioux City SMSA, based on twelve industrial sectors, 1950–1960.

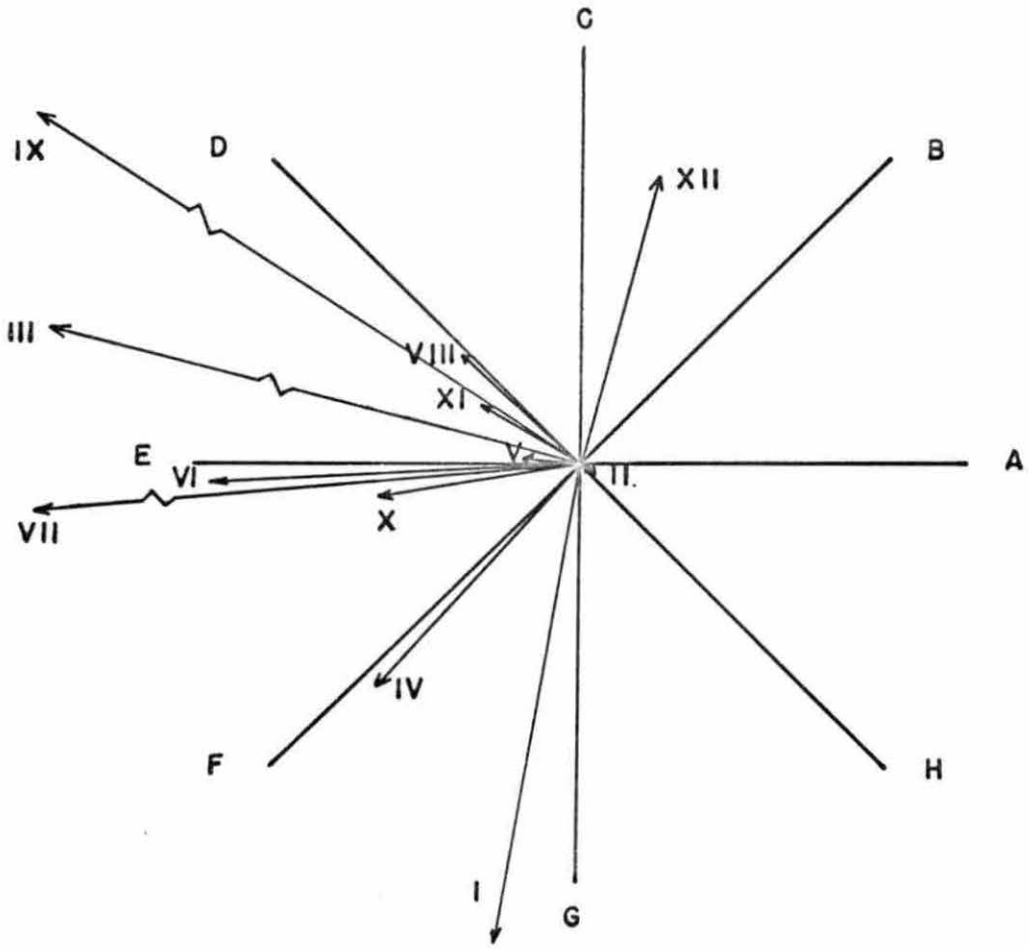


SIOUX CITY

Table C.6. Components of employment change, Sioux City, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.0483	608	-2,205	202	-1,395	-2,003
II	Mining	-0.4429	0.0702	3	- 10	2	- 5	- 8
III	Manufacturing	0.0471	-0.2591	1,252	406	-2,231	- 573	-1,825
IV	Transportation	-0.2179	-0.2289	416	- 623	- 655	- 862	-1,278
V	Communication and Utilities	0.0037	- 0.0913	152	3	- 96	60	- 93
VI	Wholesale Trade	-0.0192	-0.3524	501	- 66	-1,215	- 780	-1,281
VII	Retail Trade	-0.0240	-0.2436	1,244	- 205	-2,084	-1,045	-2,289
VIII	Finance, Insurance and Real Estate	0.2583	-0.3087	216	383	- 458	141	- 75
IX	Services	0.1972	-0.2495	1,124	1,525	1,929	720	3,454
X	Contract Construction	-0.0419	-0.1062	321	- 93	- 235	- 6	- 328
XI	Public Administration	0.1284	-0.0964	214	189	- 142	261	47
XII	Industry not Reported	1.9472	0.5949	67	904	276	1,247	1,180
	Total			6,118	1,346	-9,700	-2,237	-8,354

Figure C.7. Octant chart for St. Joseph SMSA, based on twelve industrial sectors. 1950–1960.

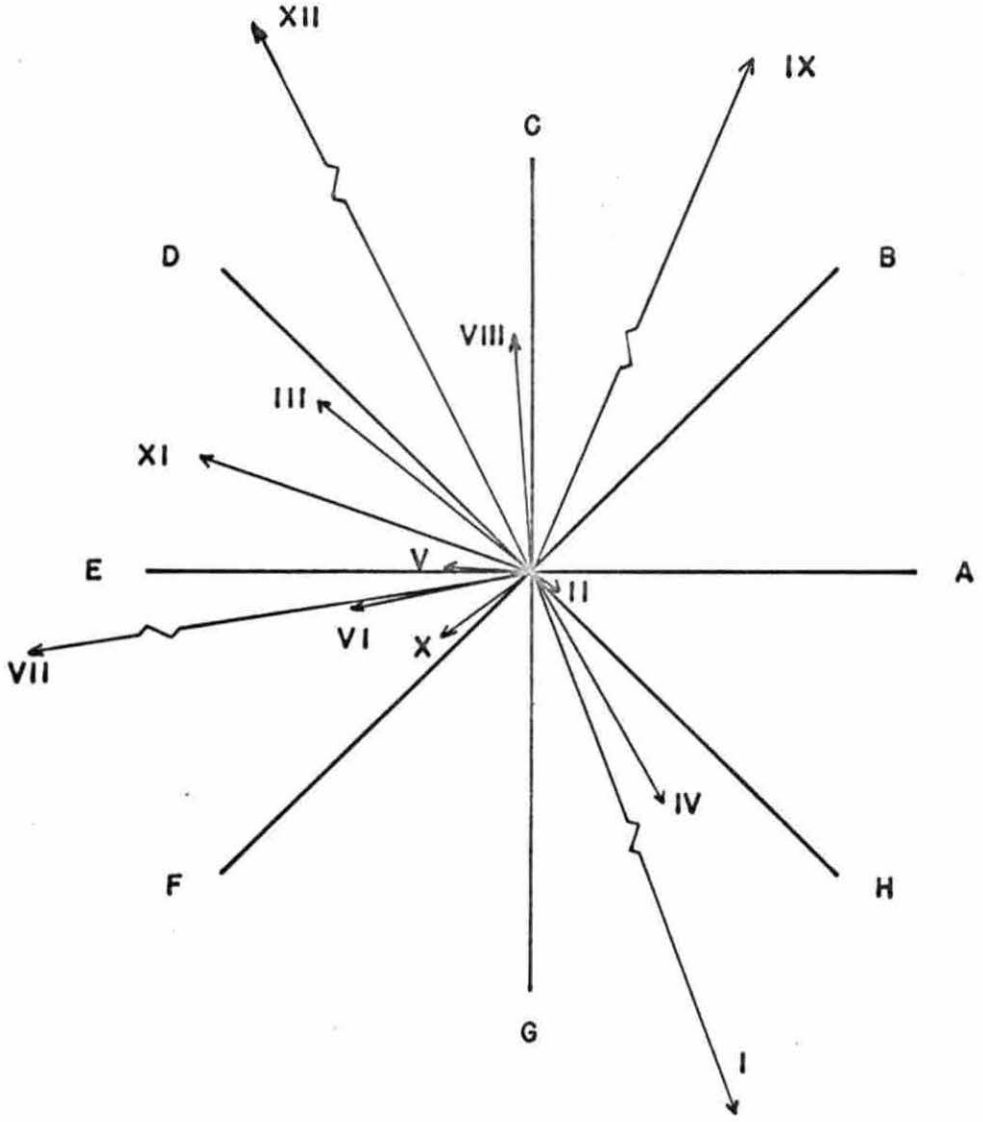


ST. JOSEPH

Table C.7. Components of employment change, St. Joseph, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	-0.0872	348	-1,260	- 208	-1,121	-1,468
II	Mining	-0.4429	0.3884	5	- 15	13	3	- 2
III	Manufacturing	0.0471	-0.1810	1,430	463	-1,780	113	-1,317
IV	Transportation	-0.2179	-0.1941	388	- 581	- 518	- 711	-1,099
V	Communication and Utilities	0.0032	-0.1350	149	3	- 139	14	- 136
VI	Wholesale Trade	-0.0192	-0.3666	380	- 50	- 958	- 628	-1,008
VII	Retail Trade	-0.0240	-0.3003	1,018	- 168	-2,103	-1,253	-2,271
VIII	Finance, Insurance and Real Estate	0.2583	-0.2742	162	287	- 305	144	- 18
IX	Services	0.1972	-0.2968	977	1,325	-1,994	308	- 669
X	Contract Construction	-0.0419	-0.2436	306	- 88	- 513	- 295	- 601
XI	Public Administration	0.1284	-0.2000	175	155	- 241	89	- 86
XII	Industry not Reported	1.9472	0.5222	57	763	205	1,025	968
	Total			5,394	1,243	-8,948	-2,312	-7,705

Figure C.8. Octant chart for Sioux Falls SMSA, based on twelve industrial sectors, 1950–1960.

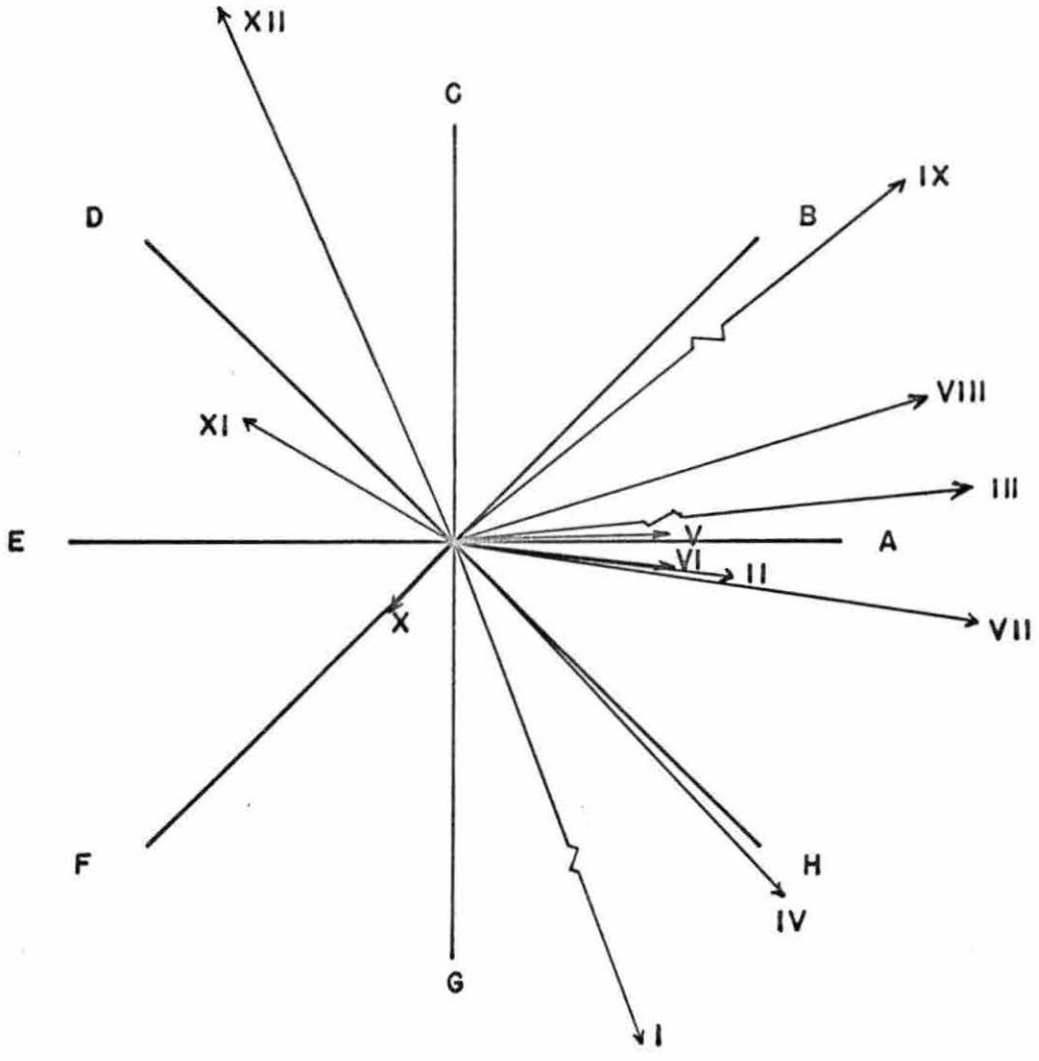


SIOUX FALLS

Table C.8. Components of employment change, Sioux Falls, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Regional Change
I	Agriculture	-0.5270	0.1291	585	-2,119	519	-1,015	-1,600
II	Mining	-0.4429	0.7013	8	- 23	36	21	13
III	Manufacturing	0.0471	-0.0573	696	225	- 274	647	- 49
IV	Transportation	-0.2179	-0.1224	204	- 306	172	70	- 134
V	Communication and Utilities	0.0032	-0.0971	158	3	- 106	56	- 103
VI	Wholesale Trade	-0.0192	-0.1084	311	- 41	- 232	38	- 273
VII	Retail Trade	-0.0240	-0.1431	812	- 134	- 799	- 121	- 933
VIII	Finance, Insurance and Real Estate	0.2583	-0.0182	177	314	- 22	468	292
IX	Services	0.1972	0.0831	779	1,056	445	2,280	1,501
X	Contract Construction	-0.0419	-0.0600	281	- 81	- 116	84	- 197
XI	Public Administration	0.1284	-0.3491	178	157	- 426	- 92	- 269
XII	Industry not Reported	1.9472	-0.9707	76	1,022	- 510	589	512
	Total			4,262	584	-1,825	3,025	-1,241

Figure C.9. Octant chart for Billings SMSA, based on twelve industrial sectors, 1950–1960.

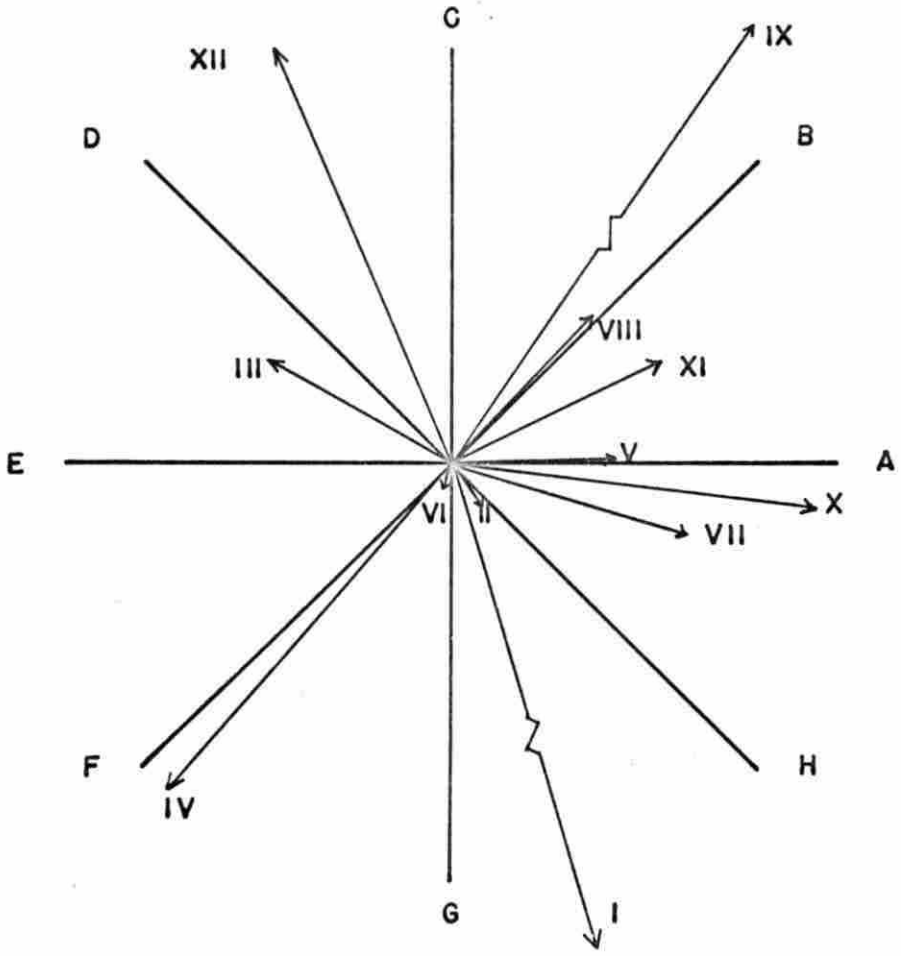


BILLINGS

Table C.9. Components of employment change, Billings, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.1941	345	-1,251	461	- 445	- 790
II	Mining	-0.4429	4.4770	11	- 35	349	326	314
III	Manufacturing	0.0471	0.4659	295	95	944	1,334	1,039
IV	Transportation	-0.2179	0.2042	307	- 460	431	278	- 29
V	Communication and Utilities	0.0032	0.5296	76	2	276	354	278
VI	Wholesale Trade	-0.0192	0.1809	229	- 30	285	484	255
VII	Retail Trade	-0.0240	0.1514	652	- 108	679	1,223	571
VIII	Finance, Insurance and Real Estate	0.2583	0.8185	109	193	611	913	804
IX	Services	0.1972	0.3990	578	784	1,586	2,947	2,370
X	Contract Construction	- 0.0419	-0.0397	271	- 78	- 74	119	- 152
XI	Public Administration	0.1284	-0.2108	187	165	- 271	81	- 106
XII	Industry not Reported	1.9472	-0.8350	52	703	- 301	454	402
	Total			3,108	- 96	5,054	8,068	4,958

Figure C.10. Octant chart for Great Falls SMSA, based on twelve industrial sectors, 1950–1960.



GREAT FALLS

Table C.10. Components of employment change, Great Falls, 1950-60.

	Industry	Shift Coefficients		Employment Effects				
		Industry Mix	Regional Share	National Growth	Industry Mix	Regional Share	Total Change	Relative Change
I	Agriculture	-0.5270	0.1613	281	-1,019	312	- 426	- 707
II	Mining	0.4429	0.2893	18	- 54	35	- 1	- 19
III	Manufacturing	0.0471	-0.0818	427	138	- 240	325	- 102
IV	Transportation	-0.2179	-0.1875	282	- 423	- 364	- 505	- 787
V	Communication and Utilities	0.0032	0.3772	82	2	212	296	214
VI	Wholesale Trade	-0.0192	-0.0027	136	- 18	- 3	117	- 21
VII	Retail Trade	-0.0240	0.0783	566	- 93	305	777	212
VIII	Finance, Insurance and Real Estate	0.2583	0.2373	111	198	182	491	380
IX	Services	0.1972	0.1380	562	762	510	1,834	1,272
X	Contract Construction	-0.0419	0.3227	212	- 61	470	621	409
XI	Public Administration	0.1284	0.2627	152	134	274	559	408
XII	Industry not Reported	1.9472	-0.8283	41	545	- 232	354	313
	Total			2,869	- 219	1,791	4,442	1,572

XV. APPENDIX D: LOCATION QUOTIENTS

Figure D.1. Summary of location quotients, by industry, for Denver SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$		$0.80 < q_i < 1.20$		$1.20 < q_i < 1.60$		$q_i > 1.60$	
1	--	--	0.93	--	--	--	--	--
2	--	--	--	0.93	--	--	--	--
3	--	0.60	--	--	--	--	--	--
4	0.50	--	--	--	--	--	--	--
5	0.50	--	--	--	--	--	--	--
6	--	--	--	1.19	--	--	--	--
7	--	--	--	--	--	1.34	--	--
8	--	0.01	--	--	--	--	--	--
9	--	0.08	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--
11	--	0.03	--	--	--	--	--	--
12	--	0.16	--	--	--	--	--	--
13	--	0.12	--	--	--	--	--	--
14	--	--	--	--	--	1.46	--	--
15	--	--	--	--	--	--	--	2.91
16	--	0.07	--	--	--	--	--	--
17	--	0.19	--	--	--	--	--	--
18	--	0.09	--	--	--	--	--	--
19	--	0.15	--	--	--	--	--	--
20	--	0.05	--	--	--	--	--	--
21	--	0.05	--	--	--	--	--	--
22	--	0.28	--	--	--	--	--	--
23	--	--	--	--	1.40	--	--	--
24	--	--	--	--	--	--	--	2.60
25	--	--	--	0.96	--	--	--	--
26	--	0.58	--	--	--	--	--	--
27	--	--	--	--	1.33	--	--	--
28	--	--	--	--	--	--	--	1.85
29	--	--	--	0.86	--	--	--	--
30	--	--	--	--	1.29	--	--	--
31	--	--	--	--	1.30	--	--	--
32	--	--	--	1.04	--	--	--	--
33	--	--	--	--	--	1.47	--	--
34	--	--	--	--	--	1.32	--	--
35	--	--	--	--	1.25	--	--	--
36	--	--	1.12	--	--	--	--	--
37	--	--	--	0.86	--	--	--	--
38	--	--	--	1.02	--	--	--	--
39	--	--	--	1.16	--	--	--	--
40	--	--	--	1.08	--	--	--	--
41	--	--	--	--	--	1.26	--	--
42	--	--	--	--	--	1.33	--	--
43	--	--	--	1.12	--	--	--	--
44	--	--	--	--	--	1.50	--	--
45	--	--	--	0.94	--	--	--	--
46	--	--	--	0.87	--	--	--	--
47	--	--	--	1.15	--	--	--	--
48	--	--	--	--	1.46	--	--	--
49	--	--	--	--	1.43	--	--	--
50	0.65	--	--	--	--	--	--	--

Figure D.2. Summary of location quotients, by industry, for Omaha SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$		$0.80 < q_i < 1.20$		$1.20 < q_i < 1.60$		$q_i > 1.60$	
1	--	--	0.97	--	--	--	--	--
2	--	--	--	0.98	--	--	--	--
3	--	0.53	--	--	--	--	--	--
4	--	--	--	--	1.36	--	--	--
5	0.42	--	--	--	--	--	--	--
6	--	--	--	1.18	--	--	--	--
7	--	--	--	0.81	--	--	--	--
8	--	0.20	--	--	--	--	--	--
9	--	0.68	--	--	--	--	--	--
10	--	0.01	--	--	--	--	--	--
11	--	0.10	--	--	--	--	--	--
12	--	--	--	--	--	1.42	--	--
13	--	0.18	--	--	--	--	--	--
14	--	0.15	--	--	--	--	--	--
15	--	0.02	--	--	--	--	--	--
16	--	0.28	--	--	--	--	--	--
17	--	0.18	--	--	--	--	--	--
18	--	0.04	--	--	--	--	--	--
19	--	0.18	--	--	--	--	--	--
20	--	0.04	--	--	--	--	--	--
21	--	0.08	--	--	--	--	--	--
22	--	0.35	--	--	--	--	--	--
23	--	--	--	--	--	--	1.91	--
24	--	--	--	--	--	--	--	2.57
25	--	--	--	--	--	--	--	2.33
26	--	0.79	--	--	--	--	--	--
27	--	--	1.12	--	--	--	--	--
28	--	--	--	--	--	1.20	--	--
29	--	--	--	1.04	--	--	--	--
30	--	--	--	--	--	--	2.04	--
31	--	--	--	--	1.31	--	--	--
32	--	--	--	0.88	--	--	--	--
33	--	--	--	--	--	1.37	--	--
34	--	--	--	--	--	1.41	--	--
35	--	--	--	--	1.35	--	--	--
36	--	--	1.12	--	--	--	--	--
37	--	--	--	0.97	--	--	--	--
38	--	--	--	--	--	1.40	--	--
39	--	--	--	1.13	--	--	--	--
40	--	--	--	1.03	--	--	--	--
41	--	--	--	--	--	1.24	--	--
42	--	--	--	1.12	--	--	--	--
43	--	--	--	1.10	--	--	--	--
44	--	--	--	1.17	--	--	--	--
45	--	--	--	1.04	--	--	--	--
46	--	--	--	0.82	--	--	--	--
47	--	--	--	--	--	1.20	--	--
48	--	--	1.14	--	--	--	--	--
49	--	--	0.94	--	--	--	--	--
50	0.69	--	--	--	--	--	--	--

Figure D.3. Summary of location quotients, by industry, for Lincoln SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$	$0.80 < q_i < 1.20$			$1.20 > q_i < 1.60$		$q_i > 1.60$	
1	--	--	--	--	1.38	--	--	--
2	--	--	--	--	--	1.41	--	--
3	--	--	--	--	--	--	--	--
4	0.23	--	--	--	--	--	--	--
5	0.62	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	4.22
7	--	--	--	0.81	--	--	--	--
8	--	0.31	--	--	--	--	--	--
9	--	0.09	--	--	--	--	--	--
10	--	0.03	--	--	--	--	--	--
11	--	0.04	--	--	--	--	--	--
12	--	0.16	--	--	--	--	--	--
13	--	0.19	--	--	--	--	--	--
14	--	0.21	--	--	--	--	--	--
15	--	0.06	--	--	--	--	--	--
16	--	0.35	--	--	--	--	--	--
17	--	0.29	--	--	--	--	--	--
18	--	0.05	--	--	--	--	--	--
19	--	0.12	--	--	--	--	--	--
20	--	0.02	--	--	--	--	--	--
21	--	0.05	--	--	--	--	--	--
22	--	0.22	--	--	--	--	--	--
23	--	--	1.08	--	--	--	--	--
24	--	0.45	--	--	--	--	--	--
25	--	--	--	--	--	--	--	2.01
26	--	0.77	--	--	--	--	--	--
27	--	--	--	--	1.33	--	--	--
28	--	--	--	1.15	--	--	--	--
29	--	--	--	--	1.53	--	--	--
30	--	--	--	--	--	--	1.97	--
31	--	--	1.14	--	--	--	--	--
32	--	0.79	--	--	--	--	--	--
33	--	--	--	--	--	1.28	--	--
34	--	--	--	1.19	--	--	--	--
35	--	--	--	--	1.25	--	--	--
36	--	--	1.13	--	--	--	--	--
37	--	0.68	--	--	--	--	--	--
38	--	--	--	1.18	--	--	--	--
39	--	--	--	1.04	--	--	--	--
40	--	--	--	1.07	--	--	--	--
41	--	--	--	1.00	--	--	--	--
42	--	--	--	1.14	--	--	--	--
43	--	--	--	--	--	1.21	--	--
44	--	--	--	--	--	1.58	--	--
45	--	--	--	0.77	--	--	--	--
46	--	--	--	--	--	--	--	1.88
47	--	--	--	1.18	--	--	--	--
48	--	--	1.06	--	--	--	--	--
49	0.70	--	--	--	--	--	--	--
50	--	--	0.85	--	--	--	--	--

Figure D.4. Summary of location quotients, by industry, for Topeka SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$	$0.80 < q_i < 1.20$			$1.20 < q_i < 1.60$			$q_i > 1.60$
1	0.54	--	--	--	--	--	--	--
2	--	0.55	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--
4	0.10	--	--	--	--	--	--	--
5	--	--	1.06	--	--	--	--	--
6	--	--	--	--	--	--	--	5.45
7	--	0.76	--	--	--	--	--	--
8	--	--	--	0.88	--	--	--	--
9	--	--	--	0.91	--	--	--	--
10	--	0.01	--	--	--	--	--	--
11	--	--	--	--	--	1.34	--	--
12	--	--	--	1.11	--	--	--	--
13	--	0.24	--	--	--	--	--	--
14	--	0.31	--	--	--	--	--	--
15	--	0.18	--	--	--	--	--	--
16	--	0.44	--	--	--	--	--	--
17	--	0.19	--	--	--	--	--	--
18	--	--	--	1.06	--	--	--	--
19	--	0.17	--	--	--	--	--	--
20	--	0.07	--	--	--	--	--	--
21	--	0.14	--	--	--	--	--	--
22	--	0.25	--	--	--	--	--	--
23	--	--	--	--	1.33	--	--	--
24	--	--	--	--	--	--	--	1.62
25	--	--	--	--	--	--	--	1.62
26	--	0.71	--	--	--	--	--	--
27	--	--	1.12	--	--	--	--	--
28	--	--	--	0.97	--	--	--	--
29	--	--	--	--	--	1.27	--	--
30	--	--	--	--	--	--	1.67	--
31	--	--	1.12	--	--	--	--	--
32	--	--	--	0.84	--	--	--	--
33	--	--	--	0.96	--	--	--	--
34	--	--	--	--	--	1.24	--	--
35	--	--	0.87	--	--	--	--	--
36	--	--	0.96	--	--	--	--	--
37	--	0.72	--	--	--	--	--	--
38	--	--	--	1.03	--	--	--	--
39	--	--	--	0.99	--	--	--	--
40	--	0.75	--	--	--	--	--	--
41	--	--	--	1.23	--	--	--	--
42	--	--	--	0.85	--	--	--	--
43	--	--	--	0.97	--	--	--	--
44	--	--	--	--	--	1.54	--	--
45	--	0.59	--	--	--	--	--	--
46	--	0.75	--	--	--	--	--	--
47	--	--	--	1.06	--	--	--	--
48	--	--	0.88	--	--	--	--	--
49	0.75	--	--	--	--	--	--	--
50	--	--	1.01	--	--	--	--	--

Figure D.5. Summary of location quotients, by industry, for Springfield SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS			
	Non-Basic Employment		Basic Employment	
	$q_i < 0.80$	$0.80 < q_i < 1.20$	$1.20 < q_i < 1.60$	$q_i > 1.60$
1	-- --	1.04 --	-- --	-- --
2	-- --	-- 1.06	-- --	-- --
3	-- 0.27	-- --	-- --	-- --
4	0.04 --	-- --	-- --	-- --
5	0.74 --	-- --	-- --	-- --
6	-- --	-- --	-- --	-- 3.99
7	-- --	-- 1.02	-- --	-- --
8	-- 0.13	-- --	-- --	-- --
9	-- 0.15	-- --	-- --	-- --
10	-- 0.01	-- --	-- --	-- --
11	-- 0.27	-- --	-- --	-- --
12	-- 0.15	-- --	-- --	-- --
13	-- 0.38	-- --	-- --	-- --
14	-- 0.18	-- --	-- --	-- --
15	-- 0.13	-- --	-- --	-- --
16	-- 0.22	-- --	-- --	-- --
17	-- 0.65	-- --	-- --	-- --
18	-- 0.74	-- --	-- --	-- --
19	-- 0.29	-- --	-- --	-- --
20	-- 0.31	-- --	-- --	-- --
21	-- 0.05	-- --	-- --	-- --
22	-- 0.46	-- --	-- --	-- --
23	-- --	1.18 --	-- --	-- --
24	-- --	-- 1.19	-- --	-- --
25	-- --	-- --	-- 1.55	-- --
26	-- 0.79	-- --	-- --	-- --
27	-- --	1.05 --	-- --	-- --
28	-- --	-- 1.16	-- --	-- --
29	-- --	-- 0.94	-- --	-- --
30	-- --	-- --	-- --	1.96 --
31	-- --	-- --	1.27 --	-- --
32	-- --	-- 1.00	-- --	-- --
33	-- --	-- --	-- 1.30	-- --
34	-- --	-- --	-- 1.34	-- --
35	-- --	0.98 --	-- --	-- --
36	-- --	1.01 --	-- --	-- --
37	-- 0.82	-- --	-- --	-- --
38	-- --	-- 1.14	-- --	-- --
39	-- 0.85	-- --	-- --	-- --
40	-- 0.71	-- --	-- --	-- --
41	-- --	-- 0.99	-- --	-- --
42	-- --	-- 0.86	-- --	-- --
43	-- --	-- 1.11	-- --	-- --
44	-- --	-- --	-- 1.46	-- --
45	-- --	-- 0.83	-- --	-- --
46	-- --	-- --	-- 1.38	-- --
47	-- --	-- 1.06	-- --	-- --
48	-- --	0.94 --	-- --	-- --
49	-- --	0.88 --	-- --	-- --
50	-- --	1.06 --	-- --	-- --

Figure D.6. Summary of location quotients, by industry, for Sioux City SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$	$0.80 < q_i < 1.20$			$1.20 < q_i < 1.60$		$q_i > 1.60$	
1	0.64	--	--	--	--	--	--	--
2	--	0.65	--	--	--	--	--	--
3	--	0.07	--	--	--	--	--	--
4	0.15	--	--	--	--	--	--	--
5	0.77	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	1.76
7	--	--	--	--	--	1.21	--	--
8	--	0.37	--	--	--	--	--	--
9	--	--	--	1.08	--	--	--	--
10	--	0.03	--	--	--	--	--	--
11	--	--	--	0.89	--	--	--	--
12	--	--	--	--	--	--	--	1.79
13	--	--	--	0.85	--	--	--	--
14	--	0.22	--	--	--	--	--	--
15	--	0.04	--	--	--	--	--	--
16	--	0.40	--	--	--	--	--	--
17	--	0.76	--	--	--	--	--	--
18	--	0.05	--	--	--	--	--	--
19	--	0.54	--	--	--	--	--	--
20	--	--	--	--	--	1.28	--	--
21	--	0.07	--	--	--	--	--	--
22	--	0.43	--	--	--	--	--	--
23	--	--	--	--	--	--	1.78	--
24	--	--	--	--	--	--	--	3.01
25	--	--	--	--	--	--	--	1.62
26	--	0.64	--	--	--	--	--	--
27	--	--	1.12	--	--	--	--	--
28	--	--	--	1.12	--	--	--	--
29	--	--	--	1.12	--	--	--	--
30	--	--	--	--	1.51	--	--	--
31	--	--	--	--	1.24	--	--	--
32	--	--	--	0.92	--	--	--	--
33	--	--	--	1.08	--	--	--	--
34	--	--	--	--	--	1.38	--	--
35	--	--	0.89	--	--	--	--	--
36	--	--	1.08	--	--	--	--	--
37	--	0.77	--	--	--	--	--	--
38	--	--	--	--	--	1.54	--	--
39	--	--	--	1.01	--	--	--	--
40	--	0.79	--	--	--	--	--	--
41	--	--	--	--	--	1.23	--	--
42	--	0.76	--	--	--	--	--	--
43	--	--	--	1.11	--	--	--	--
44	--	--	--	1.12	--	--	--	--
45	--	--	--	1.03	--	--	--	--
46	--	--	--	--	--	1.31	--	--
47	--	--	--	1.12	--	--	--	--
48	--	--	1.16	--	--	--	--	--
49	0.73	--	--	--	--	--	--	--
50	--	--	0.91	--	--	--	--	--

Figure D.7. Summary for location quotients, by industry, for St. Joseph SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$	$0.80 < q_i < 1.20$			$1.20 < q_i < 1.60$		$q_i > 1.60$	
1	0.37	--	--	--	--	--	--	--
2	--	0.38	--	--	--	--	--	--
3	--	0.13	--	--	--	--	--	--
4	0.11	--	--	--	--	--	--	--
5	0.42	--	--	--	--	--	--	--
6	--	--	--	0.95	--	--	--	--
7	--	--	--	--	--	--	--	1.93
8	--	0.61	--	--	--	--	--	--
9	--	0.51	--	--	--	--	--	--
10	--	0.01	--	--	--	--	--	--
11	--	0.06	--	--	--	--	--	--
12	--	--	--	1.09	--	--	--	--
13	--	0.09	--	--	--	--	--	--
14	--	0.11	--	--	--	--	--	--
15	--	0.07	--	--	--	--	--	--
16	--	0.16	--	--	--	--	--	--
17	--	0.19	--	--	--	--	--	--
18	--	0.04	--	--	--	--	--	--
19	--	0.08	--	--	--	--	--	--
20	--	0.01	--	--	--	--	--	--
21	--	0.02	--	--	--	--	--	--
22	--	0.16	--	--	--	--	--	--
23	--	--	--	--	--	--	2.21	--
24	--	--	--	--	--	--	--	5.14
25	--	--	--	0.91	--	--	--	--
26	--	0.42	--	--	--	--	--	--
27	--	--	--	--	--	--	1.61	--
28	--	--	--	--	--	--	--	2.00
29	--	--	--	--	--	1.24	--	--
30	--	--	1.02	--	--	--	--	--
31	--	--	1.07	--	--	--	--	--
32	--	0.79	--	--	--	--	--	--
33	--	--	--	0.91	--	--	--	--
34	--	--	--	--	--	1.20	--	--
35	--	--	--	--	1.27	--	--	--
36	--	--	--	--	1.21	--	--	--
37	--	--	--	1.00	--	--	--	--
38	--	--	--	0.84	--	--	--	--
39	--	--	--	0.89	--	--	--	--
40	--	--	--	0.82	--	--	--	--
41	--	--	--	0.95	--	--	--	--
42	--	0.69	--	--	--	--	--	--
43	--	--	--	--	--	1.48	--	--
44	--	--	--	--	--	--	--	2.62
45	--	--	--	1.02	--	--	--	--
46	--	0.61	--	--	--	--	--	--
47	--	--	--	--	--	1.47	--	--
48	--	--	--	--	1.27	--	--	--
49	--	--	--	--	--	--	1.93	--
50	--	--	--	--	1.27	--	--	--

Figure D.8. Summary of location quotients, by industry, for Sioux Falls SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$	$0.80 < q_i < 1.20$			$1.20 < q_i < 1.60$			$q_i > 1.60$
1	0.57	--	--	--	--	--	--	--
2	--	0.58	--	--	--	--	--	--
3	--	0.20	--	--	--	--	--	--
4	0.06	--	--	--	--	--	--	--
5	0.51	--	--	--	--	--	--	--
6	--	--	--	--	--	1.48	--	--
7	--	--	--	--	--	1.41	--	--
8	--	0.52	--	--	--	--	--	--
9	--	0.31	--	--	--	--	--	--
10	--	0.03	--	--	--	--	--	--
11	--	0.11	--	--	--	--	--	--
12	--	0.61	--	--	--	--	--	--
13	--	0.24	--	--	--	--	--	--
14	--	0.22	--	--	--	--	--	--
15	--	0.11	--	--	--	--	--	--
16	--	0.32	--	--	--	--	--	--
17	--	0.15	--	--	--	--	--	--
18	--	0.52	--	--	--	--	--	--
19	--	0.38	--	--	--	--	--	--
20	--	0.04	--	--	--	--	--	--
21	--	0.78	--	--	--	--	--	--
22	--	0.31	--	--	--	--	--	--
23	--	--	--	--	1.25	--	--	--
24	--	--	--	--	--	--	--	2.53
25	--	0.75	--	--	--	--	--	--
26	--	0.38	--	--	--	--	--	--
27	--	--	--	--	1.27	--	--	--
28	--	--	--	--	--	1.49	--	--
29	--	--	--	1.08	--	--	--	--
30	--	--	1.04	--	--	--	--	--
31	--	--	1.12	--	--	--	--	--
32	--	--	--	0.81	--	--	--	--
33	--	--	--	0.89	--	--	--	--
34	--	--	--	--	--	1.27	--	--
35	--	--	--	--	1.46	--	--	--
36	--	--	--	--	1.45	--	--	--
37	--	--	--	--	--	--	--	1.63
38	--	--	--	0.96	--	--	--	--
39	--	--	--	1.11	--	--	--	--
40	--	--	--	1.08	--	--	--	--
41	--	--	--	1.14	--	--	--	--
42	--	--	--	1.12	--	--	--	--
43	--	--	--	--	--	--	--	1.68
44	--	--	--	--	--	--	--	1.61
45	--	--	--	--	--	--	--	2.07
46	--	--	--	--	--	1.58	--	--
47	--	--	--	--	--	1.37	--	--
48	--	--	--	--	1.24	--	--	--
49	--	--	--	--	1.43	--	--	--
50	0.63	--	--	--	--	--	--	--

Figure D.9. Summary of location quotients, by industry, for Billings SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$		$0.80 < q_i < 1.20$		$1.20 < q_i < 1.60$		$q_i > 1.60$	
1	0.50	--	--	--	--	--	--	--
2	--	0.51	--	--	--	--	--	--
3	--	0.20	--	--	--	--	--	--
4	0.10	--	--	--	--	--	--	--
5	0.76	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	3.23
7	--	--	--	1.05	--	--	--	--
8	--	0.51	--	--	--	--	--	--
9	--	0.20	--	--	--	--	--	--
10	--	0.02	--	--	--	--	--	--
11	--	0.22	--	--	--	--	--	--
12	--	0.28	--	--	--	--	--	--
13	--	0.37	--	--	--	--	--	--
14	--	0.45	--	--	--	--	--	--
15	--	0.31	--	--	--	--	--	--
16	--	0.59	--	--	--	--	--	--
17	--	0.54	--	--	--	--	--	--
18	--	--	--	1.03	--	--	--	--
19	--	0.34	--	--	--	--	--	--
20	--	0.31	--	--	--	--	--	--
21	--	0.07	--	--	--	--	--	--
22	--	0.55	--	--	--	--	--	--
23	--	--	--	--	--	--	2.07	--
24	--	--	--	--	--	--	--	3.68
25	--	--	--	--	--	1.56	--	--
26	--	--	--	0.88	--	--	--	--
27	--	--	--	--	1.50	--	--	--
28	--	--	--	--	--	1.53	--	--
29	--	--	--	--	--	1.47	--	--
30	--	--	--	--	1.46	--	--	--
31	--	--	1.02	--	--	--	--	--
32	--	--	--	0.90	--	--	--	--
33	--	--	--	1.05	--	--	--	--
34	--	--	--	1.04	--	--	--	--
35	--	--	--	--	--	--	1.74	--
36	--	--	1.01	--	--	--	--	--
37	--	--	--	0.94	--	--	--	--
38	--	--	--	1.11	--	--	--	--
39	--	--	--	0.83	--	--	--	--
40	--	0.62	--	--	--	--	--	--
41	--	--	--	1.05	--	--	--	--
42	--	--	--	1.10	--	--	--	--
43	--	--	--	1.08	--	--	--	--
44	--	--	--	--	--	1.48	--	--
45	--	0.68	--	--	--	--	--	--
46	--	--	--	1.09	--	--	--	--
47	--	--	--	--	--	1.23	--	--
48	--	--	1.10	--	--	--	--	--
49	--	--	0.89	--	--	--	--	--
50	--	--	0.96	--	--	--	--	--

Figure D.10. Summary of location quotients, by industry, for Great Falls SMSA, 1960.

INDUSTRY	LOCATION QUOTIENTS							
	Non-Basic Employment				Basic Employment			
	$q_i < 0.80$		$0.80 < q_i < 1.20$		$1.20 < q_i < 1.60$		$q_i > 1.60$	
1	0.29	--	--	--	--	--	--	--
2	--	0.29	--	--	--	--	--	--
3	--	0.40	--	--	--	--	--	--
4	--	--	0.92	--	--	--	--	--
5	0.71	--	--	--	--	--	--	--
6	--	--	--	1.15	--	--	--	--
7	--	--	--	1.11	--	--	--	--
8	--	0.55	--	--	--	--	--	--
9	--	0.59	--	--	--	--	--	--
10	--	0.04	--	--	--	--	--	--
11	--	0.27	--	--	--	--	--	--
12	--	--	--	1.11	--	--	--	--
13	--	0.25	--	--	--	--	--	--
14	--	--	--	1.19	--	--	--	--
15	--	0.23	--	--	--	--	--	--
16	--	--	--	--	--	--	--	2.11
17	--	0.60	--	--	--	--	--	--
18	--	0.32	--	--	--	--	--	--
19	--	0.48	--	--	--	--	--	--
20	--	0.19	--	--	--	--	--	--
21	--	0.34	--	--	--	--	--	--
22	--	0.76	--	--	--	--	--	--
23	--	--	--	--	1.23	--	--	--
24	--	--	--	1.05	--	--	--	--
25	--	--	--	--	--	1.43	--	--
26	--	--	--	--	--	1.23	--	--
27	--	--	--	--	1.23	--	--	--
28	--	--	--	--	--	1.44	--	--
29	--	--	--	1.03	--	--	--	--
30	--	--	--	--	1.44	--	--	--
31	--	--	1.10	--	--	--	--	--
32	--	--	--	1.01	--	--	--	--
33	--	--	--	1.10	--	--	--	--
34	--	--	--	1.12	--	--	--	--
35	--	--	--	--	1.41	--	--	--
36	--	--	1.16	--	--	--	--	--
37	--	--	--	--	--	1.25	--	--
38	--	--	--	1.18	--	--	--	--
39	--	--	--	1.00	--	--	--	--
40	--	0.78	--	--	--	--	--	--
41	--	--	--	--	--	1.22	--	--
42	--	--	--	1.19	--	--	--	--
43	--	--	--	--	--	1.22	--	--
44	--	--	--	--	--	1.26	--	--
45	--	--	--	1.18	--	--	--	--
46	--	--	--	1.03	--	--	--	--
47	--	--	--	--	--	1.30	--	--
48	--	--	1.18	--	--	--	--	--
49	--	--	--	--	1.48	--	--	--
50	--	--	0.96	--	--	--	--	--

XVI. APPENDIX E: FOUR-SECTOR EMPLOYMENT PROJECTIONS

Figure E.1. Four-sector employment projections, Denver SMSA, 1940-2020.

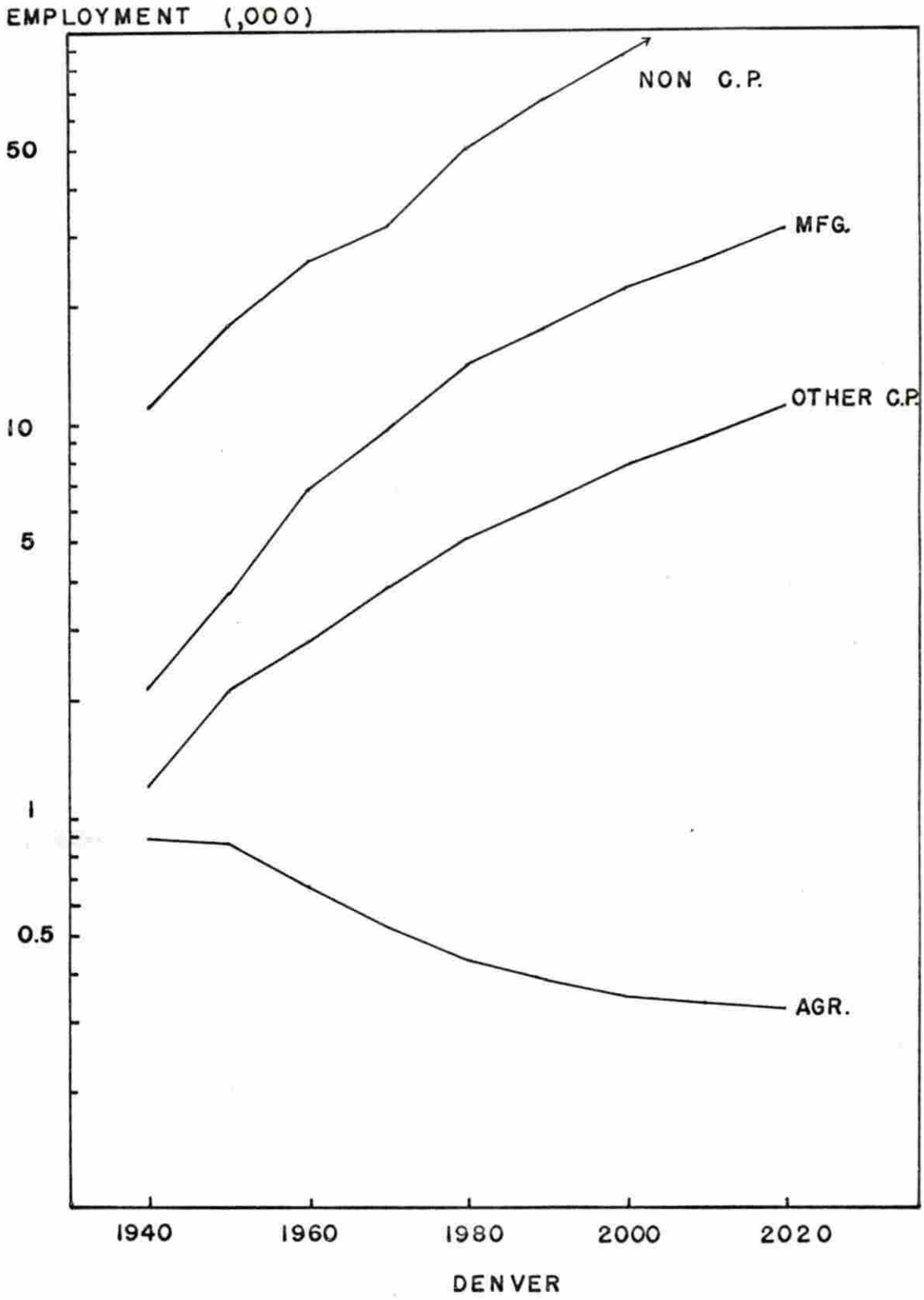

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
MFG.
OTHER C.P.
AGR.
1940
1960
1980
2000
2020
DENVER

Figure E.2. Four-sector employment projections, Omaha SMSA, 1940–2020.

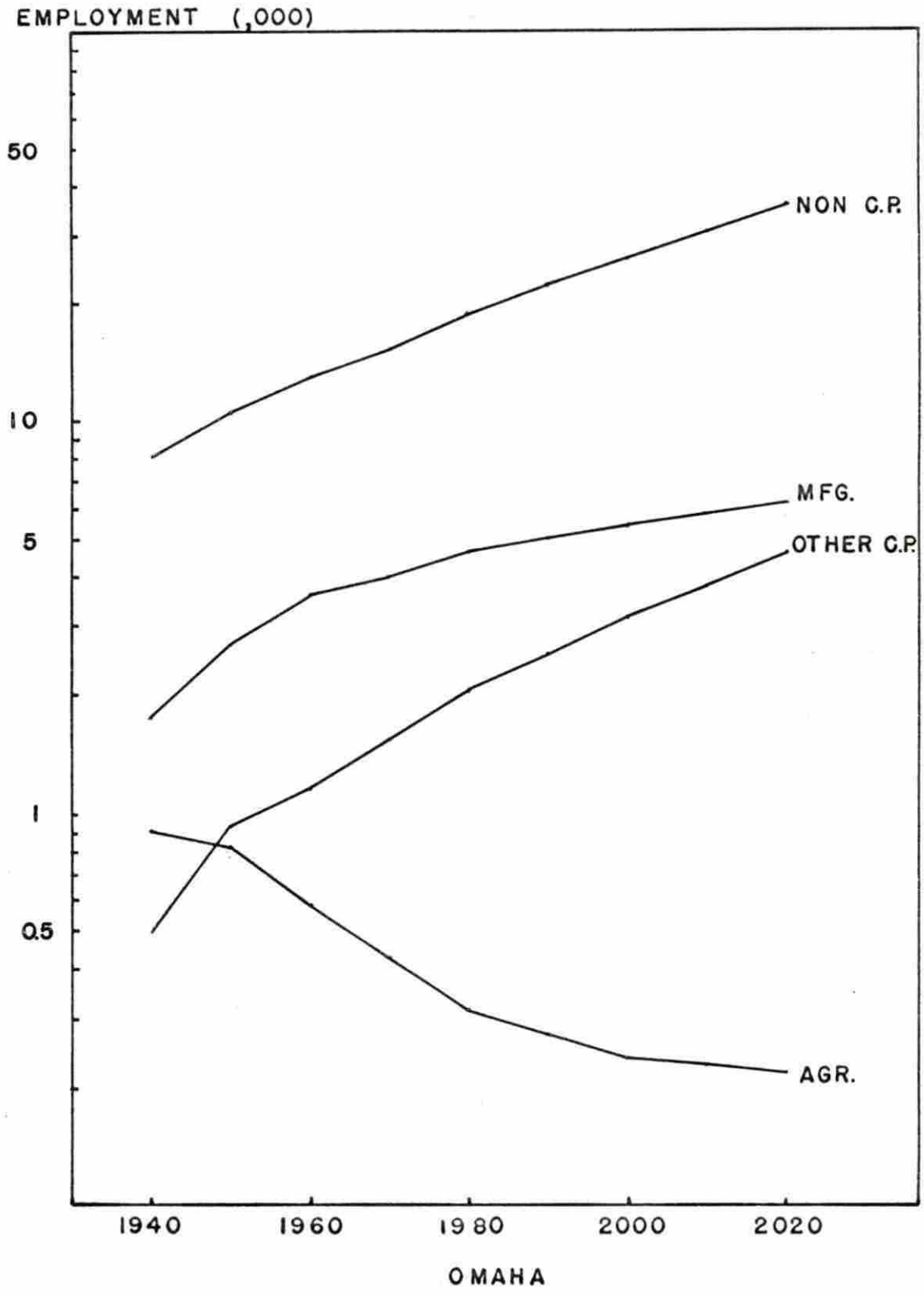

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
MFG.
OTHER C.P.
AGR.
1940
1960
1980
2000
2020
OMAHA

Figure E.3. Four-sector employment projections, Lincoln SMSA, 1940-2020.

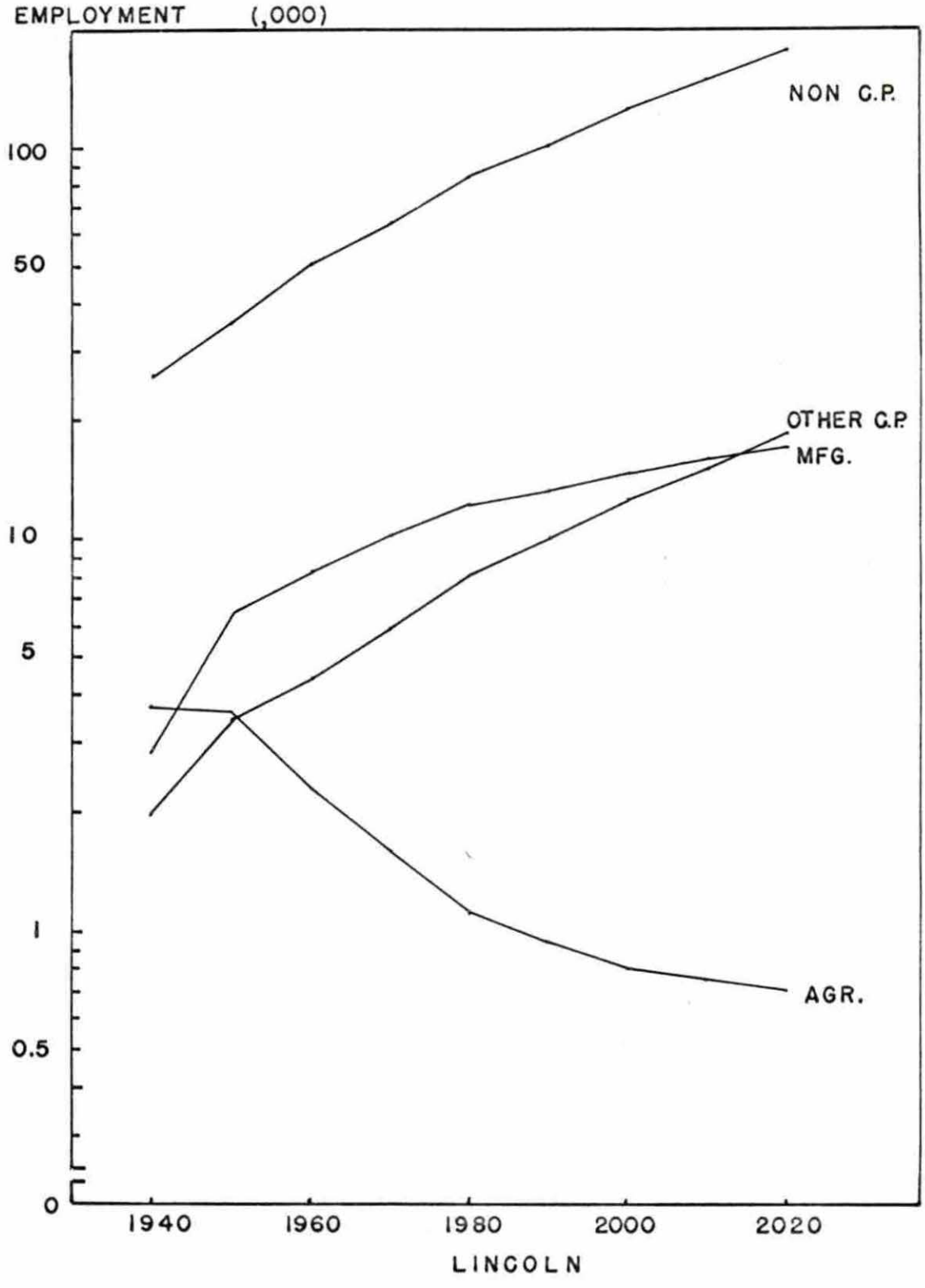

EMPLOYMENT (,000)
NON C.P.
OTHER C.P.
MFG.
AGR.
100
50
10
5
1
0.5
0
1940
1960
1980
2000
2020
LINCOLN

Figure E.4. Four-sector employment projections, Topeka SMSA, 1940-2020.

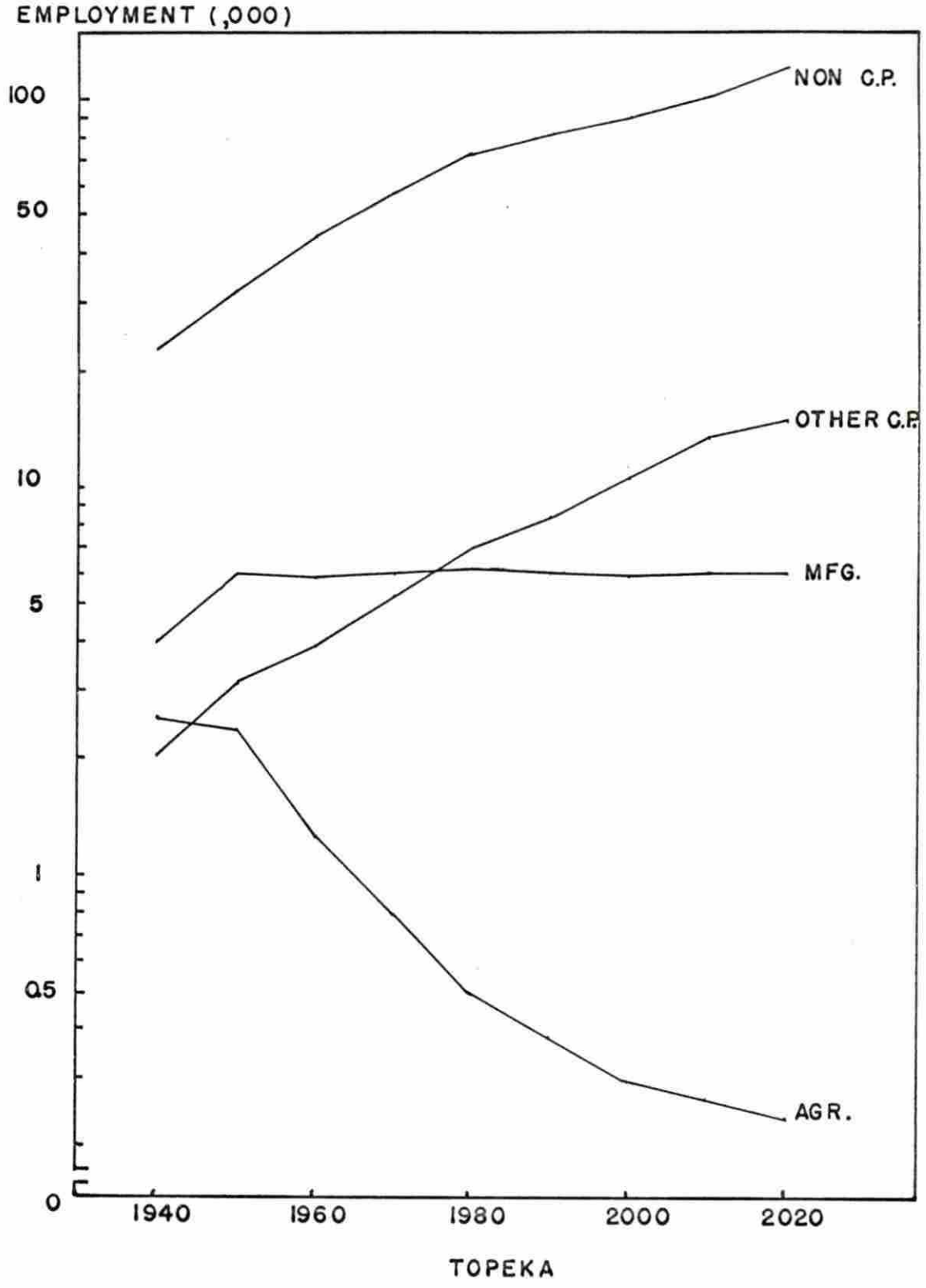

EMPLOYMENT (,000)
100
50
10
5
1
0.5
0
NON C.P.
OTHER C.P.
MFG.
AGR.
1940
1960
1980
2000
2020
TOPEKA

Figure E.5. Four-sector employment projections, Springfield SMSA, 1940-2020.

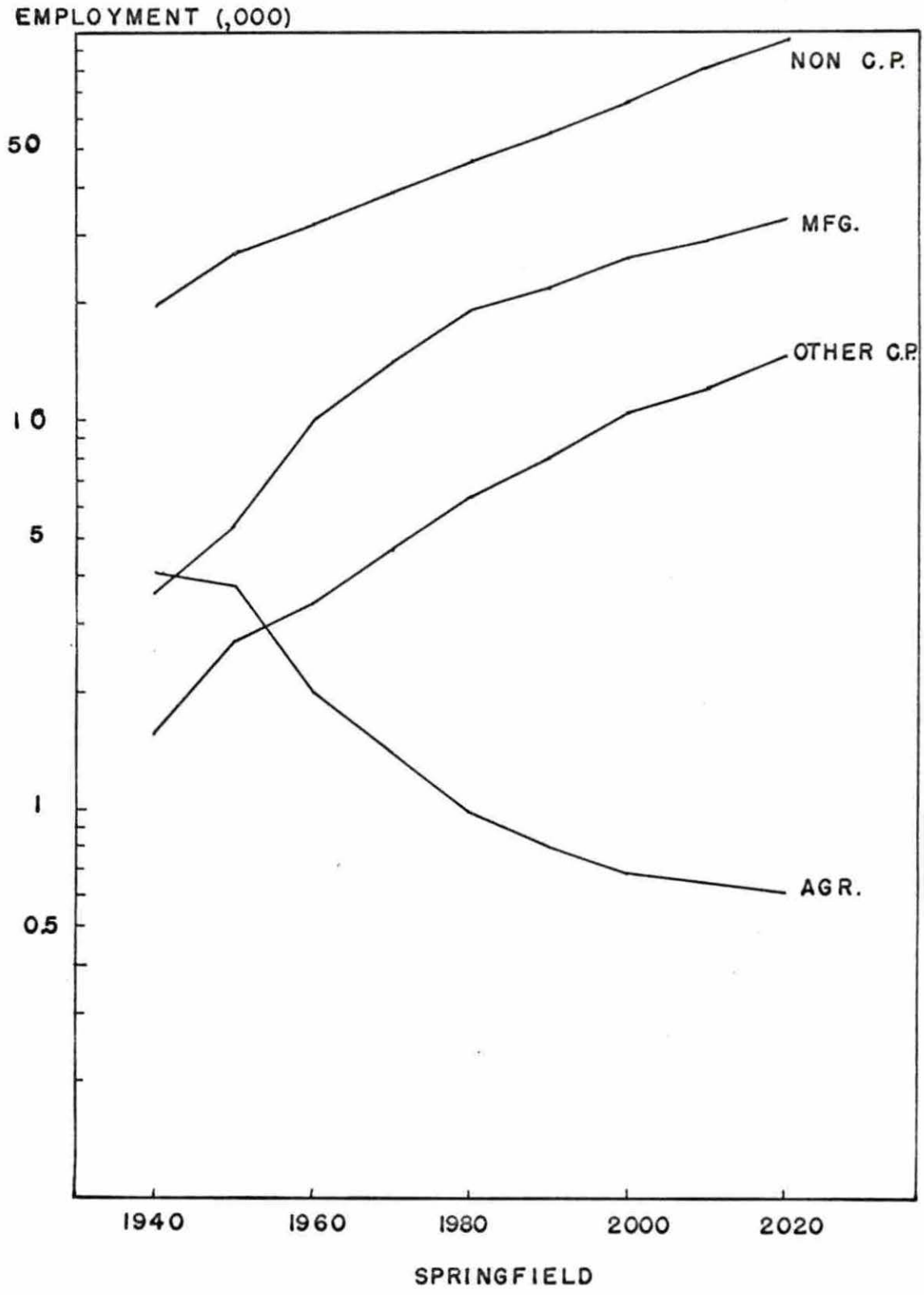

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
MFG.
OTHER C.P.
AGR.
1940
1960
1980
2000
2020
SPRINGFIELD

Figure E.6. Four-sector employment projections, Sioux City smsa, 1940-2020.

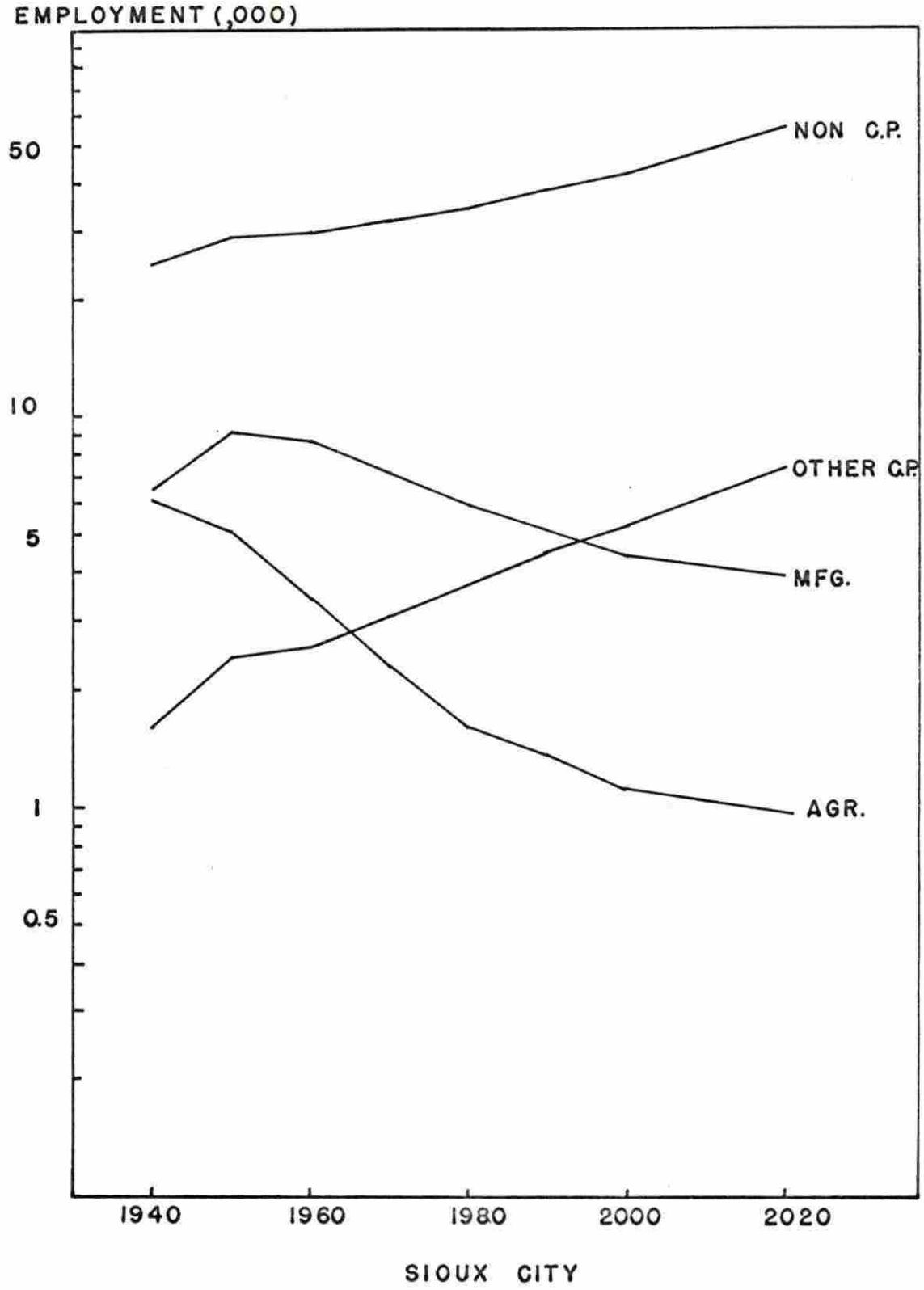

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
OTHER C.P.
MFG.
AGR.
1940
1960
1980
2000
2020
SIOUX CITY

Figure E.7. Four-sector employment projections, St. Joseph SMSA, 1940-2020.

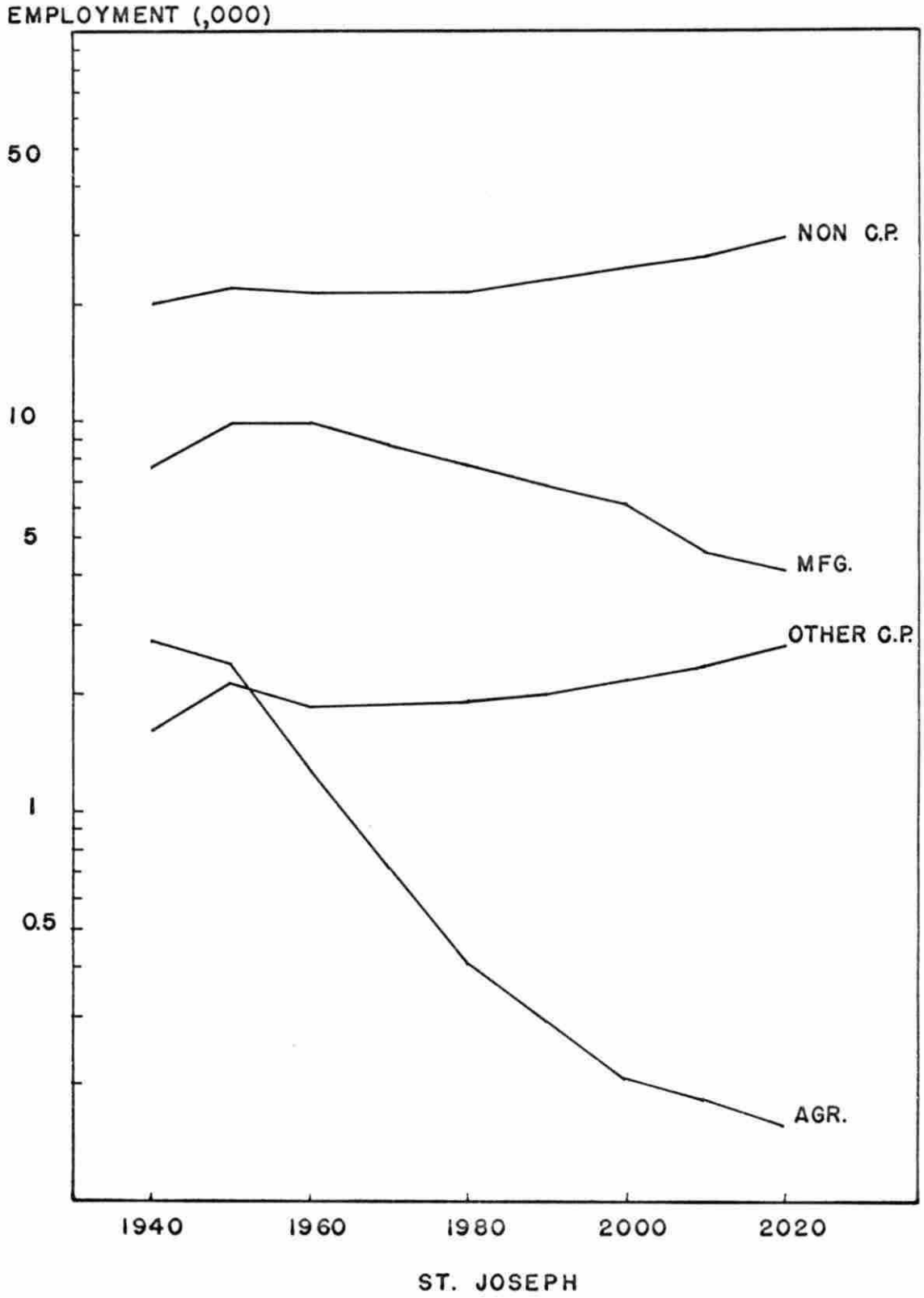

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
MFG.
OTHER C.P.
AGR.
1940
1960
1980
2000
2020
ST. JOSEPH

Figure E.8. Four-sector employment projections, Sioux Falls SMSA, 1940–2020.

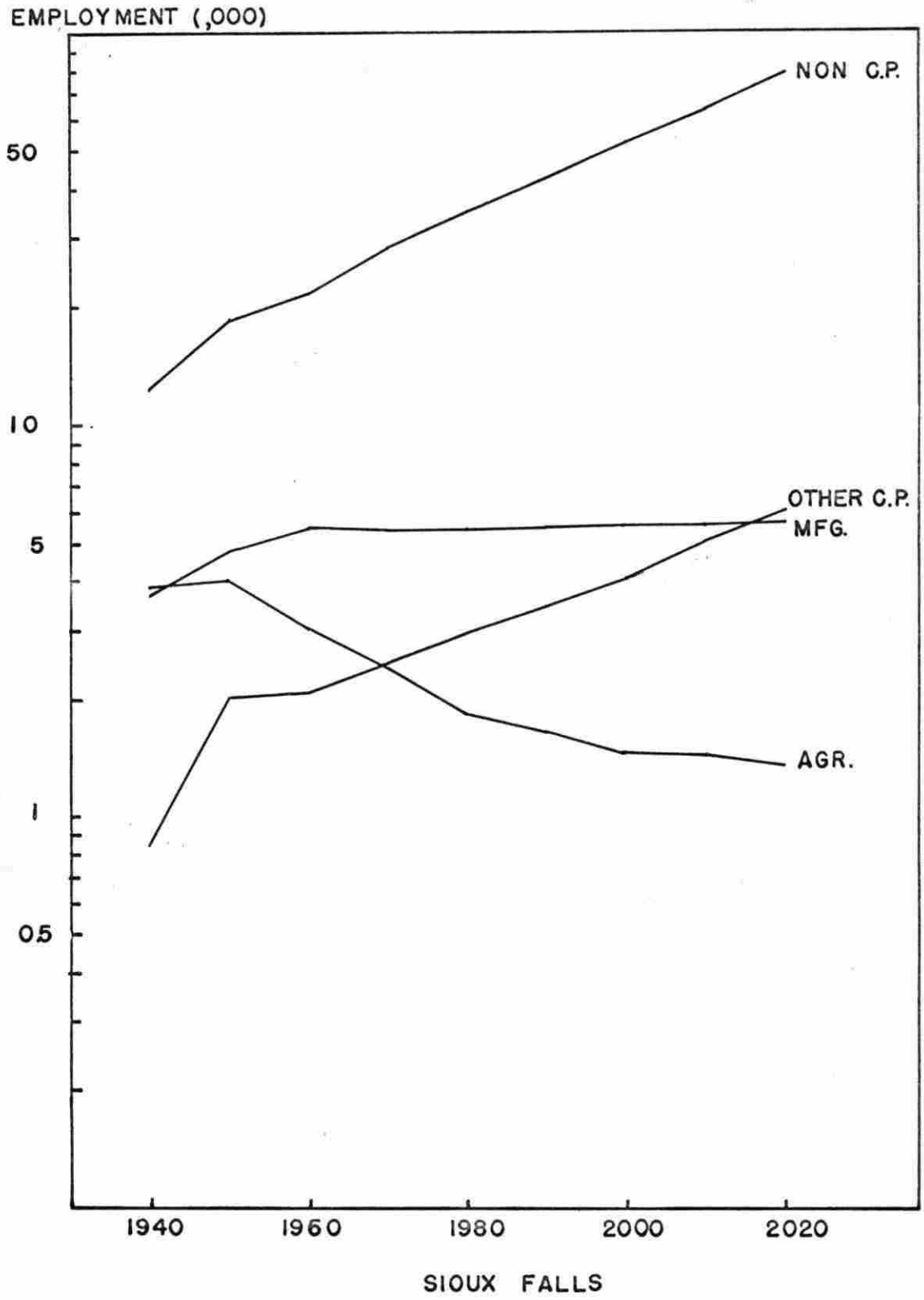

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
OTHER C.P.
MFG.
AGR.
1940
1960
1980
2000
2020
SIOUX FALLS

Figure E.9. Four-sector employment projections, Billings SMSA, 1940-2020.

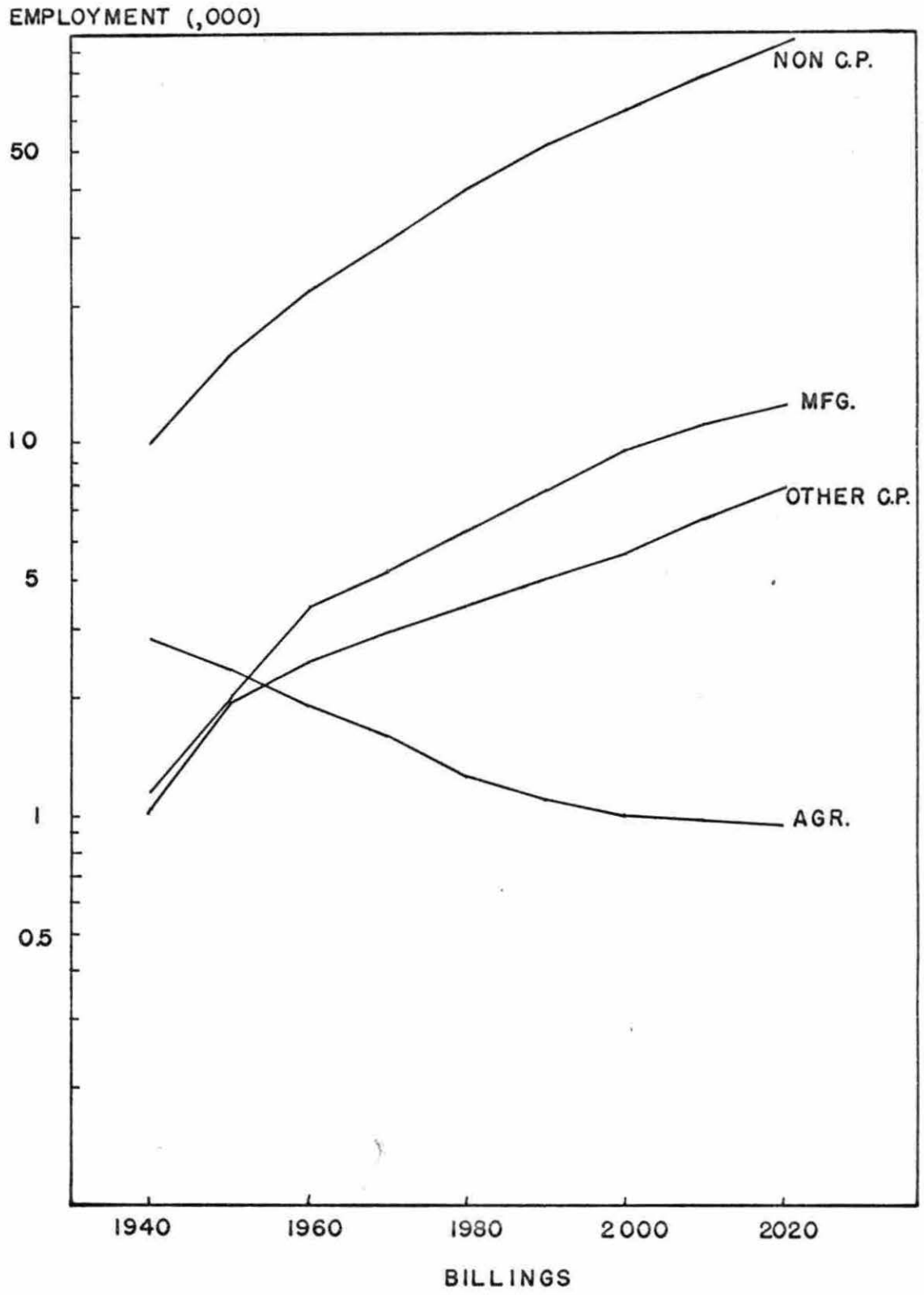
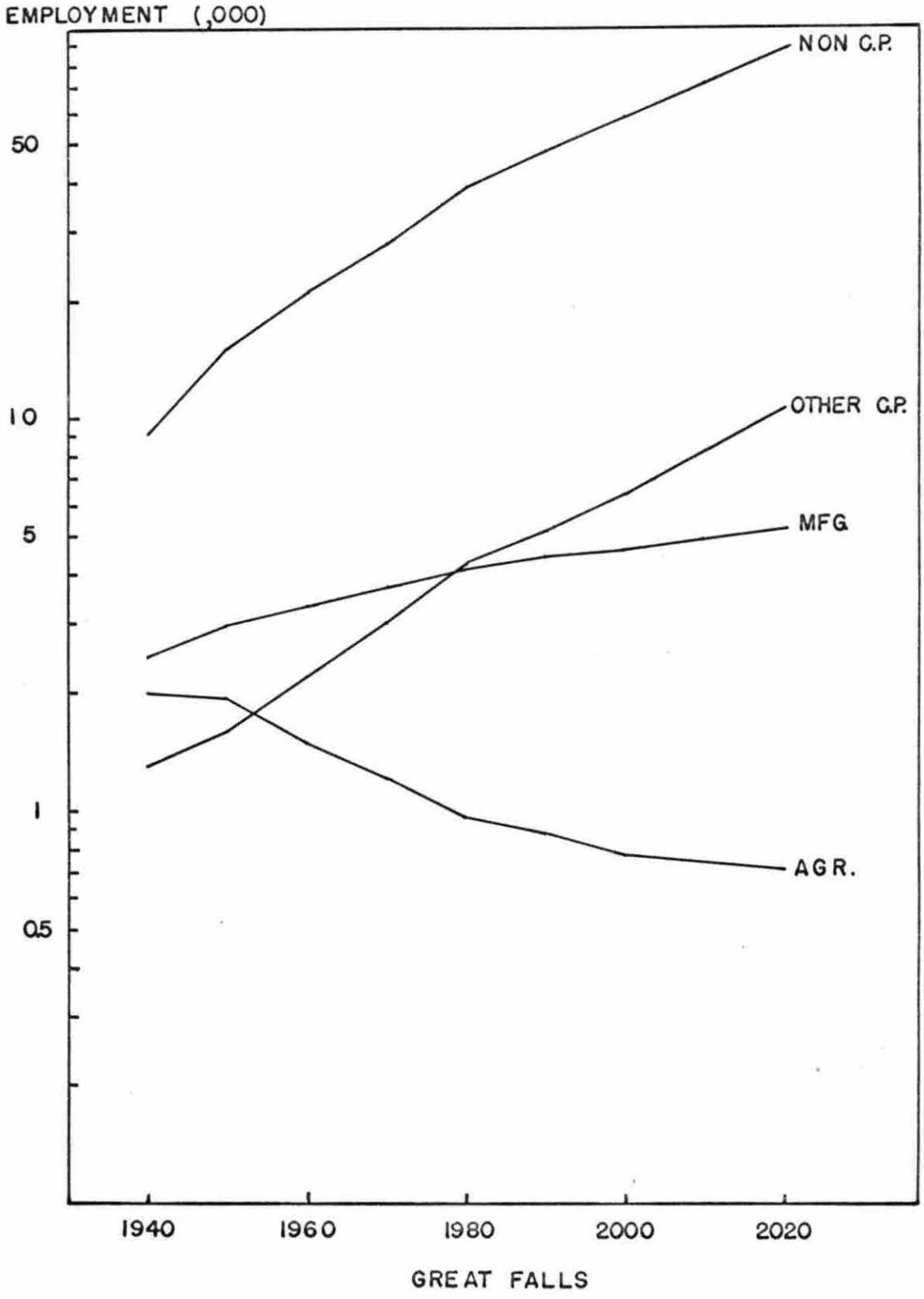

EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
MFG.
OTHER C.P.
AGR.
1940
1960
1980
2000
2020
BILLINGS

Figure E.10. Four-sector employment projections, Great Falls SMSA, 1940-2020.


EMPLOYMENT (,000)
50
10
5
1
0.5
NON C.P.
OTHER C.P.
MFG.
AGR.
1940
1960
1980
2000
2020
GREAT FALLS

XVII. APPENDIX F: REGIONAL-SHARE COEFFICIENT PROJECTIONS

Figure F.1. Shift analysis projection, regional-share coefficient ("C" effect) for Denver SMSA, 1940-1960.

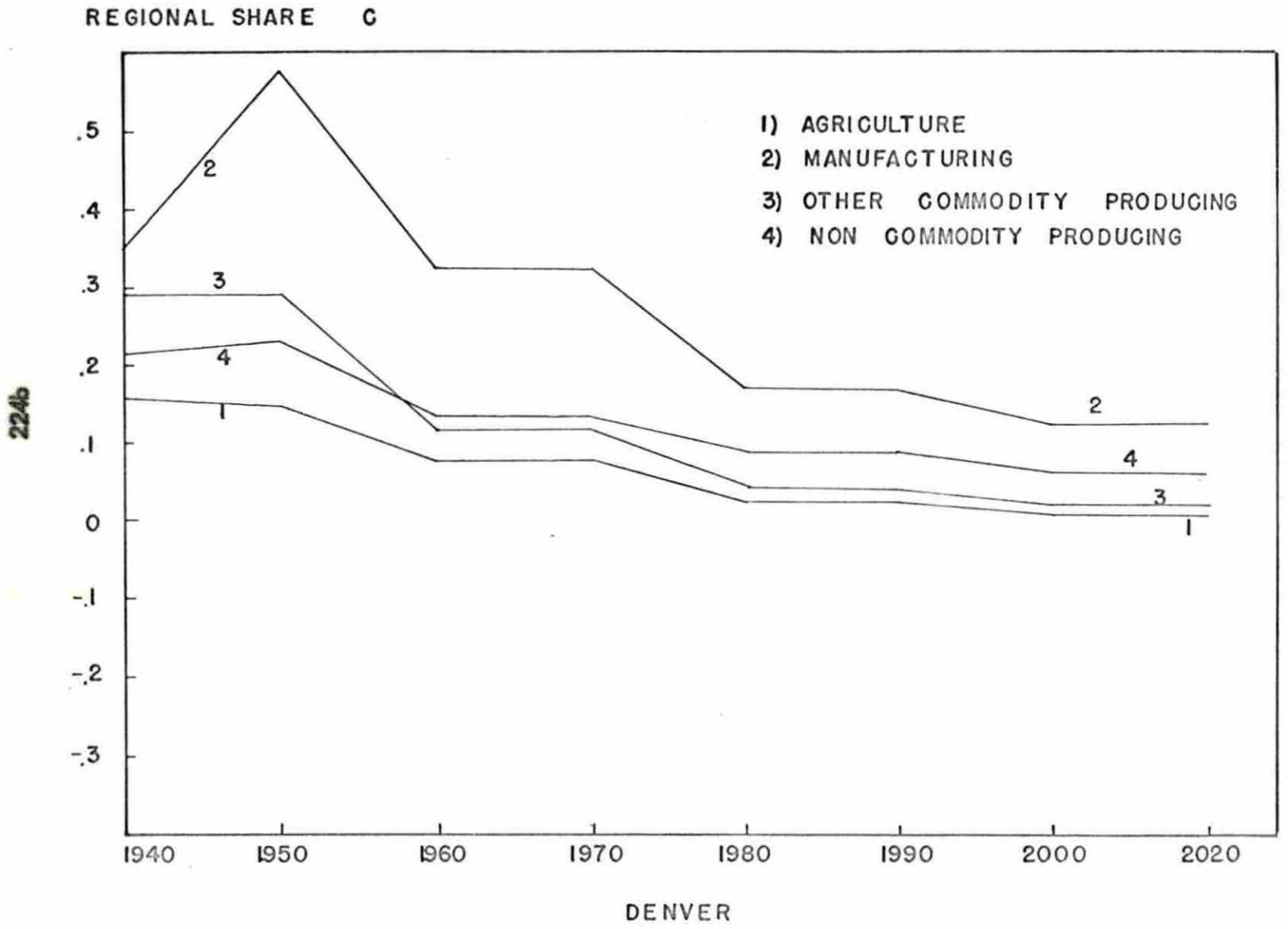
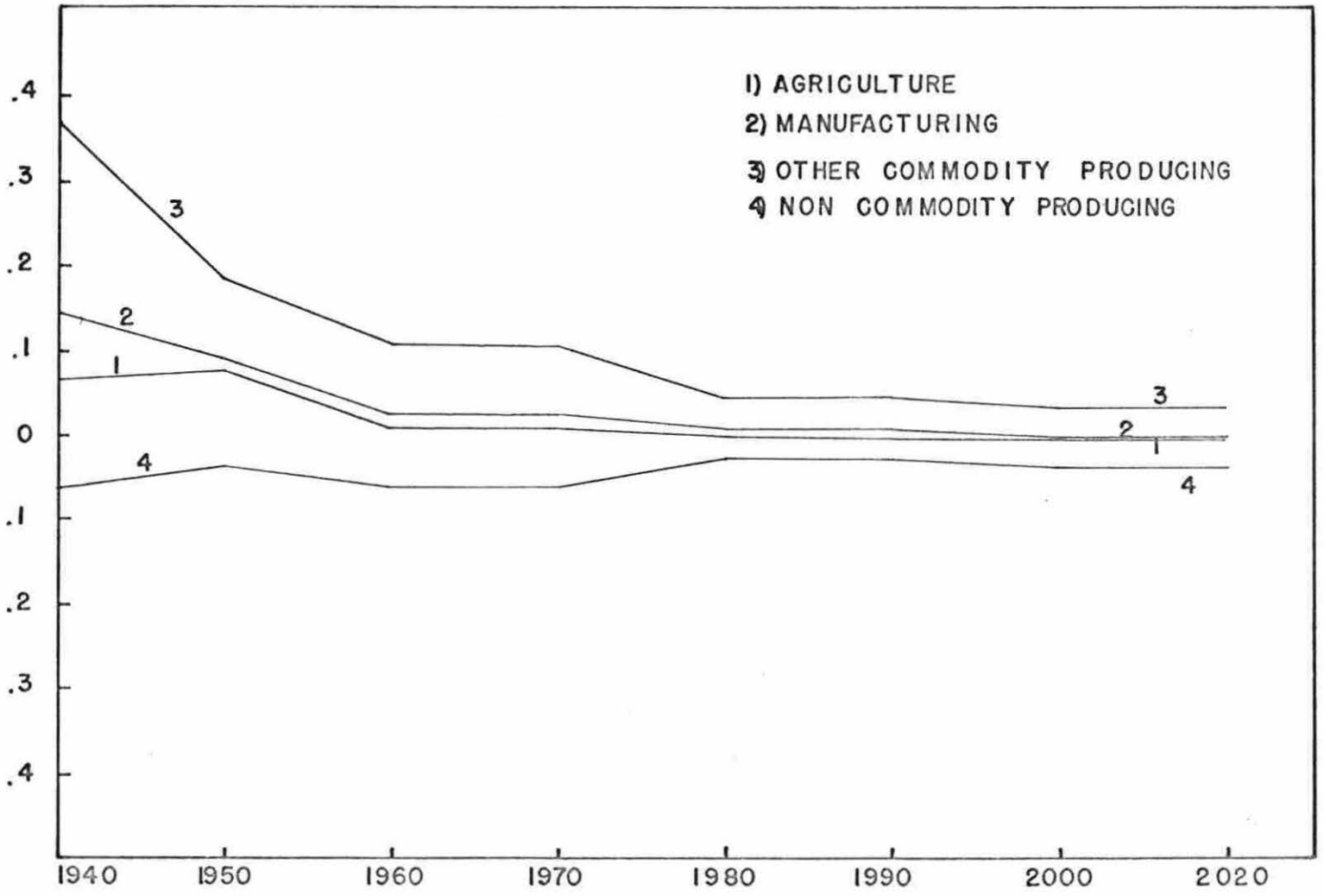

REGIONAL SHARE C
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON COMMODITY PRODUCING
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
1940
1950
1960
1970
1980
1990
2000
2020
DENVER

Figure F.2. Shift analysis projection, regional-share coefficients ("C" effect) for Omaha SMSA, 1940–1960.

REGIONAL SHARE C



OMAHA

Figure F.3. Shift analysis projection, regional-share coefficient ("C" effect) for Lincoln SMSA, 1940-1960.

REGIONAL SHARE C

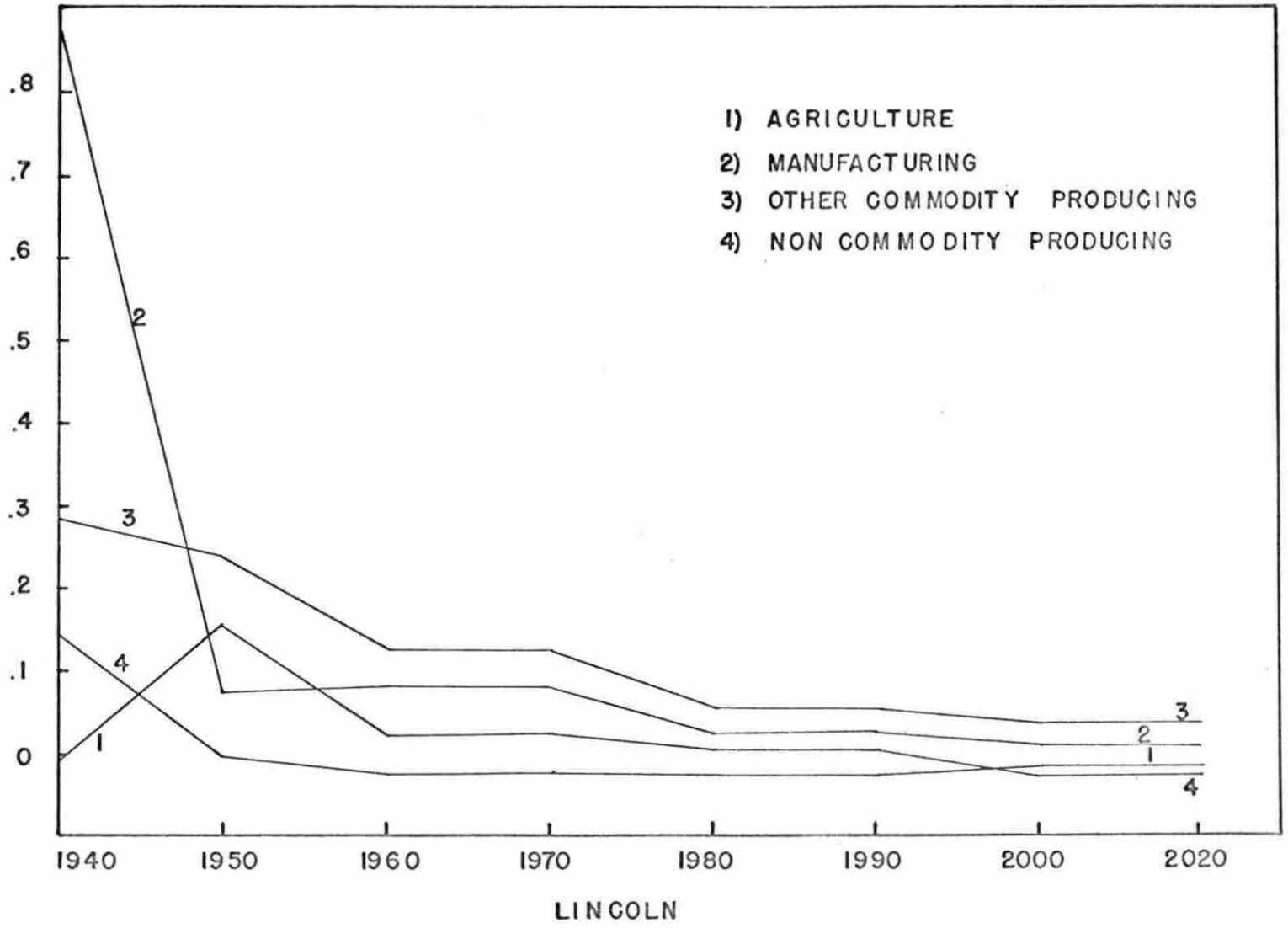


Figure F.4. Shift analysis projection, regional-share coefficient ("C" effect) for Topeka SMSA, 1940-1960.

REGIONAL SHARE C

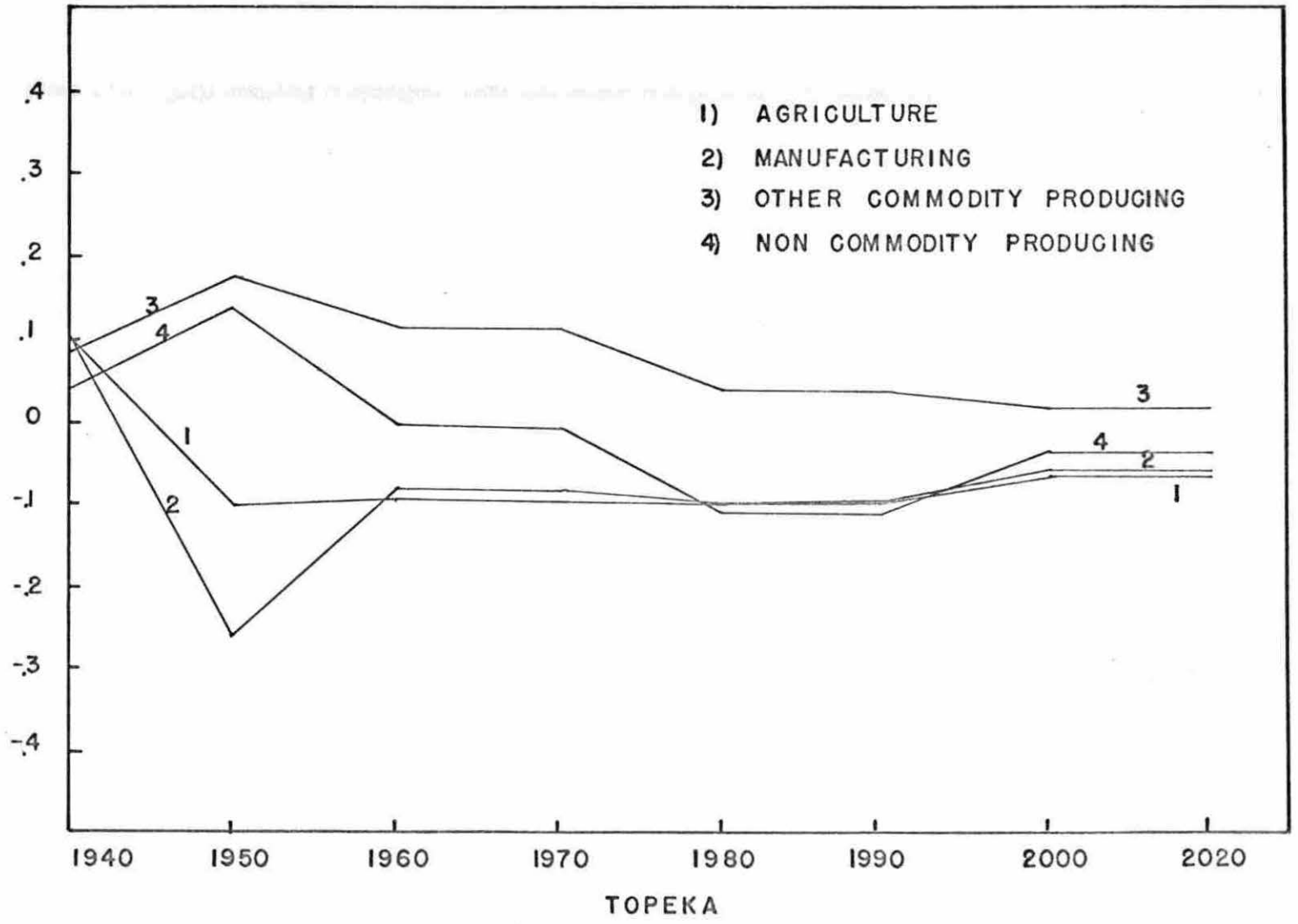


Figure F.5. Shift analysis projection, regional-share coefficient ("C" effect) for Springfield SMSA, 1940-1960.

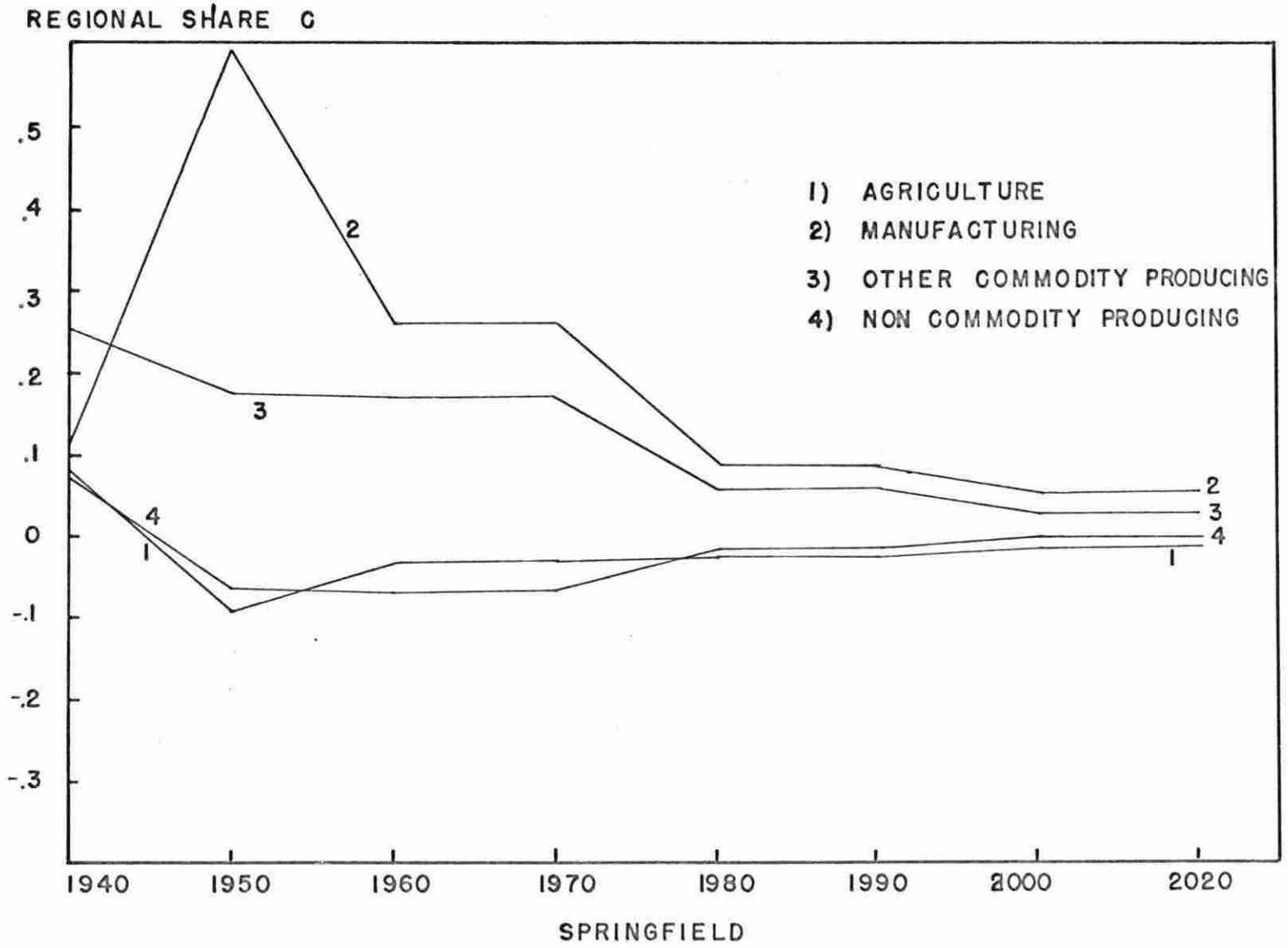
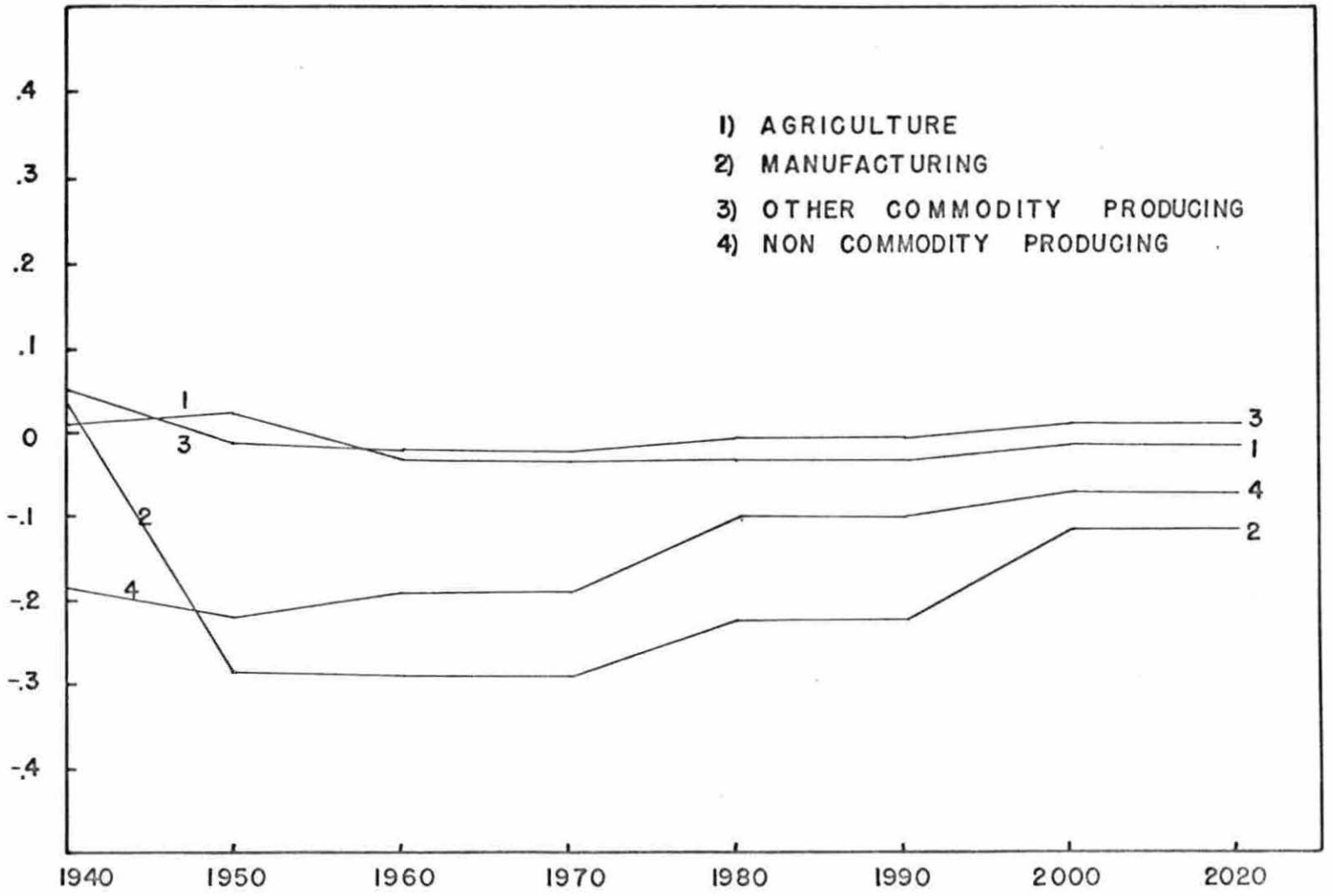

REGIONAL SHARE C
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
1940
1950
1960
1970
1980
1990
2000
2020
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON COMMODITY PRODUCING
SPRINGFIELD

Figure F.6. Shift analysis projection, regional-share coefficient ("C" effect) for Sioux City SMSA, 1940-1960.

REGIONAL SHARE C



SIOUX CITY

Figure F.7. Shift analysis projection, regional-share coefficient ("C" effect) for St. Joseph SMSA, 1940-1960.

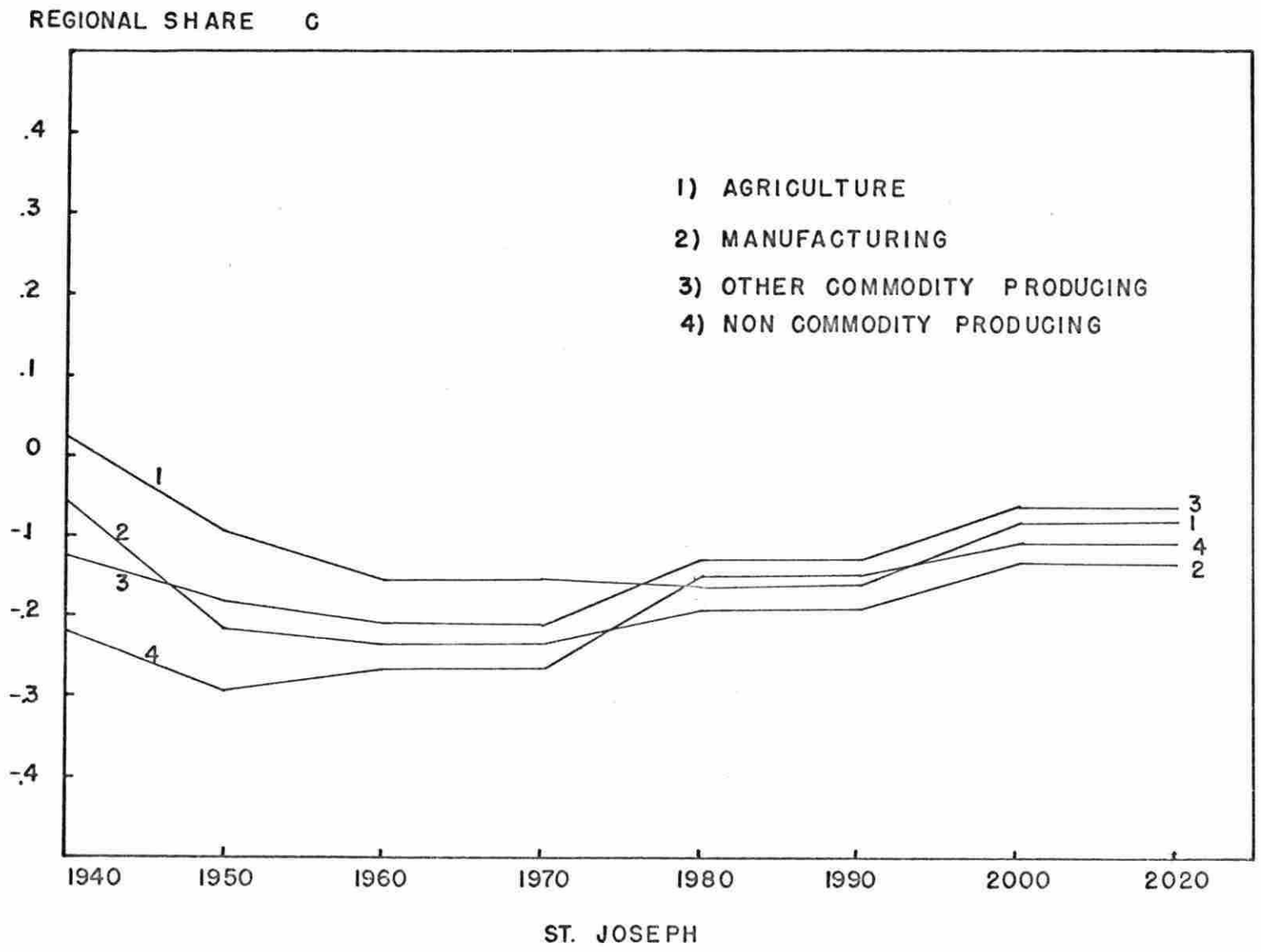
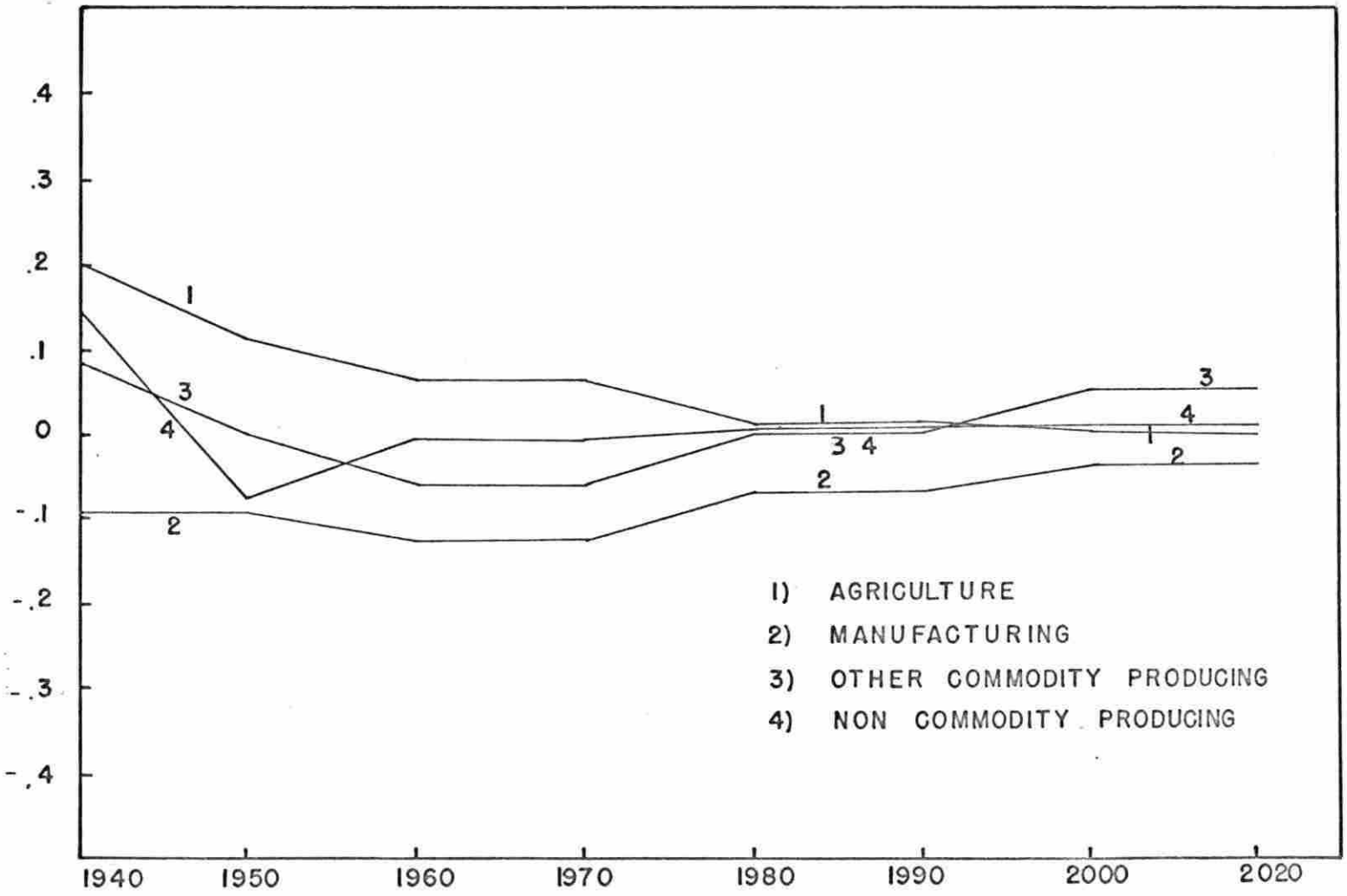

REGIONAL SHARE C
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON COMMODITY PRODUCING
1
2
3
4
3
1
4
2
1940
1950
1960
1970
1980
1990
2000
2020
ST. JOSEPH

Figure F.8. Shift analysis projection, regional-share coefficient ("C" effect) for Sioux Falls SMSA, 1940-1960.

REGIONAL SHARE C



SIOUX FALLS

Figure F.9. Shift analysis projection, regional-share coefficient ("C" effect) for Billings SMSA, 1940-1960.

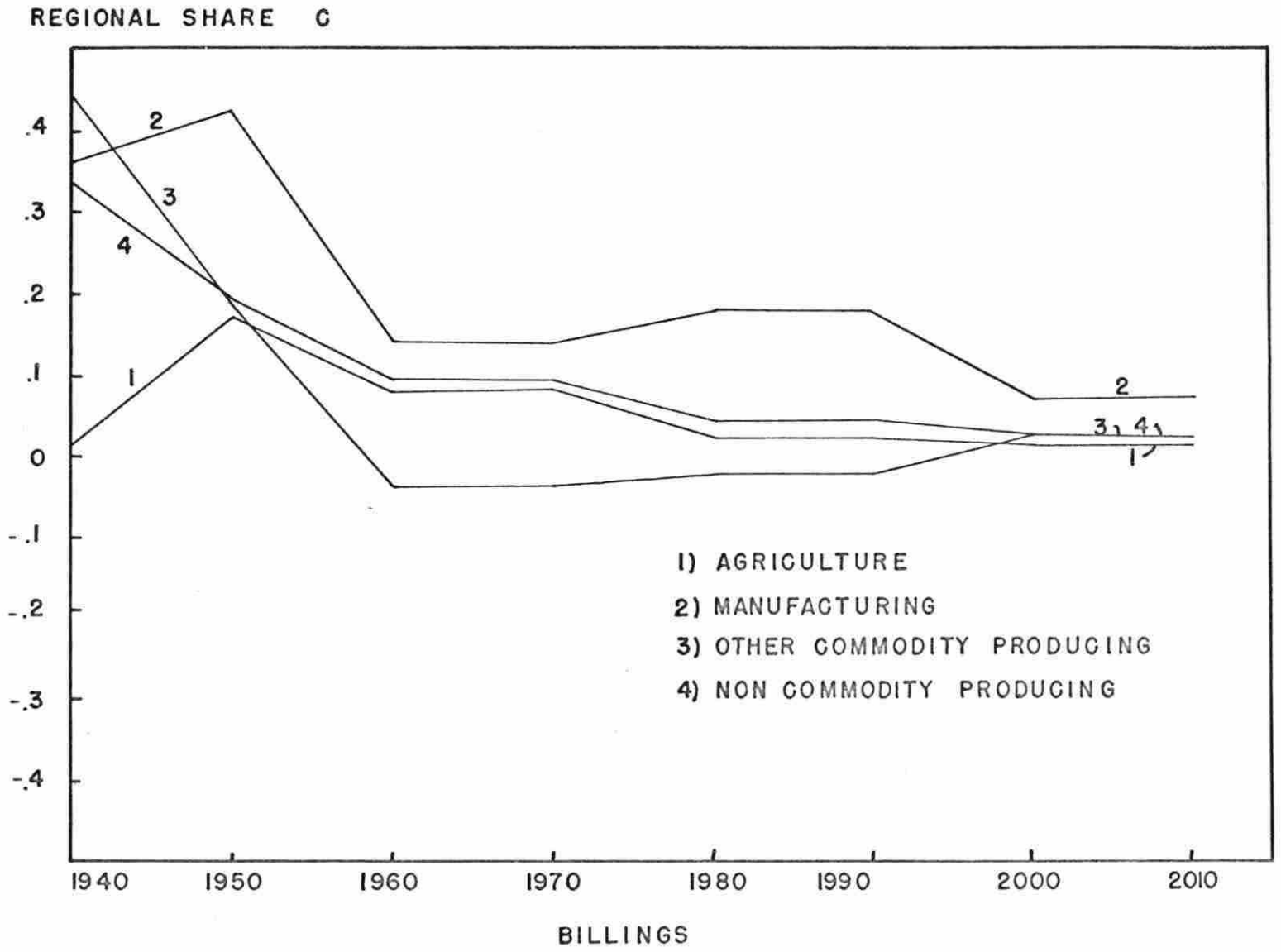
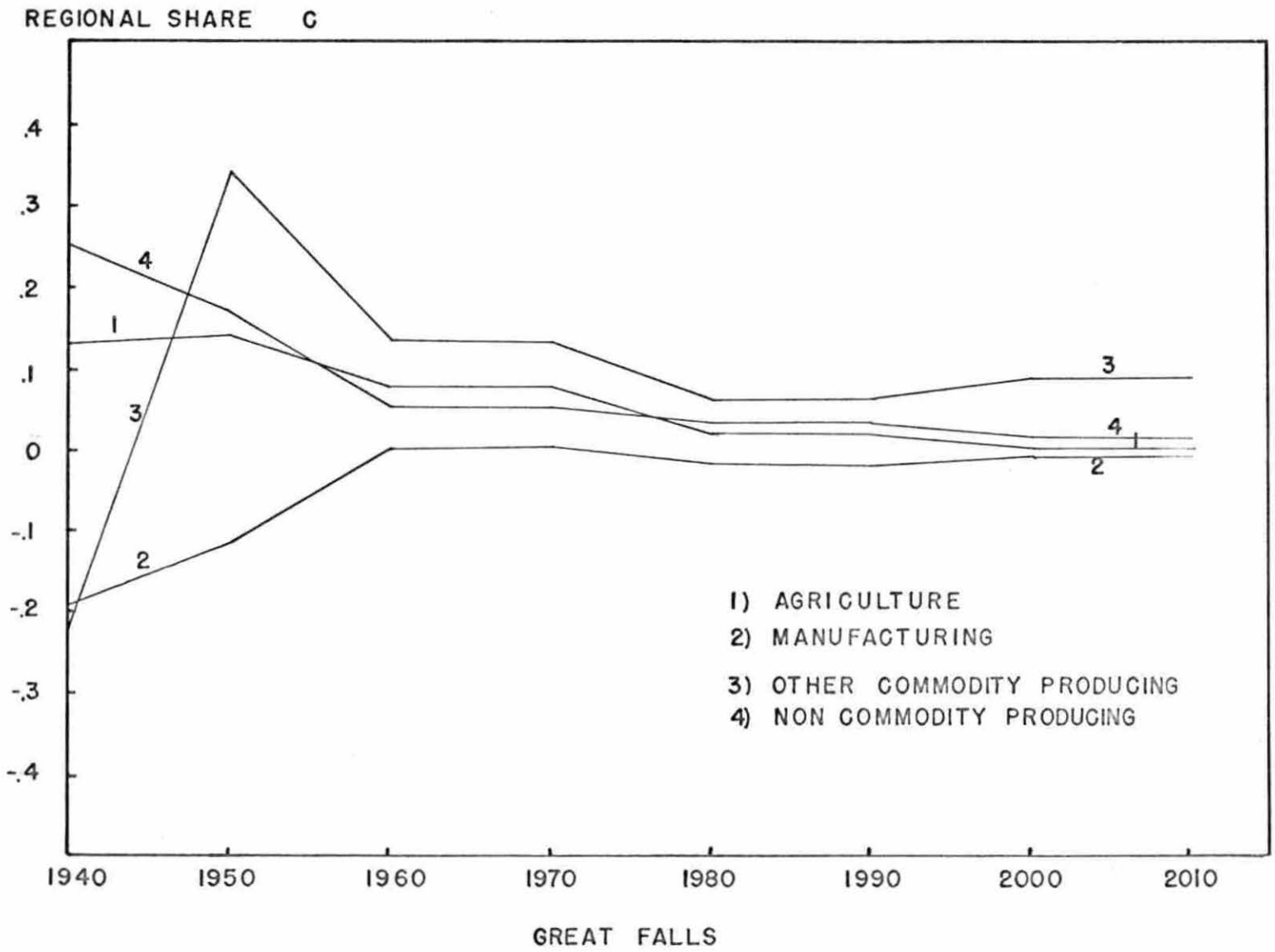

REGIONAL SHARE C
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
1940
1950
1960
1970
1980
1990
2000
2010
BILLINGS
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON COMMODITY PRODUCING

Figure F.10. Shift analysis projection, regional-share coefficient ("C" effect) for Great Falls SMSA, 1940-1960.


REGIONAL SHARE C
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
1940
1950
1960
1970
1980
1990
2000
2010
1
2
3
4
1) AGRICULTURE
2) MANUFACTURING
3) OTHER COMMODITY PRODUCING
4) NON COMMODITY PRODUCING
GREAT FALLS