

ECONOMIC RESEARCH INSTITUTE OF ERIE
THE PENNSYLVANIA STATE UNIVERSITY

A SHIFT-SHARE ANALYSIS OF
THE ERIE ECONOMY:
1970-1980

James A. Kurre

ECONOMIC RESEARCH INSTITUTE OF ERIE
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PREFACE

The purpose of Penn State-Behrend's Economic Research Institute of Erie is to collect, analyze, interpret and disseminate data and information on the Erie regional economy. Research results are published and distributed in two forms: Institute Executive Summaries and Institute Technical Reports. The former are concise summaries of research results while the latter are detailed technically oriented publications.

The preparation of this technical report was made possible through the support and cooperation of several individuals and groups both within and outside the University. Financial support for the establishment of the Institute was provided by a grant from the Manufacturers Association of Erie. The Institute's Advisory Board assisted and continues to assist in the evaluation of Institute research proposals. Lois Bird, Regional Labor Market Analyst, Pennsylvania Department of Labor and Industry, provided invaluable advice in addition to local labor market data. The University provided research facilities including computer and library support. Ron McCarty and George Dudas of Penn State-Behrend's Computer Center supplied computational assistance. Suggestions for improving the manuscript were provided by Lois Bird, Jack Burke and Barry Weller. Any errors remain the responsibility of the author.

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EXECUTIVE SUMMARY

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Shift-share analysis is a method for examining, industry by industry, how employment growth in a region varies from national growth over a particular time period. This paper applies shift-share analysis to the Erie county economy for the period 1970-1980, using 16 individual industries.

The analysis discloses that the Erie economy faces the twin problems of a relatively slow-growth industry mix, and local firms that tend to grow more slowly than their competitors in the same industries elsewhere. The result is a regional economy that is growing at a rate substantially slower than that of the national economy.

Overall, Erie employment grew a little over half as fast as national employment during the '70's. Had Erie grown at the same rate as the nation overall (27.7%), the region would have added 27,022 new jobs. In fact, employment growth was only 14,900 jobs (15.3%), leaving a differential of 12,122 jobs. This differential was the result of a combination of concentration of employment in the slower-growing industries (industry mix effect) and, even more importantly, the fact that Erie firms within a given industry tended to grow more slowly than their counterparts in other regions (regional share effect). The industry mix effect meant that Erie would have had 3,304 more jobs created over the period if it had had the same mix of industries as the nation overall. Likewise, Erie's share of employment (i.e., the county's employment as a percentage of national employment) in most industries declined over the period. Had the region maintained its share in all industries, 8,818 more new jobs would have been created.

Of the 16 industries examined, only five grew at a faster rate in Erie than they did nationally. Three of these--primary and fabricated metals, food processing, and "other nondurable manufactured goods"--were manufacturing industries, while two--services, and FIRE (finance, insurance and real estate)--were nonmanufacturing industries. Of these five, the three manufacturing industries were declining nationally over the period while Erie employment in them grew. These patterns indicate that

Erie may have a competitive advantage in these industries, especially in the metals industries which are much more heavily represented in the Erie economy than in the national economy. This was also true to a lesser extent in the food processing industry. Since the nonmanufacturing industries tend to be the growth industries in the "post-industrial" economy, Erie's increase in share in the service and FIRE industries is encouraging. However, even with their more rapid local growth, the Erie economy has less than its proportional share of both these industries. While the local economy is probably just catching up to the nation in the service industries, Erie may have a competitive advantage in the FIRE industries. If so, the local growth rate of that sector will continue to outstrip the national growth rate, perhaps leading to a significant change in the Erie industrial structure.

The key question arising from this study concerns the future directions of Erie's industrial growth. For a period of time, a local economy can grow by attaining a larger and larger share of industries that are growing slowly, or even declining, nationally. The local economy may be able to prosper in the short run with such a strategy, but it is crucial to realize that eventually the region must attract newer, faster growing industries. A short run strategy of concentrating in slow-growth industries may allow local incomes to increase and may set the stage for further growth in other industries. In the long run, however, a regional economy that is tied closely and solely to declining industries will share the fate of those industries.

A SHIFT-SHARE ANALYSIS OF THE ERIE ECONOMY, 1970-1980

I. INTRODUCTION

One way of evaluating the performance of a regional economy is to compare it to that of the national economy. One widely-used method for doing this is shift-share analysis. Shift-share analysis is a method for examining, industry by industry, how employment growth in a region varies from national growth over a particular time interval.

This paper applies shift-share analysis to the Erie regional economy (Erie county)¹ for the period 1970-1980 and examines the results. The second section of the paper explains the shift-share methodology and the data used for the analysis. The third section presents the results of the analysis for the Erie data and suggests some possible interpretations. The final section summarizes the results and suggests directions for future research.

II. METHODOLOGY

2.1 The Shift-Share Technique

Shift-share analysis provides a statistical framework for examining changes in regional employment over some period of time relative to national changes in employment. Shift-share focuses

on the differential between regional and national growth rates, breaking it into parts for easier consideration. One part of the differential is due to the industry mix of the region: does Erie county have fast- or slow-growing industries? The other part of the differential is due to the relative strength of local firms compared to their counterparts elsewhere: are Erie firms in a given industry growing faster or slower than other firms in that industry?

Specifically, shift-share decomposes the actual change in employment (usually designated as R) into three components: the national growth component (N), the industry mix component (M), and the regional share component (S).² The basic relationship of shift-share analysis can be represented as:

$$\underline{\text{Regional change}} = \underline{\text{National growth}} + \underline{\text{industry Mix}} + \underline{\text{regional Share}}$$
$$R = N + M + S.$$

The national growth component, N, is the amount by which regional employment would have changed if the region had grown at the same rate as the nation overall during the period in question. Like all of the components, it is measured in actual numbers of jobs and is not a rate.

Since local policymakers have no control over the national rate of growth, they are usually more concerned with the extent to which the regional economy is participating in national growth. The differential between actual regional growth (R) and growth at the overall national growth rate (N) is typically the focus of interest. This differential, R-N, is referred to as the "net shift" in the regional employment pattern, and is attributable to the remaining two components, the industry mix and competitive effects.

A region typically has a different mixture of industries than the nation. To the extent that a region has more than its share of fast-growing industries, regional employment change would be greater than the overall national growth rate would suggest. Of course, the opposite is true if a region has a concentration of slow-growth industries. The industry mix component (M) measures the change in regional employment due to the region's industry mix being faster- or slower-growing than the nation's overall. A positive M component reflects a regional industry mix rich in growth industries, while a negative M value reflects a preponderance of relatively slow-growing industries.

The industry mix effect, while important, is not sufficient by itself to account for the difference between regional and national growth. A region may also grow faster or slower than the national growth and industry mix components would lead us to expect, if its firms are growing faster or more slowly than the average firms in their respective industries. To the extent that local firms in an industry are stronger than their competitors elsewhere, the region will increase its share of that industry's employment, and total regional employment will grow faster than otherwise expected. A positive S component indicates that the local economy has the faster-growing firms in a particular industry, and a negative S implies the converse.

In any discussion of shift-share, it must be pointed out that this technique is not a behavioral model; it does not explain why the region grows at a slower or faster rate than the nation. It is merely a framework for examining the components of that change. It does, however, help to identify the right questions to ask in evaluating the performance of the local economy. Examination of

the industrial mix of a region and the vigor of local firms is fundamental to an understanding of the regional economy. As the noted regional economist Wilbur Thompson has said: "Tell me your industry mix and I will tell your fortune."³ It doesn't take a crystal ball to see that a combination of slow growth industries and local firms that are weak compared to their competitors elsewhere points to a bleak future for a region, unless something is done to change those trends.

Shift-share analysis points out both the dark and bright spots in the local economic picture. By examining the kinds of industries in which the local economy has a competitive advantage (those for which the S component is positive), we may find some clues as to the types of industries that may prosper here in the future--those that regional planners could expect to attract successfully and see flourish here.

2.2 Data

While shift-share analysis may be applied to a broad range of economic variables, employment is the measure most often used. This emphasis arises from general concern over employment as a key measure of any economy and, very pragmatically, from the fact that employment data is more readily available at the regional level than other measures of economic performance such as income or output. The Erie region is no exception to these generalizations.

Local employment data were furnished by the Office of Employment Security (OES) of the Pennsylvania Department of Labor and Industry. The OES surveys a sample of employers in the region every month, gathering data on employment, wages, and hours. This sample serves as the basis for monthly estimates for the region as

a whole and for individual industry categories. These monthly data are revised annually to reflect the results of yearly reports that must be submitted by all firms subject to unemployment compensation laws, which includes about 98% of all nonagricultural employment. The employment at each establishment is assigned to an industry group according to the primary product of the plant. The Standard Industrial Classification (SIC) codes⁴ are the official government designations used for these industry groups. For nonagricultural wage and salary employment, the OES currently breaks total employment down into 25 categories for Erie. Since earlier data were not published in that detail, and because of changes in the official SIC definitions, it was necessary to combine some of the data series. As a result, this study examines 16 separate industries, as well as aggregations of them, as detailed in Table 1. The data used in this study were also adjusted to remove the effect of employment fluctuations due to strikes.⁵

While the OES data are the most comprehensive employment statistics available, they do not include proprietors and the self-employed, farm workers, domestics, or military personnel. The employment data also do not distinguish between full and part time employees. However, since these regional data are the base for calculating national employment figures as published by the U.S. Bureau of Labor Statistics, they have the advantage of being fully comparable with the national series used for this study.⁶

Table 1

Industry Definitions

<u>Title</u>	<u>SIC</u>	<u>Description</u>
Manufacturing		
Nondurables		
Food	20	Food and kindred products
Paper and Printing	26 27	Paper and allied products Printing and publishing
Rubber and Misc. Plastics	30	Rubber and miscellaneous plastics products
Other Nondurables	21 22 23 28 29 31	Tobacco manufactures Textile mill products Apparel and other textile products Chemicals and allied products Petroleum and coal products Leather and leather products
Durables		
Furniture	25	Furniture and fixtures
Metals	33 34	Primary metal industries Fabricated metal products
Machinery and Transportation Eqpt.	35 37	Nonelectrical machinery Transportation equipment
Electrical Equipment	36	Electric and electronic equipment
Other Durables	24 32 38 39	Lumber and wood products Stone, clay and glass products Instruments and related products Miscellaneous manufacturing industries
Nonmanufacturing*		
Construction	15-17	Contract construction
Transportation and Public Utilities	40-49	Transportation and public utilities
Services	70-89	Services
F.I.R.E.	60-67	Finance, insurance and real estate
Wholesale and Retail Trade	50-51 52-59	Wholesale Trade Retail Trade
Government Federal State & Local	91-99	Government (nonmilitary) Federal Government State and Local Government

*The nonmanufacturing category also includes mining employment (SICs 10-14) for the national data.

III. SHIFT-SHARE ANALYSIS OF THE ERIE ECONOMY

3.1 Overview

Employment data for 1970 and 1980 for Erie and the U.S. are presented in Table 2, along with the change and rate of change in employment. Over the period, Erie employment grew by 14,900 jobs or 15.3%. This change represents a decrease of 1,200 jobs, or -2.7%, in the manufacturing industries, offset by an expansion of 16,100 jobs, or 30.6%, in the nonmanufacturing industries. During the 1970-1980 period, employment in the nation grew at an overall rate of 27.7%, with manufacturing expanding by 4.6% and nonmanufacturing by 36.9%. While the Erie economy grew at a slower pace than the national economy, several local industries performed well. Shift-share analysis of the data helps to point this out.

3.2 Interpretation of the Shift-Share Results: An Example

The shift-share results are presented in Table 3. Of course, these data are useless unless interpreted correctly. To assist understanding, this section presents an example of interpretation of all the components of the shift-share analysis for the metals industry, which includes both primary and fabricated metal manufacturing. In Table 3, the R component for each industry indicates how much Erie county employment actually changed during the decade. The N figures indicate how much employment would have grown if each industry had grown at the overall national growth rate of 27.7%. The difference between these numbers is the net shift in employment to be accounted for by the industry mix and

Table 2

Employment by Industry, 1970 and 1980,
Erie and United States

Industry	United States				Erie			
	1970	1980	Change		1970	1980	Change	
			#	%			#	%
Manufacturing	19,813.9	20,718.8	904.9	4.6%	44.8	43.6	-1.2	-2.7%
Nondurables	8,184.2	8,150.5	-33.7	-0.4	9.4	10.0	0.6	6.4
Food	1,730.6	1,671.6	-59.0	-3.4	1.8	2.3	0.5	27.8
Paper and Printing	1,821.2	1,957.9	136.7	7.5	3.1	3.1	0.0	0.0
Rubber and Misc. Plastics	599.9	762.9	163.0	27.2	4.1	4.1	0.0	0.0
Other Non- durables	4,032.5	3,758.1	-274.4	-6.8	0.4	0.5	0.1	25.0
Durables	11,629.7	12,568.3	938.6	8.1	35.4	33.6	-1.8	-5.1
Furniture	454.0	493.7	39.7	8.7	1.5	1.4	-0.1	-6.7
Metals	2,933.8	2,897.7	-36.1	-1.2	10.8	11.1	0.3	2.8
Machinery and Trans. Eqpt.	4,106.5	4,509.0	402.5	9.8	12.1	13.0	0.9	7.4
Electrical Equipment	1,891.2	2,143.4	252.2	13.3	6.5	4.0	-2.5	-38.5
Other Durables	2,244.2	2,524.5	280.3	12.5	4.5	4.1	-0.4	-8.9
Nonmanufacturing*	50,290.0	68,834.0	18,544.0	36.9	52.6	68.7	16.1	30.6
Construction	3,213.0	4,141.0	928.0	28.9	3.1	2.8	-0.3	-9.7
Transportation and Pub. Util.	4,454.0	5,123.0	669.0	15.0	5.2	5.2	0.0	0.0
Services	11,253.0	17,266.0	6,013.0	53.4	12.8	21.0	8.2	64.1
F.I.R.E.	3,563.0	5,057.0	1,494.0	41.9	3.3	4.9	1.6	48.5
Wholesale and Retail Trade	14,774.0	20,168.0	5,394.0	36.5	17.0	22.0	5.0	29.4
Government	12,422.0	16,102.0	3,680.0	29.6	11.2	12.8	1.6	14.3
Federal	2,690.0	2,763.0	73.0	2.7	1.2	1.2	0.0	0.0
State & Local	9,732.0	13,339.0	3,607.0	37.1	10.0	11.6	1.6	16.0
Total	70,103.9	89,552.8	19,448.9	27.7%	97.4	112.3	14.9	15.3%

All employment data are in thousands of jobs. Columns may not add to totals due to rounding.

*The nonmanufacturing category also includes mining employment (SICs 10-14) for the national data.

Table 3

Shift-Share Results for
Erie, 1970-1980

<u>Industry</u>	<u>R</u>	<u>N</u>	<u>Net Shift</u>	<u>M</u>	<u>S</u>
Manufacturing	-1,200	12,429	-13,629	-8,556	-5,072
Nondurables	600	2,608	-2,008	-1,349	-659
Food	500	499	1	-561	562
Paper and Printing	0	860	-860	-627	-233
Rubber and Misc. Plastics	0	1,138	-1,138	-23	-1,114
Other Nondurables	100	111	-11	-138	127
Durables	-1,800	9,821	-11,621	-7,207	-4,413
Furniture	-100	416	-516	-285	-231
Metals	300	2,996	-2,696	-3,129	433
Machinery and Trans. Eqpt.	900	3,357	-2,457	-2,171	-286
Electrical Equipment	-2,500	1,803	-4,303	-936	-3,367
Other Durables	-400	1,248	-1,648	-686	-962
Nonmanufacturing	16,100	14,593	1,507	5,252	-3,746
Construction	-300	860	-1,160	35	-1,195
Transportation and Public Utilities	0	1,443	-1,443	-662	-781
Services	8,200	3,551	4,649	3,289	1,360
F.I.R.E.	1,600	916	684	468	216
Wholesale and Retail Trade	5,000	4,716	284	1,490	-1,207
Government	1,600	3,107	-1,507	632	-2,139
Federal	0	333	-333	-300	-33
State & Local	1,600	2,774	-1,174	932	-2,106
Total	14,900	27,022	-12,122	-3,304	-8,818

These data are in numbers of jobs. Rows may not sum to totals due to rounding.

R = Actual regional change in employment

N = National growth component

Net shift = R - N

M = Industry mix component

S = Regional share (competitive) component

competitive effects. For example, if Erie metals employment had grown at the same rate as national employment overall, it would have added 2,996 jobs (N) during the period. In fact, Erie metals employment increased by only 300 (R), so growth was 2,696 less than would have been expected. This net shift can be accounted for by the difference between the metals industry's national growth rate and the overall national growth rate, and the difference in growth rates between metals nationally and in Erie.

The industry mix effect (shown graphically in Figure 1 for all industries) tells how much of the net shift is due to the fact that the metals industry was a relatively slow-growing sector nationally during the decade of the '70's. While total national employment grew by 27.7%, metals nationally declined by 1.2% during the decade. This difference of 28.9% means that metals in Erie would have grown by 3,129 employees less than the N component suggested. A negative sign in the M column in Table 3, or a bar to the left of the axis in Figure 1, indicates an industry that grew more slowly at the national level than the economy overall, while a positive sign indicates a relatively fast-growth industry.

Finally, the regional share, or competitive component (shown graphically for all industries in Figure 2), indicates whether Erie firms in each industry grew at a faster or slower rate than other firms in their industries. For the metals industry, the difference between the industry mix effect (-3,129) and the net shift (-2,696) is accounted for by the fact that Erie metals employment grew by 2.8% over the period while employment in that sector declined at a rate of 1.2% nationally. The positive 433 reflects Erie metals growth above and beyond what would have occurred if the local metals industry had grown at the same rate

FIGURE 1
 INDUSTRY MIX COMPONENT (M)
 ERIE SHIFT-SHARE ANALYSIS FOR 1970-1980

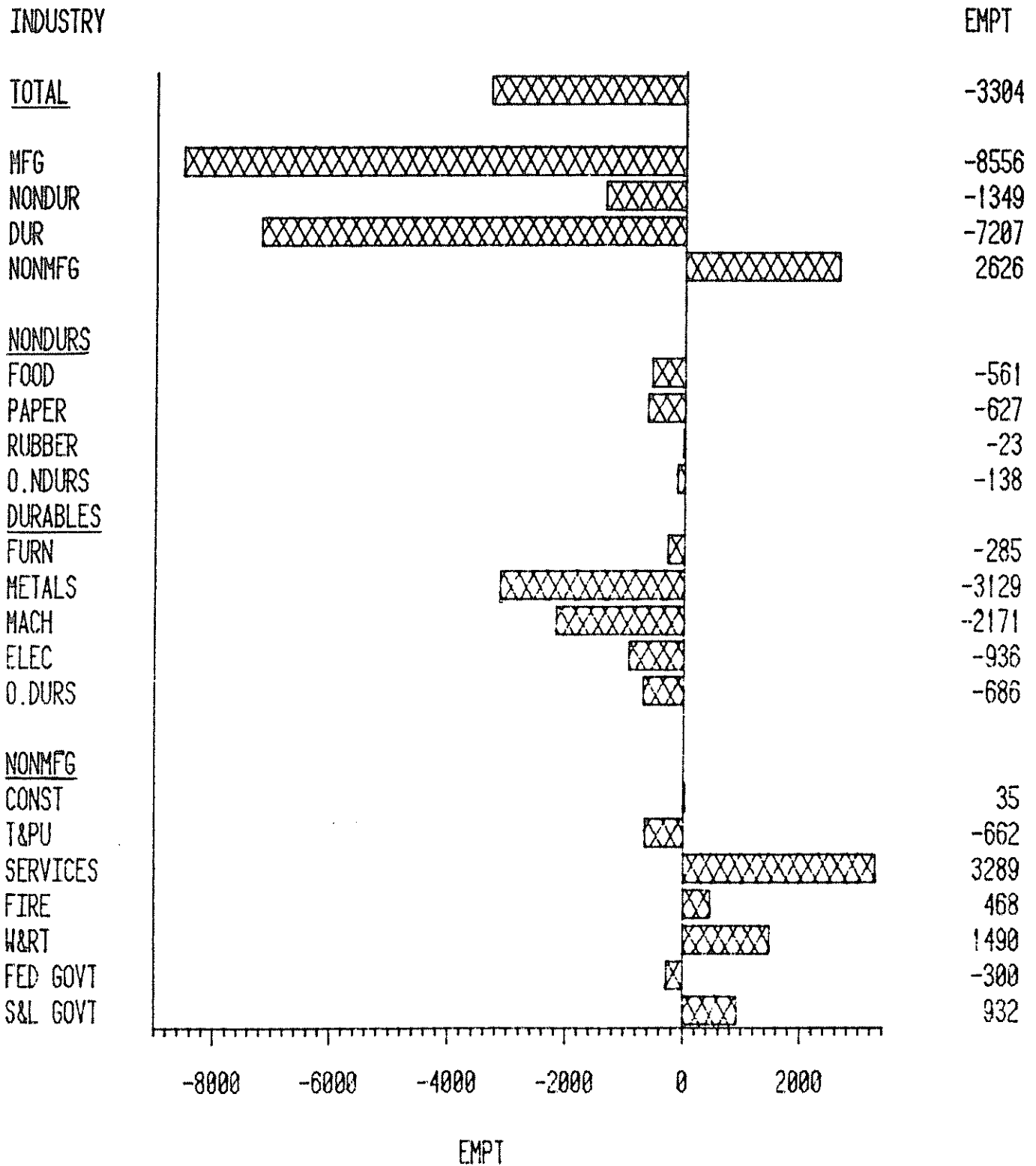
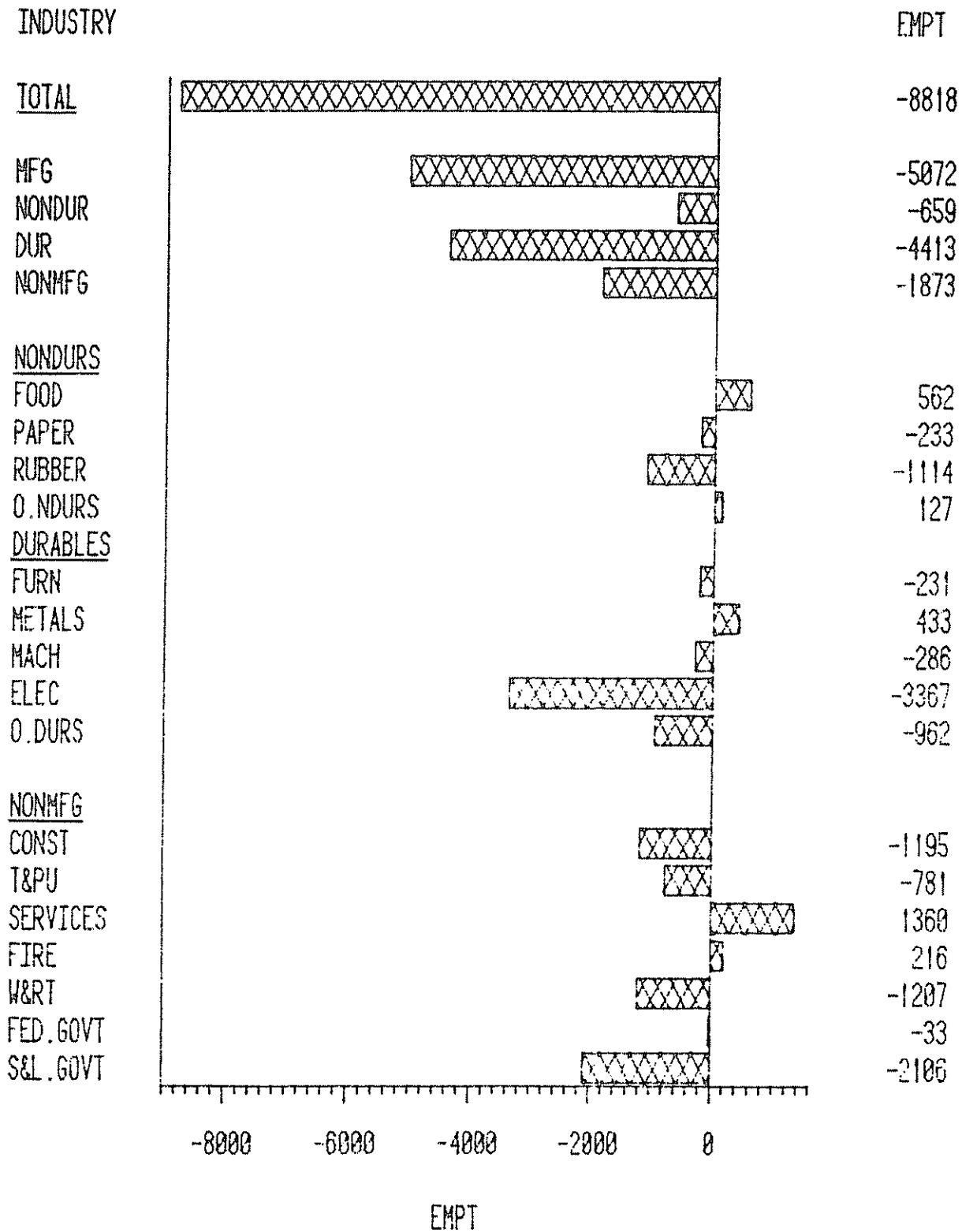


FIGURE 2
 REGIONAL SHARE (COMPETTIVE) COMPONENT (S),
 ERIE SHIFT-SHARE ANALYSIS FOR 1970-1980



as the industry nationally. A positive S component indicates an industry in which Erie firms are growing faster than their competitors elsewhere; a negative S indicates the opposite.

3.3 Industrial Growth in the Erie Economy, 1970-1980

Overall, Erie county employment grew a little over half as fast as national employment during the '70's. Had Erie grown at the same rate as the nation overall, the region would have added 27,022 new jobs. In fact, employment growth was only 14,900 jobs, leaving a differential or net shift of 12,122 jobs. This negative differential was the result of a combination of concentration of employment in the slower-growing industries and, even more importantly, the fact that Erie firms within a given industry tended to grow more slowly than their counterparts in other regions. The industry mix effect meant that Erie would have had 3,304 more jobs created over the period if it had had the same mix of industries as the nation overall. Likewise, Erie's share of employment (i.e., the county's employment as a percentage of national employment) in most industries declined over the period. Had the region maintained its share in all industries, 8,818 more new jobs would have been created.

A part of Erie's slower growth over the period is due to the fact that Erie is an industrial town, like most of the cities of the "manufacturing belt" which extends from the western Great Lakes to the Northeast coast. Nearly 46% of Erie's employment was concentrated in manufacturing in 1970, as opposed to 28% in the nation as a whole (see Table 4 and Figures 3 and 4). As the U.S. economy continues to shift from goods- to service-producing industries, regions like Erie that have heavy concentrations of

Table 4

Industrial Distribution of Employment,
Erie and U.S., 1970 and 1980

<u>Industry</u>	<u>United States</u>		<u>Erie</u>	
	<u>1970</u>	<u>1980</u>	<u>1970</u>	<u>1980</u>
Manufacturing	28.3%	23.2%	46.0%	38.8%
Nondurables	11.7	9.1	9.7	8.9
Food	2.5	1.9	1.8	2.0
Paper and Printing	2.6	2.2	3.2	2.8
Rubber and Misc. Plastics	0.9	0.9	4.2	3.7
Other Nondurables	5.8	4.2	0.4	0.4
Durables	16.6	14.0	36.3	29.9
Furniture	0.6	0.6	1.5	1.2
Metals	4.2	3.2	11.1	9.9
Machinery and Transportation Equipment	5.9	5.0	12.4	11.6
Electrical Equipment	2.7	2.4	6.7	3.6
Other Durables	3.2	2.8	4.6	3.7
Nonmanufacturing	71.7	76.9	54.0	61.2
Construction	4.6	4.6	3.2	2.5
Transportation and Public Utilities	6.4	5.7	5.3	4.6
Services	16.1	19.3	13.1	18.7
F.I.R.E.	5.1	5.6	3.4	4.4
Wholesale and Retail Trade	21.1	22.5	17.5	19.6
Government	17.7	18.0	11.5	11.4
Federal	3.8	3.1	1.2	1.1
State & Local	13.9	14.9	10.3	10.3
Total	100.0%	100.0%	100.0%	100.0%

FIGURE 3
 INDUSTRIAL DISTRIBUTION OF EMPLOYMENT
 ERIE AND US, 1970

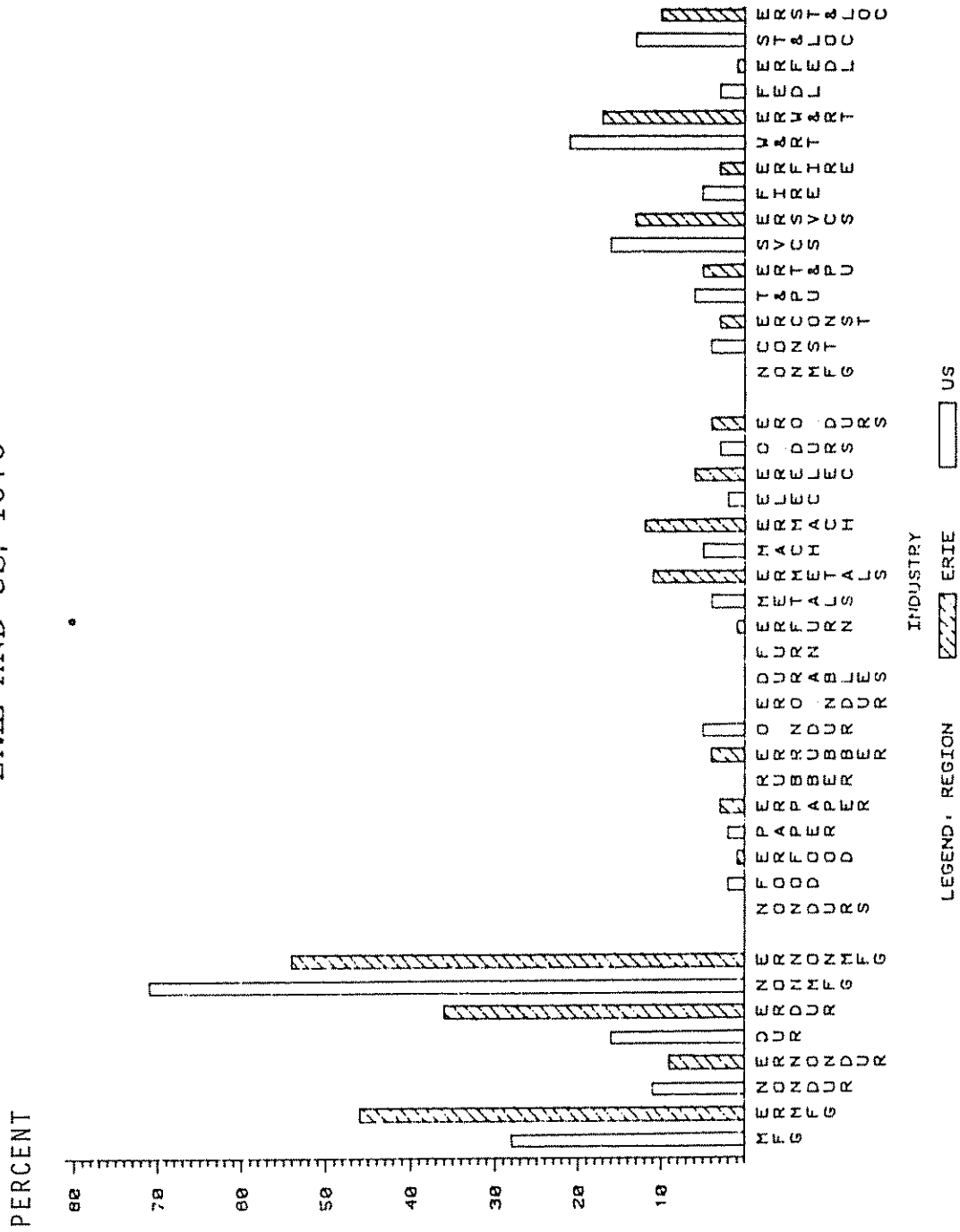
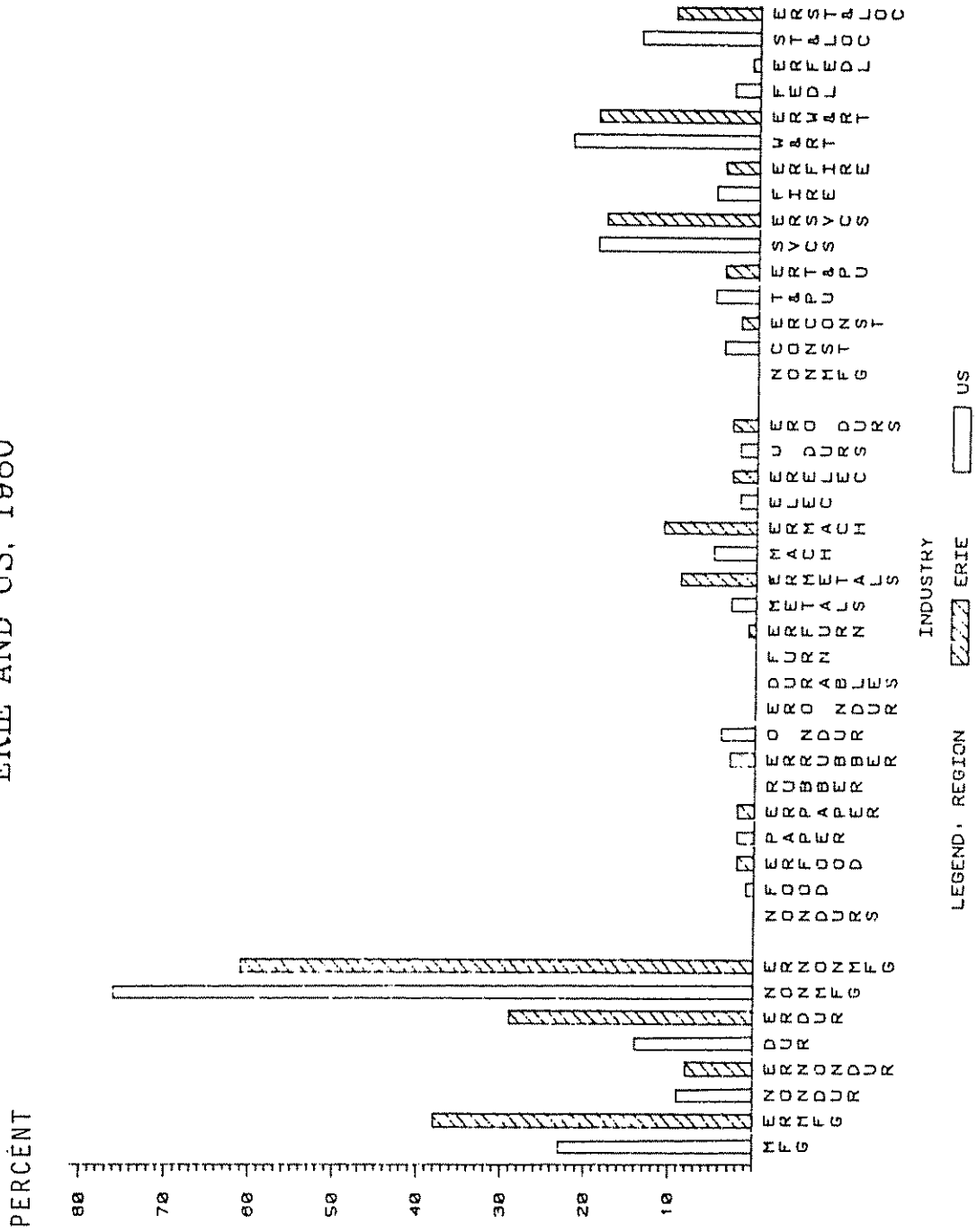


FIGURE 4
INDUSTRIAL DISTRIBUTION OF EMPLOYMENT
ERIE AND US, 1980



manufacturing firms will typically experience slower growth than the nation.

There are some bright spots in the manufacturing picture however. Within that industry category, Erie county employment is heavily concentrated in the durables rather than the nondurables. Over the decade of the '70s, employment in the manufacturing of durables grew by 8.1% nationally while in the nondurables it fell by 0.4%. Within these industry categories, there are some individual industries that performed better in Erie than might have been expected from the national experience. Erie apparently had a competitive advantage in the food processing and metals industries during the decade, as well as that category designated as "other nondurable manufacturing". The primary and fabricated metals industries account for approximately 10% of the region's employment, and the local firms grew by 2.8% over the period while the industry nationally shrank by 1.2%. In food processing, Erie employment grew by 27.8% while it fell by 3.4% nationally. While this industry presently accounts for only about 2% of Erie county employment, this huge disparity in growth rates may indicate the possibility of attracting other plants in food processing to the local area.

At the other end of the spectrum, electrical machinery employment declined by 38.5% in Erie while it grew by 13.3% nationally. Rubber and miscellaneous plastics employment did not change from January '70 to January '80 in Erie, although it grew by 27.2% nationally. Employment in six of the eight manufacturing categories examined grew more slowly in Erie than in the nation overall, including the largest local manufacturing industry, nonelectrical machinery and transportation equipment.

The nonmanufacturing industries tended to be the growth

industries in the nation during the decade, and the same was true in Erie. While Erie's nonmanufacturing industries grew more slowly overall than their national counterparts, there were some notable exceptions. The service industries accounted for over 13% of Erie's employment in 1970, and they grew by 64.1% during the period, compared with 53.4% in the nation as a whole. The financial industries (finance, insurance, and real estate) also grew at a faster rate in Erie than in the nation. While this category only accounts for about 4% of Erie employment, it is one of the fastest growing sectors of both the local and the national economies.

IV. CONCLUSIONS

4.1 Summary and Implications for Growth

Shift-share analysis of Erie employment growth between January 1970 and January 1980 discloses that the Erie economy faces the twin problems of a relatively slow-growth industry mix and firms that tend to grow more slowly than their competitors elsewhere. The result is a regional economy that is growing at a rate substantially slower than that of the national economy.

A closer inspection of the results reveals that Erie's share of national employment was increasing in five industries: food processing, primary and fabricated metals, "other nondurable manufactured goods", services, and finance, insurance and real estate (see Figure 2). Of these, the three manufacturing industries were declining nationally over the period while Erie employment in them grew. These patterns indicate that Erie may

have a competitive advantage in these industries, especially in the metals industries which are much more heavily represented in the Erie economy than in the national economy. This was also true to a lesser extent in the food processing industry. By 1980, Erie's food processing employment had risen to represent 2.0% of local employment, slightly greater than that industry's share of national employment.

Erie's increase in share in the services and FIRE industries is encouraging. However, even with their more rapid local growth, the Erie economy has less than its proportional share of both these industries. Nationwide, services represented 19.3% of total 1980 employment and FIRE, 5.6%. In Erie, the comparable figures were 18.7% and 4.4%. For the service industries, it seems likely that the Erie economy is just catching up to the national economy, becoming more self-sufficient in the services that the county's residents purchase. In the FIRE category, however, it is possible that Erie is developing a competitive advantage, exporting financial services to those living outside the county and bringing in income for local workers. If there is a competitive advantage here, local growth in FIRE will continue to outstrip its national growth, leading perhaps to a significant change in the local industrial structure. Such a change would help to diversify the local industry mix and enable Erie to share more in the growth of the national economy.

While the foregoing discussion has generally been couched in terms of attracting new employment, this should not be narrowly interpreted to mean attracting new firms. A major portion of the growth in a local economy arises from expansion of existing employers, those who have already chosen the region as a location

for their production.⁷ To the extent that local sites offer a competitive advantage in their production processes, these firms will expand more than other firms, and perhaps even diversify into other, faster-growing industries. While attracting new firms to the region might be the fastest method of diversifying the region's industry mix, it is necessary to remember that the core growth of a region will come from expansion of its existing plants. Local leaders must look within, as well as without, the boundaries of the county for sources of future growth.

The key question arising from this study concerns the future directions of Erie's industrial growth. For a period of time, a local economy can grow by attaining a larger and larger share of industries that are growing slowly, or even declining, nationally. The local economy can prosper in the short run with such a strategy, but it is crucial to realize that eventually the region must attract newer, faster growing industries. A short run strategy of concentrating in slow-growth industries may allow the local economy to grow to a scale necessary for the attraction of other industries. If the slow-growth target industries happen to be relatively high-paying industries, local income may also increase, further enabling growth in industries that depend on the availability of local disposable income. In the long run, however, a region that is tied closely and solely to declining industries will share the fate of those industries.

4.2 Suggestions for Further Research

This analysis of Erie employment data has pointed out some important characteristics of the local economy. The tentative conclusions of this study need to be strengthened by examining

Erie employment trends over time; by looking at a period longer than the ten years of this study and also at more recent trends within that ten-year period. A time-series study of the regional share (competitive) component for various industries should help to explain the major deterioration in Erie's growth patterns that was pinpointed in ERIE Technical Report #1.⁸ Which industries were most responsible for the new slower growth that the Erie economy has experienced since 1975? Are a few industries responsible, or have all industries been growing more slowly?

It would also be useful to examine whether Erie's industry mix has been becoming more specialized or more diversified over the period, and to compare regional wage and income patterns by industry with those of the nation. Do our industries tend to be the high-wage industries? Which industries might the Erie area be able to attract, and which should it attempt to attract? Some of these areas of research are currently under investigation and will be the topic of future ERIE reports.

Appendix

Shift-Share Algorithms

The shift-share results presented in Table 3 were derived by using the following formulae.

$$R = N + M + S$$

National Growth Component

$$N_i = E_i^{70} (US_t^{80}/US_t^{70} - 1)$$

Industry Mix Component

$$M_i = E_i^{70} (US_i^{80}/US_i^{70} - US_t^{80}/US_t^{70})$$

Regional Share (Competitive) Component

$$S_i = E_i^{70} (E_i^{80}/E_i^{70} - US_i^{80}/US_i^{70})$$

where subscripts denote industries (with t = total employment), superscripts denote years, E denotes Erie employment, and US denotes national employment. For example, E_i^{70} refers to Erie employment in industry i in 1970; US_t^{80} refers to total national employment in 1980.

These calculations were made for each of the 16 individual industries. The values for total employment and the industry categories (manufacturing, nondurables, durables, nonmanufacturing and government) were found by summing the results for the respective individual industries.

NOTES

¹The Erie region as used here is the Erie Standard Metropolitan Statistical Area (SMSA). It is officially defined as Erie County. See Executive Office of the President, Office of Management and Budget, Standard Metropolitan Statistical Areas, 1975 (Washington, D.C.: U.S. Government Printing Office, 1975).

²For a good overview of the shift-share technique and a description of its development, see Benjamin H. Stevens and Craig L. Moore, "A Critical Review of the Literature of Shift-Share as a Forecasting Technique," Journal of Regional Science, XX, #4, (Dec., 1980), pp. 419-437.

³Wilbur R. Thompson, "The Economic Base of Urban Problems", in Contemporary Economic Issues, revised edition, edited by Neil W. Chamberlain, (Homewood, Ill.: Richard D. Irwin, Inc., 1973). p. 1.

⁴Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual (Washington, D.C.: U.S. Government Printing Office, 1972), and Supplement (1978).

⁵In using the shift-share technique, care must be taken to choose time points that are not "exceptional" in some way. An industry involved in a labor dispute will exhibit employment levels that are exceptionally low for the period of the strike. To remove this potentially misleading temporary fluctuation, the employees in the OES category "idle due to labor dispute" were treated as if they were employed for purposes of this study.

Likewise, it is necessary to choose dates at similar points on the business cycle. The data used in this study are for January of the respective years, rather than national averages, since December 1969 and January 1980 were officially defined peaks of the national business cycle. See the report cited in note 8 for more information on the local impact of the business cycle.

⁶National employment data came from U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, United States, 1909-1978, BLS Bulletin 1312-11, (Washington, D.C.: U.S. Government Printing Office), and Supplement to Employment and Earnings, Revised Establishment Data, June, 1982. The "establishment data" series used for this report are not the same as the "resident data" series used to estimate the regional and national labor force, employment, and unemployment numbers. The resident data series counts people residing in an area, while the "establishment data" which is the basis of this study is a job count and focuses on where people work. The difference between the two depends on the number of people who commute across the boundaries of the labor market in question, and dual job holding. For a detailed discussion of these topics, see "Explanatory Notes", Employment and Earnings, September, 1983, pp. 113-139,

published by the U.S. Department of Labor, Bureau of Labor Statistics. ERIE Technical Report #1 (see note 8 below) uses resident data.

⁷See evidence and references cited in The Dynamics of Intrametropolitan Industrial Location: Detroit, 1970-75, by James A. Kurre (unpublished Ph.D. dissertation, Wayne State University, 1982), p. 25.

⁸Barry R. Weller, "Impact of the National Business Cycle on Regional Employment: A Study of the Erie SMSA", ERIE Technical Report #1, December, 1983.