

Ohio Sea Grant

ECONOMIC LINKAGES IN NORTHERN OHIO

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Technical Summary
OHSU-TS-9

The Ohio State University
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Ohio Cooperative Extension Service
Ohio Department of Natural Resources

Sea Grant Technical Summaries are published by the Ohio Sea Grant Program at the Ohio State University and are partially supported through a grant from the National Sea Grant College Program at the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. These summaries are designed to transmit research results from Sea Grant sponsored and related investigations to users of coastal and offshore resources. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notation that may appear hereon.

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ECONOMIC LINKAGES IN NORTHERN OHIO*

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Leroy J. Hushak, George W. Morse and Kofi K. Apraku

Northern Ohio contains some of the most industrialized and urbanized counties in Ohio and perhaps in the U.S. In 1958, Ohio was surpassed only by New York, California and Illinois in manufacturing employment. Five of the state's ten largest manufacturing counties were located in northern Ohio, with Cuyahoga having the largest manufacturing employment of 241,000.

Over the past 20 years, economic change accompanied by new technologies and new sources of raw materials have altered the employment potential of northern Ohio. Between 1960 and 1980, manufacturing employment declined by 7.5 percent in this region to 550,653 while it increased by 0.5 percent in Ohio and by 21 percent in the U.S.

In this paper we identify the economic sectors which have the greatest regional impact as they grow or decline for a 17-county region which contains the major industrial counties of northern Ohio: Ashtabula, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Lucas, Mahoning, Medina, Ottawa, Portage, Sandusky, Seneca, Summit, Trumbull and Wood. These sectors should receive special attention in both state and local economic development programs.

Methodology

A 43-sector, open, single region, static input-output (I/O) model is the methodological basis of the study. The 1972 U.S. National I/O model updated to 1978 prices was used to derive 40 sectors of the regional model. The highly disaggregated 365 sector model was adapted to reflect the size and structure of the region's economy. Data for two sectors (marina and boat dealers, and charter fishing) were developed from primary data surveys, while data for a third sector (commercial fishing) was adapted from another I/O study.

*The study underlying this paper is the unpublished Ph.D. dissertation of Kofi Apraku entitled, "Economic Impact of the Lake Erie Fishery and Other Lake Erie Industries: An Input-Output Model of the Northern Ohio Regional Economy," The Ohio State University, 1983. The study was directed by Leroy J. Hushak, Professor of Agricultural Economics at the Ohio Agricultural Research and Development Center at The Ohio State University. Salaries and research support was provided by state and federal funds appropriated to the Ohio Sea Grant Program and to the Ohio Agricultural Research and Development Program, The Ohio State University.

In 1978, this 17-county region generated output of \$150 billion, income of \$31 billion, and employment of 1.7 million man-years. Over 46 percent of the people employed in Ohio were employed in this region.

Results

High impact sectors are defined as large sectors which have high multipliers. To identify the high impact sectors of northern Ohio, several steps are taken. First, the largest sectors and the sectors with the highest output, income and employment multipliers were identified. The output multiplier is the total change in output which results from a one unit change in final demand for the output of a sector. The income (employment) multiplier is the total change in income (employment) which results from a one unit change in income (employment) where the income (employment) change is generated initially by a change in final demand.

Second, those sectors which rank high on these criteria are derived from the high impact sectors, i.e., they have the potential of generating the largest impacts in the region. Finally, these high impact sectors are separated into those sectors which have shown increasing vs. decreasing employment over the 1960-80 period. Those sectors which are growing are considered to be capable of generating further growth in the region. Those which are declining are problem sectors where the decline needs to be stopped or continued decline needs to be offset by growth in other sectors.

To select the sectors which appear in Table 1, the 15 largest sectors for each of three criteria (output, income and employment) were listed. From these lists, it was found that 12 sectors were common to all three lists; this comprises the first group of sectors in Table 1, i.e., construction, primary iron and steel manufacturing, etc. An additional four sectors appear on two lists, while one sector (Electricity, Gas, and Sanitary Services) appears only once. The employment and employment multipliers for each sector are also presented in Table 1. Comparable information on output and income are excluded because of space limitations. The 17 sectors listed in Table 1 account for 84 percent of output and employment in the region, but only 50 percent of income. This difference is in part accounted for by the large service-oriented sectors such as eating and drinking

establishments, health and miscellaneous services which are relatively low wage sectors.

Table 2 was developed similarly to Table 1, except that the largest output, income and employment multipliers were used to select the top 15 sectors. A total of 22 sectors appears in Table 2. Eight of these sectors appear on all three lists of top 15 sectors as ranked by the three multipliers. Seven sectors appear on two lists and seven on only one. Five of the seven sectors which appear only once have high employment multipliers. The 22 sectors in Table 2 account for 62 percent of the output, 32 percent of the income and 37 percent of the employment. The mean output per man-year of employment is \$145,317 for the sectors in Table 2 as compared to \$86,693 in Table 1. Similarly, the mean income per man-year of employment is \$15,287 as compared to \$10,686 in Table 1. While the sectors in Table 2 are smaller than those in Table 1, they are more capital intensive, higher paying, and have higher multipliers.

The second step is to use size and multiplier criteria to sort out the highest impact sectors in the region. These two criteria are appropriate because: (1) a small change in a large sector can easily result in a larger regional impact than a large change in a small sector and (2) a larger multiplier means a larger regional impact per unit in final demand for the output of a sector.

Three sectors clearly stand out as high impact sectors because they appear in the top 15 sectors on both criteria: heating, plumbing and fabricated metals; motor vehicle equipment; and finance and insurance. These are relatively large sectors of output, income and employment which have relatively large output, income and employment multipliers.

A total of six other sectors appear in both tables. Chemicals and allied products ranks on two size criteria (output and income) and two multipliers (income and employment). Construction, primary iron and steel, electric and electronic equipment, and health services are large sectors which rank on only one multiplier criteria. Electricity, gas and sanitary services ranks on one criteria in each table. In addition, the large service-oriented sectors in Table 1, wholesale, eating and drinking establishments, miscellaneous services, and retail are important to any regional economy, not because they have high multipliers, but because they are

important input suppliers to the high multiplier sectors, i.e., they account for a significant part of the multipliers of high multiplier sectors.

In Table 3, employment trends for 1960 to 1980 are shown for many of the sectors listed in Tables 1 and 2. Since the data in Table 3 are from general Ohio Bureau of Employment Services publications and the I/O model data were developed from a detailed County Business Patterns data tape for 1978, several sectors of interest are omitted from Table 3 and several others are partially reported because of data availability limitations.

The data in Table 3 clearly show the large employment declines in the heavy manufacturing sectors, which are well known. These declining sectors include transportation equipment, in which the high impact sector "motor vehicle equipment" is contained. However, significant employment growth has occurred in fabricated metals, which contains the high impact sector "heating, plumbing and fabricated metals." Finance and insurance, the third high impact sector, has also shown significant employment growth. Other sectors showing large employment growth are wholesale, retail, and other service-oriented sectors. The growth rates of retail and services are biased upward because changes in unemployment compensation coverage have required many firms to report to the Ohio Bureau of Employment Services in 1980 that did not have to report in 1970 or 1960.

Implications for Regional Growth

The results of this study clearly demonstrate what is well known. Northern Ohio, in particular the northeast, has experienced major negative economic impacts from declines in its core manufacturing sectors and the accompanying indirect impacts on related sectors. These core sectors have relatively large multipliers and are large in size.

Less well known is how the region can facilitate the current transition in order to again become a dynamic growth region. The results of this study suggest several sectors which merit attention. "Heating, plumbing and fabricated metals" and "finance and insurance" are two sectors which are large, have large multipliers and are experiencing employment growth. Chemicals and allied products ranks relatively high on size and multiplier criteria and has shown a moderate increase in

employment. Wholesale, retail and other service-oriented sectors are large and are showing rapid employment growth. Part of this growth is production of services for export, rather than input supply to other sectors in the economy. However, the data underlying this study and published data in general are not sufficiently detailed to separate export from support industries within the service-oriented sectors.

Table 1. Employment and Employment Multipliers for the Largest Output, Income and Employment Sectors, 17-County Region, 1978

	Employment Man-Years	Employment Multiplier
Three of Three		
Construction	66,767	2.21
Rubber & Leather Products	48,711	1.83
Primary Iron & Steel Manufacturing	67,128	2.15
Heating, Plumbing & Fabricated Metals	54,215	1.92
Miscellaneous Machinery	64,933	1.88
Electric & Electronic Equipment	57,990	1.85
Motor Vehicle Equipment	87,957	3.12
Wholesale	95,838	1.47
Finance & Insurance	60,693	2.58
Eating & Drinking Establishments	81,385	1.42
Health Services	106,470	2.11
Miscellaneous Services	326,003	1.31
Two of Three		
Crops ^a	45,347	1.51
Chemicals & Allied Products ^b	21,875	3.47
Non-Water Transportation	44,261	1.54
Retail	194,979	1.09
One of Three		
Electricity, Gas & Sanitary	17,648	2.50
Regional Economy	1,713,779	1.90

Large output and employment

Large output and income.

Large employment and income.

Large output.

Table 2. Employment and Employment Multipliers for the Largest Multiplier Sectors, 17-County Region, 1978

	Employment Man-Years	Employment Multiplier
Three of Three		
Food & Kindred Products	17,179	3.00
Textiles	14,925	2.00
Primary Nonferrous Metals	21,099	2.31
Heating, Plumbing & Fabricated Metals	54,215	1.92
Motor Vehicle Equipment	87,957	3.12
Water Transportation	2,324	2.09
Finance & Insurance	60,693	2.58
Charter Fishing	42	2.83
Two of Three		
Livestock	4,729	1.74
Furniture & Fixtures	6,277	1.69
Chemicals & Allied Products	21,875	3.47
Boat-Ship Building & Repair	2,518	1.55
Other Manufacturing	6,259	1.71
Auto Repair Services	10,604	2.62
Marina & Boat Dealers	3,790	1.53
One of Three		
Other Mining	970	2.84
Construction	66,767	2.21
Paper & Allied Products	9,598	1.84
Primary Iron & Steel Manufacturing	67,128	2.15
Electric & Electronic Equipment	57,990	1.85
Electricity, Gas & Sanitary	17,648	2.50
Health Services	106,470	2.11

Large output and employment

Large output and income.

Large employment and income.

Large output.

Table 3. Regional Employment and Employment Changes for Selected Sectors, 1960, 1970 and 1980.

	1960	1970	1980	1970-1980 % Change	
Construction	60,460	64,312	66,715	+	3.7
Food & Kindred Products	31,261	26,986	21,054	-	21.7
Textiles	NA	11,330	8,080	-	28.7
Chemicals & Allied Products	22,857	26,141	26,307	+	0.6
Rubber & Leather Products	59,836	59,384	49,358	-	16.9
Primary Metals	103,339	102,819	76,705	-	25.4
Fabricated Metals	58,625	66,078	79,037	+	19.6
Electric & Electronic Equipment	NA	47,803	47,451	-	0.7
Transportation Equipment	78,947	77,620	63,065	-	18.7
Transportation	43,464	48,483	45,691	-	5.8
Water Transportation	NA	6,060	2,564	-	57.7
Electricity, Gas & Sanitary	14,024	14,926	15,850	+	6.2
Wholesale	73,562	85,375	108,383	+	26.9
Retail	191,727	252,608	309,551	+	22.5
Eating & Drinking Est.	33,694	44,725	68,695	+	53.6
Finance & Insurance	36,138	49,767	64,771	+	30.1
Services	84,230	126,369	328,041	+	159.6
Auto Repair	5,197	6,977	8,594	+	23.2
Health	4,139	11,416	96,059	+	741.4

Data reported for a limited number of counties.

Includes primary iron and steel manufacturing and primary nonferrous metals.

Includes heating, plumbing and fabricated metals.

Includes motor vehicle equipment.