Staff Papers Series

P85-36 December 1985

MINNESOTA ECONOMIC TRENDS IN THE 1980's

Wilbur R. Maki and Hossein Akhavipour

Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

MINNESOTA ECONOMIC TRENDS IN THE 1980's

Wilbur R. Maki and Hossein Akhavipour

Staff Papers are published without formal review within the Department of Agricultural and Applied Economics

CONTENTS

SUMMARY

The findings on aggregate Minnesota economic trends in this report are summarized as follows:

1. Minnesota industry has become increasingly sensitive to the business cycle.

2. Minnesota industry has become increasingly diverse, particularly in its export-producing sector.

3. Increasing industry diversity has been accompanied by more, rather than less, volatility in employment and earnings.

4. Minnesota industry expansion is represented by increases in total employment and, also, increases in market share, which can be shown as employment share, that is, the percentage of the total U.S. employment in a particular industy residing in Minnesota.

5. Minnesota industry employment expansion since 1940 is attributed to the rapid expansion of services-producing industries , particularly retail trade finance, insurance and real estate, business services, profesional services, and local government.

6. Lagging growth in goods-producing industries is attributed largely to the decline in agricultural employment, which was accompanied by even larger changes in output per worker, not only in agriculture, but also, mining and manufacturing.

7. Rapid expansion of foreign export markets in the 1970's for Minnesota aricultural and manufactured products accounted, in part, for the strong, above-average performance of the Minnesota economy in the 1970's.

8. Productivity increases, measured by growth in output per worker, are more and more important in accounting for growth in gross industry product, particularly in periods of increasing labor shortages.

9. Changes in output per worker, like market share, will vary over the business cycle which, in turn, will account for state and regional variations in employment growth.

10. Growth in both output per worker and total employment has contributed to growth in industry value added and Gross State Product in Minnesota, with the largest increases originating in the manufacturing, trade, finance, insurance and real estate, and private services industries.

11. Minnesota industry expansion is illustrated by three industry "winners" of the last three decases of Minnesota's econmoic

history, namely, computing and other office equipment, manufacturing, business services, and health services and their unique responses to the business cycle.

12. Agriculture and mining have been among the slowest-growing industries in total value added, earnings, and employment.

13. Growth in Minnesota per capita income is attributed to two critical factors--the shift in basic employment from agriculture to manufacturing and the rapid increase in labor force particpation.

14. Occupational earnings of the Minnesota work force can be represented by a bimodal distribution of earnings per job with lower-paying, part-time service jobs accounting for much of the lower mode and higher-paying, full-time professional, managerial, and technical jobs accounting for much of the upper mode.

15. Gender-based disparities in occupational earnings and income persist with female workers holding most of the low-paying jobs.

These findings point to the urgency of Minnesota state government addressing the statewide and regional consequences of the increasing cyclical sensitivity of the Minnesota economy. These consequences are intermixed with others emanating from critical structural changes in industry mix, market share, and output per worker.

The findings in this report show that each new decade of Minnesota's economic history has differed from the one before. The 1950 decade was marked by the emergence of a new nonfarm manufacturing sector and an expanding regional trade and service center in the Minneapolis-St. Paul Metropolitan Area. The 1960's brought dramatic changes in Minnesota's economic base with the shift to services, including the growth of health services and state and local government. The 1970's nurtured unprecedented growth in Minnesota's foreign export markets, but lagging growth in computing and other office equipment manufacturing and health services. The 1980's became the decade of

re-assessment, with two recessions that stopped Minnesota's above average economic growth dead in its tracks and with an aborted recovery that has not yet run its course.

The good news is that new growth industries have emerged, like business services, that are, in part, catalysts in coping with cost-reducing competition. Finally, the challenge of improving worker productivity in the services-producing industries has not been left unnoticed, as in the health services industry, which is confronting the challenge of achieving economy in the delivery of essential services by reducing employment levels, changing product mix, and generally improving service management and delivery practices.

MINNESOTA ECONOMIC TRENDS IN THE 1980'S

Wilbur R. Maki and Hossein Akhavipour

Minnesota nonfarm industry nearly doubled in employment in the past 25 years. Total wage and salary jobs increased from 932 thousand in 1959 to 1.8 million in 1984. Nonfarm self-employed also grew from less than 100 thousand to more than 160 thousand. Meanwhile, total farm employment dropped from more than 200 thousand to near 150 thousand.

While the Minnesota economy expanded and diversified, it also became increasingly sensitive to the general business cycle. In the last two recessions, Minnesota employment dropped 5.6 percent from its 1979 pre-recession peak of 1,787,000 to its 1982 recession trough of 1,686,000 as ahown in Figure 1. During the same period, U.S. employment dropped only 1.8 percent.

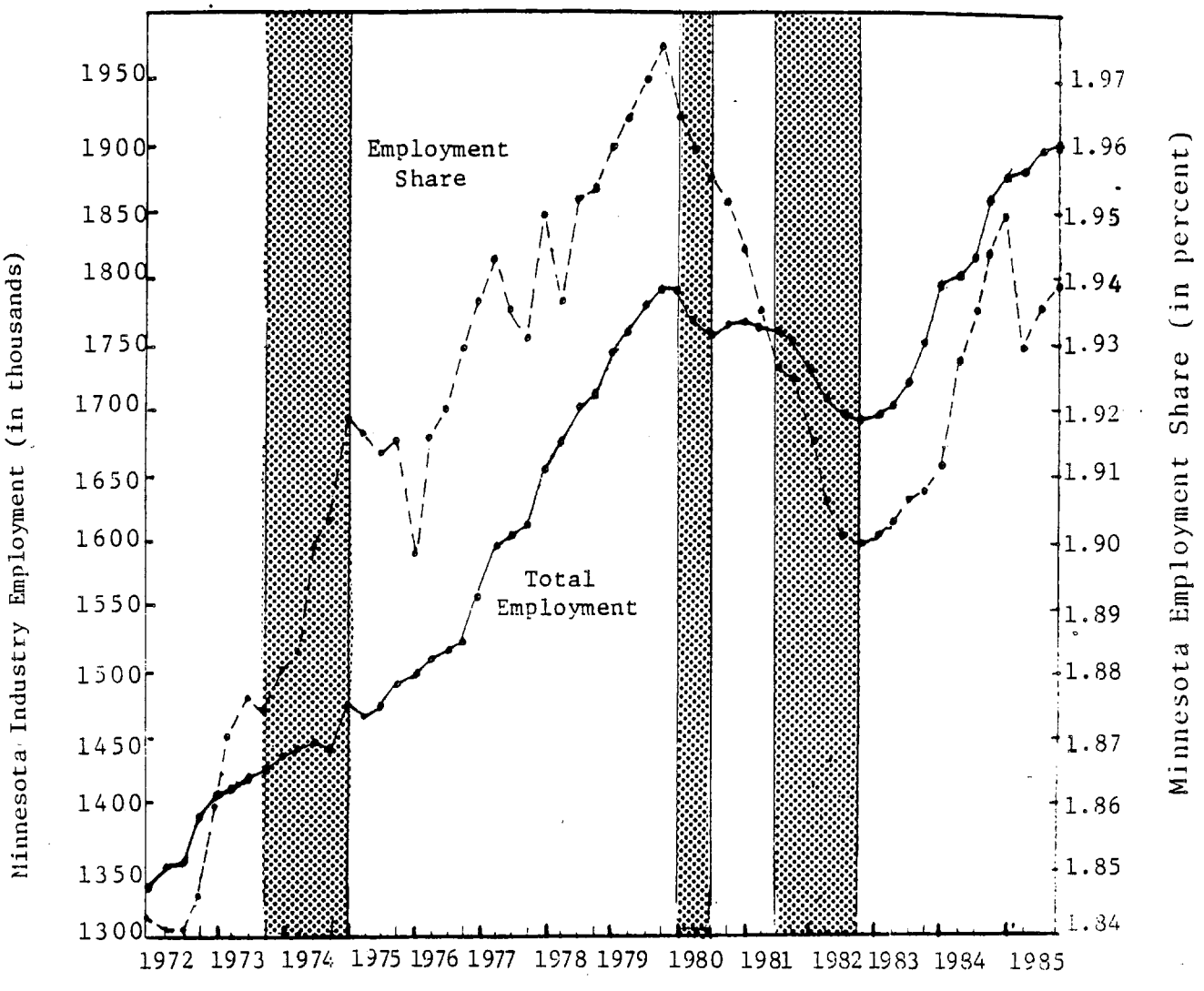
Even more dramatic is the sharp drop in Minneota's share of total U.S. employment from peak to trough. Minnesota's employment share had increased from 1.84 percent in 1972 to 1.97 in 1979 but it dropped to 1.90 percent in 1982. Each one-hundredth-of-one-percent change in total employment share is equivalent to a change of nearly 10,000 jobs.

So far what Minnesota lost in recession, it has made up in recovery. To do so, however, the recovery must last three to four years or longer. Calendar year 1985 completes the third full year since the 1981-82 recession.

From World War II, to the present day, the U.S. economy has survived eight periods of expansion and contraction. These averaged 55

Figure 1

Minnesota seasonally-adjusted nonagricultural wage and salary employment drops in recession but regains above-average job losses (with reference to U.S.) with above-average job gains in the three to five years of economic recovery following a recession trough.



Source: U.S. Bureau of Labor Statistics (Unpublished data), November 1985.

months--44 of expansion and 11 of contraction.

Four periods of expansion and three of contraction are counted in the 13-year period from January 1972 to December 1985 cited in this report. Trough (T) and peak (P) months mark the period of expansion (E) and contraction (C), which have ranged from 6 months for contraction to 50 months for expansion.

Year	Month	Duration
1973	November (P)	36 months (E)
1975	March (T)	16 months (C)
1980	January (P)	50 months (E)
1980	July (T)	6 months (C)
1981	July (P)	12 months (E)
1982	November (T)	17 months (C)
1985	December	37 months (E)

The current recovery in Minnesota is now lagging behind past performance. In fact, Minnesota employment growth was at a virtual stand still for several months in 1985 -- a consequence of a trade-weakened manufacturing sector and a precariously sick agriculture. Taconite mining is in trouble, too. These now are the victims of a high-federal deficit and a high-valued dollar that dull the competitive edge of American industry and forfeit both domestic and world markets to many outside competitors.

Despite the economic adversities faced by Minnesota industry in the early 1980s, its employment growth, particularly in manufacturing and service industries, outpaced employment growth in the U.S. in the post-recession period. U.S. manufacturing employment growth slowed down sharply, of course, as exports declined and imports rose.

The past 25 years of growth and change in U.S. and world economies has meant tremendous shifts in Minnesota industry employment, the

productivity of this employment, and the incomes it generates. In this report, we view the Minnesota economy in its totality and the critical factors that affect its health and well-being. We do so by tracking Minnesota's share of U.S. employment industry by industry and the increasing volatility and sharpened sensitivity of the Minnesota economy to changing national and world economic conditions. We view, finally, an economy that has become increasingly diversified as manufacturing and services account for more and more of the state's basic industries.

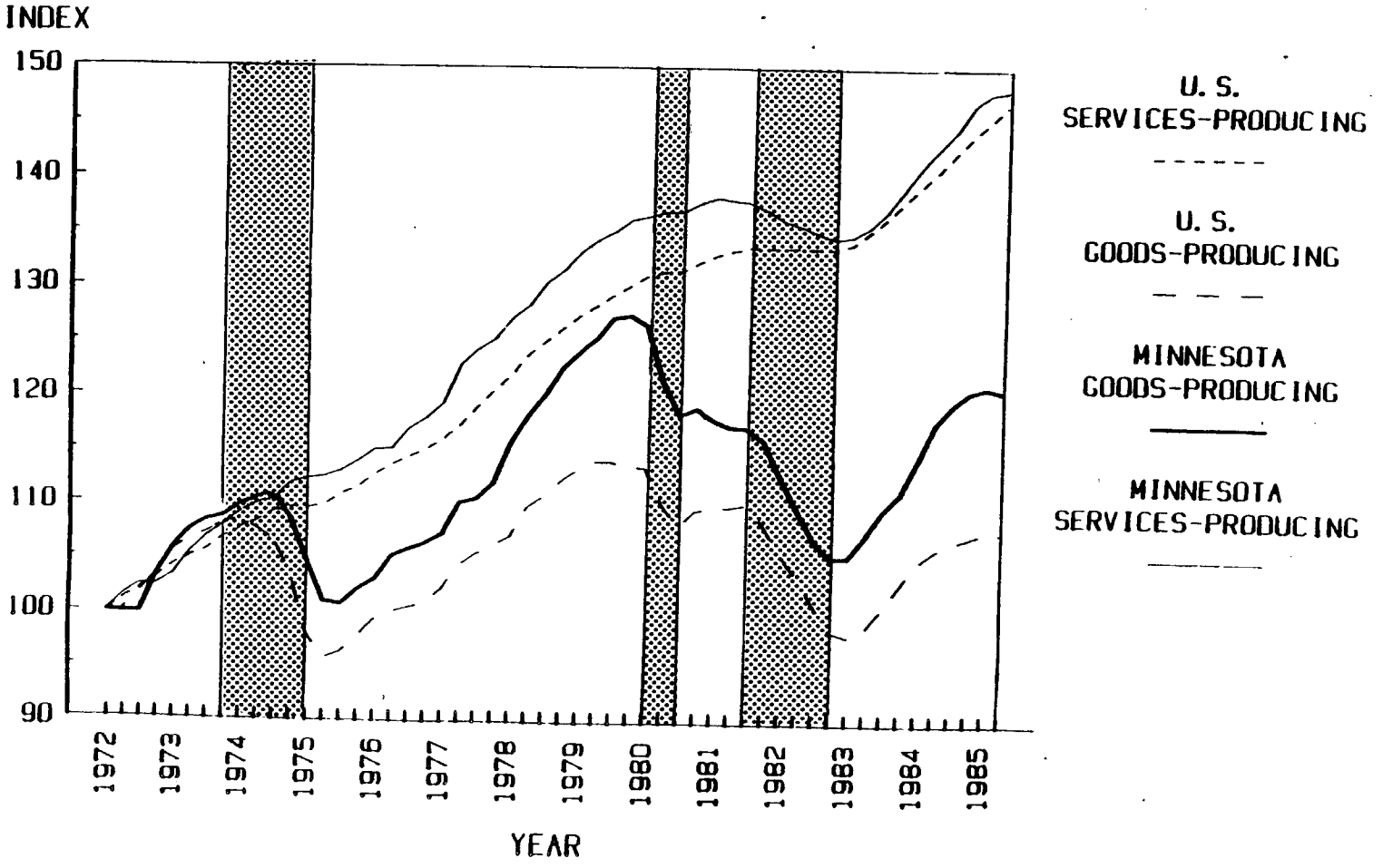
CYCLICALLY-SENSITIVE INDUSTRY

The role of industry in economic growth and change is affected by its market orientation. Export-producing industry--primarily goods-producing farming, mining, and manufacturing businesses--is readily identified by the out-of-state destination of its product: It brings in the first dollar that circulates and re-circulates from one business to another before it leaves the state. Residentiary industry, that is, all businesses except export-producing, is marked by the local nature of its markets and clients: It serves all economic units in local market areas--household, business, and government.

Because of the close correspondence between export-producing and goods-producing industries on the one hand, and residentiary and services-producing industries on the other, the more readily obtained and familiar breakdown between goods-producing and services-producing employment is used in this report, as presented in Figure 2. Acknowledged in the use of this dichotomy, however, is the increasing importance of strict services-producing industries in Minnesota's economics base, that is, among the export-producing industries.

Figure 2

SERVICES-PRODUCING EMPLOYMENT GROWTH OUTPACES GOODS-PRODUCING EMPLOYMENT GROWTH IN BOTH MINNESOTA AND THE U.S.



Most cyclically-sensitive businesses are export-producing because of market exposure -- the same markets that are entered by export-producing businesses in other states and countries. Periodic shifts in these markets are transmitted almost instantly to all participants, regardless of location.

Among Minnesota's goods-producing export industries, quarter-to-quarter variability in sales and employment is largest in mining. This variability is, in part, cyclical and short-term and, in part, structural and long-term. The cyclical part is triggered by the sharp fluctuations in the U.S. steel-making industry--the result of correspondingly sharp fluctuations in U.S. final demand.

At the peak of the business cycle in 1979, Minnesota taconite mining employment totaled 16 thousand, as shown in Table 1. This peak corresponded with a peak production of about 50 million tons of taconite pellets. Current production is less than 35 million tons while total employment is less than eight thousand.

Construction employment also is highly cyclical, but it, too, is being adversely affected by long-term construction trends. Wage and salary jobs in this industry increased from slightly more than 60 thousand in mid-1975 to its peak level of 84 thousand in late 1979.

During the 1980 and 1981-82 recessions, jobs in the construction industry dropped sharply. By early 1983, total construction employment dropped to below 58 thousand--a decline of 27 thousand, which amounted to 32 percent of peak employment.

Manufacturing industries, particularly durable-goods manufacturing, are among the most cyclically sensitive. Wage and salary employment in durable goods manufacturing, for example, dropped from a late 1979 peak

Table 1

Minnesota nonfarm wage and salary employment, when reported on a seasonally-unadjusted, job-count basis, shows large quarter-to-quarter increases and decreases in response to the business cycle.

Industry	Full-time and part-time jobs					Annual change		
	First Qtr 1972	First Qtr 1975	Fourth Qt 1979	First Qtr 1983	Fourth Qt 1984	1972-1979	1979-1983	1983-1984
	Thousand					percent		
Good-producing:								
Mining	12.8	13.6	17.3	7.7	8.1	4.0	-20.7	2.9
Construction	51.2	50.3	88.2	44.7	76.4	7.3	-17.7	35.8
Manufacturing, total	293.7	313.1	386.7	331.7	380.1	3.6	-4.3	8.1
Food products	49.3	45.7	49.2	43.4	46.7	0.0	-3.5	4.3
Paper & allied prod.	28.7	31.1	33.6	31.8	34.3	2.1	-1.6	4.4
Printing & publishing	24.8	26.0	33.6	35.1	40.8	4.0	1.3	9.0
Other nondurable goods	27.3	28.1	31.9	25.0	28.8	2.0	-6.7	8.4
Lumber & furniture	12.6	11.1	16.3	13.4	16.9	3.4	-5.4	14.2
Fabricated metal	29.9	32.0	39.7	31.9	35.5	3.7	-6.1	6.3
Nonelectrical machinary	57.7	68.9	90.2	78.6	94.4	5.9	-3.9	11.0
Electrical Machinary	17.9	22.6	28.4	23.8	28.0	6.1	-4.9	9.7
Other durables	45.5	47.6	63.8	48.7	54.7	4.5	-7.4	6.9
Total good producing	357.7	377.0	492.2	384.1	464.6	4.2	-6.8	11.5
Service-producing:								
Trans.,Comm.,& Pub. Utilities	84.6	88.9	102.5	90.7	98.9	2.5	-3.4	5.1
Wholesale trade	89.5	102.1	119.0	105.8	119.0	3.7	-3.3	6.9
Retail trade	226.2	254.3	334.9	305.5	359.2	5.2	-2.6	9.7
Fin.,Insurance, real estate	65.9	73.3	92.9	98.2	107.0	4.5	1.6	5.0
Services, total	229.8	268.9	360.2	378.9	430.3	6.0	1.5	7.5
Business services	26.2	31.2	54.9	57.1	78.9	10.0	1.1	20.3
Health services	82.9	92.9	119.7	131.6	136.3	4.9	2.7	2.0
Other services	120.7	144.8	185.0	190.2	215.1	5.7	0.8	7.3
Government	245.5	270.0	300.5	291.2	299.2	2.6	-0.9	1.6
Federal government	30.6	30.5	31.3	29.9	30.8	0.3	-1.3	1.7
State government	57.3	62.4	72.5	73.7	74.8	3.1	0.5	0.8
Local education	88.5	101.2	108.5	99.7	103.4	2.7	-2.4	2.1
Other local	69.1	75.9	88.4	87.7	90.2	3.2	-0.2	1.6
Total services-producing	941.5	1057.5	1310.0	1270.3	1413.6	4.4	-0.9	6.3
Total nonfarm wage & salary	1299.2	1434.5	1802.2	1654.4	1878.2	4.3	-2.4	7.5

Source: Minnesota Department of Jobs and Training (Unpublished data), July 1984.

of 248 thousand to a early 1983 low of 200 thousand -- a 19 percent decline in two years.

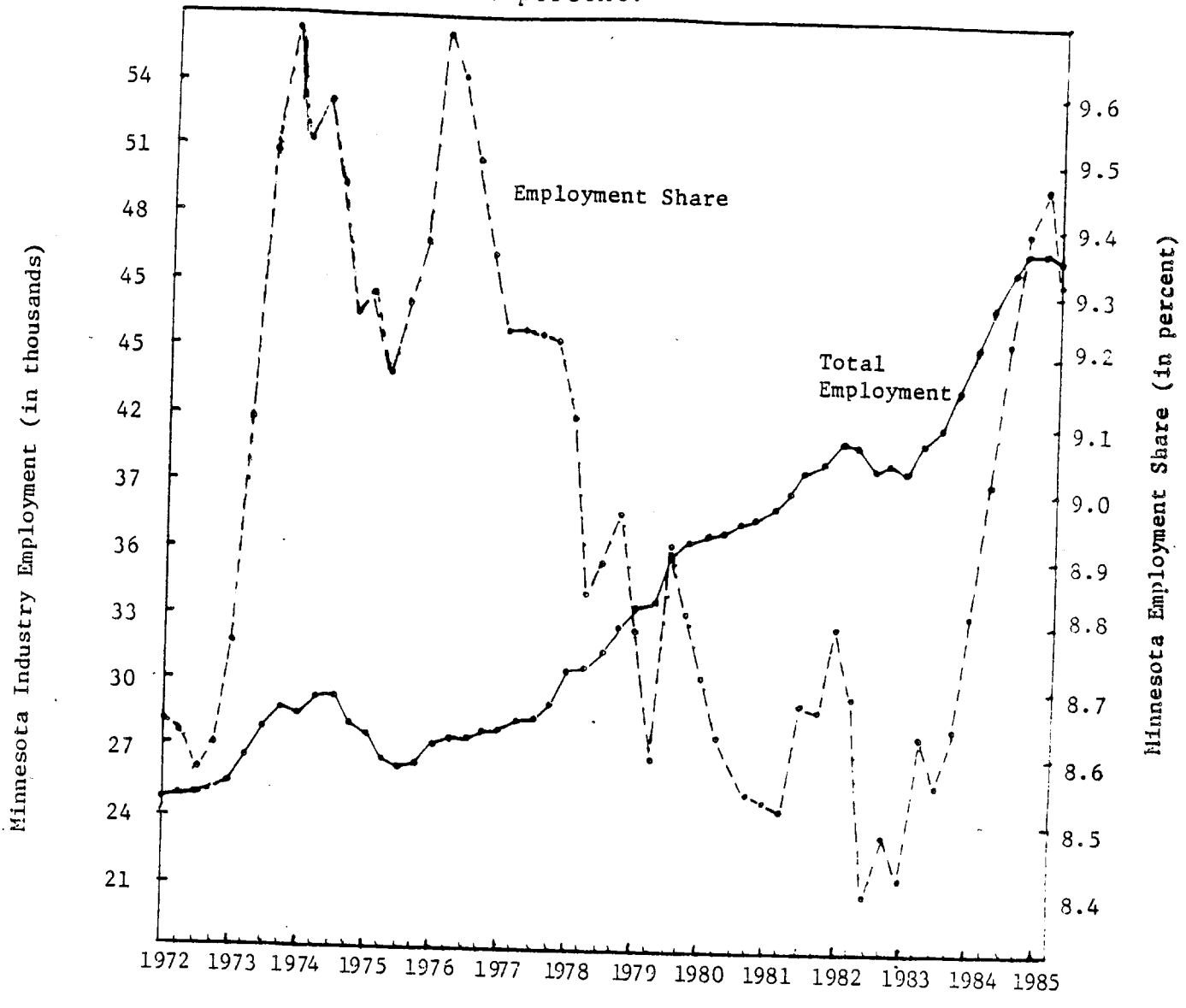
We can clearly visualize and appreciate how Minnesota industries are affected by the business cycle when we focus on three well-known "winners" among Minnesota's growth industries--computing and other office equipment manufaacturing, business services, and health services. The first of the three led Minnesota's manufacturing industry growth in the 1960s, the second now leads Minnesota's growth in services, while the third led it in the 1970's. Each industry has played a special role in the growth and development of the Minnesota economy.

The computing and other office equipment industry grew rapidly in its early years in Minnesota. By 1972 it accounted for nearly 10 percent of the U.S. computer and office equipment industry employment share. This industry changed course again in the early 1980's. Despite the job-reducing impacts of the 1980 and 1981-82 recessions on durable goods manufacturing, this industry actually increased in wage and salary employment from 38 thousand in late 1979 to 42 thousand in early 1982 and only then dropped to 40 thousand before increasing sharply to its 1984 peak of 50 thousand jobs, as shown in Figure 3.

In spite of recession, the Minnesota computing and other office equipment industry was expanding its share of total U.S. employment in this industry from a 15-year low of 8.4 percent in 1982 to 9.5 percent in 1984. It had declined from its historical peak share of 9.7 percent in early 1973 even though it was increasing in total employment. This occurred because of its rapid, above-average growth in the rest of the nation.

Figure 3

Jobs in computing and other office machinery manufacturing have doubled since 1972--the largest increases having occurred since the 1981-82 recession when Minnesota's job share of the U.S. total had dropped to 8.4 percent.



Source: Minnesota Department of Jobs and Training, Current Employment Statistics Program (seasonally adjusted data series) and U.S. Department of Commerce (unpublished data series), July 1984

The business services industry is another rapidly expanding, and now increasingly, export-producing industry. Total wage and salary employment grew from 31 thousand, or 1.6 percent of total U.S. employment in this industry in 1972 to nearly 79 thousand or 1.9 percent of the U.S. employment in late 1984, as shown in Figure 4. This Minnesota growth industry also escaped the 1980-82 recessions with only a slight drop in total employment and U.S. employment share. This is a new growth industry that is strongly linked to all of Minnesota's technology-intensive industry, particularly in durable goods manufacturing and other services.

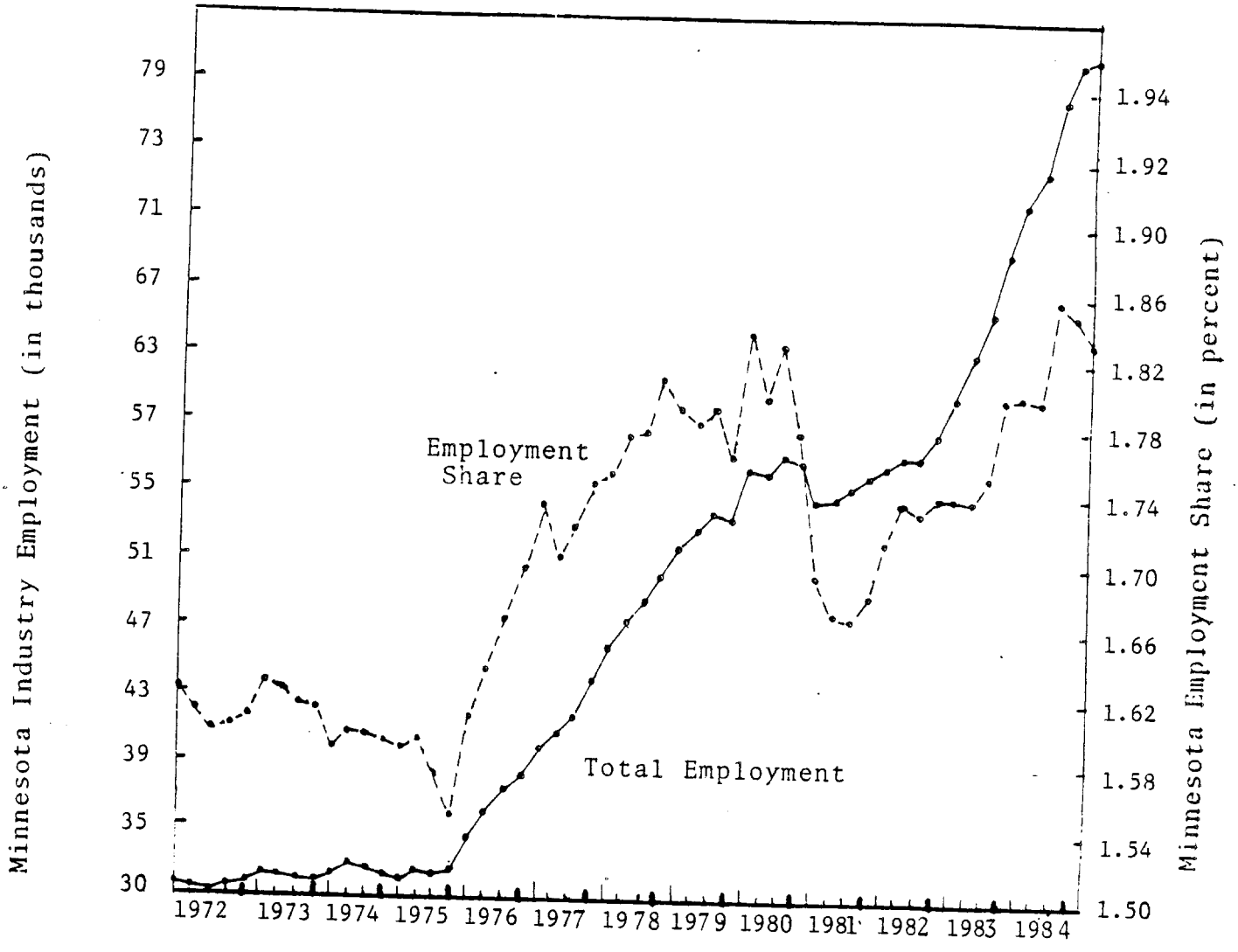
The health services industry is a third Minnesota growth industry that is also export-producing insofar as it attracts patients, clients, and customers from outside the state. It is now the slowest-growing of the three and like the computing equipment industry, it, also, lost in its share of total U.S. employment. It dropped from 2.4 percent of U.S. employment in mid-1983 to 2.2 percent of U. S. employment in mid-1983, as shown in Figure 5. Total wage and salary employment increased, meanwhile, from 86 thousand to 134 thousand.

Employment growth in the health services industry now lags its earlier growth rates because of industry de-regulation and cost-reducing pressures asserted by both private and public employers. Large reductions in hospital employment since 1981 account for much of the recent quarterly volality in total wage and salary employment in this industry.

Total employment in the health services industry is, of course, much larger than the wage and salary employment reported here when the self-employed and government employees are correctly included in health

Figure 4

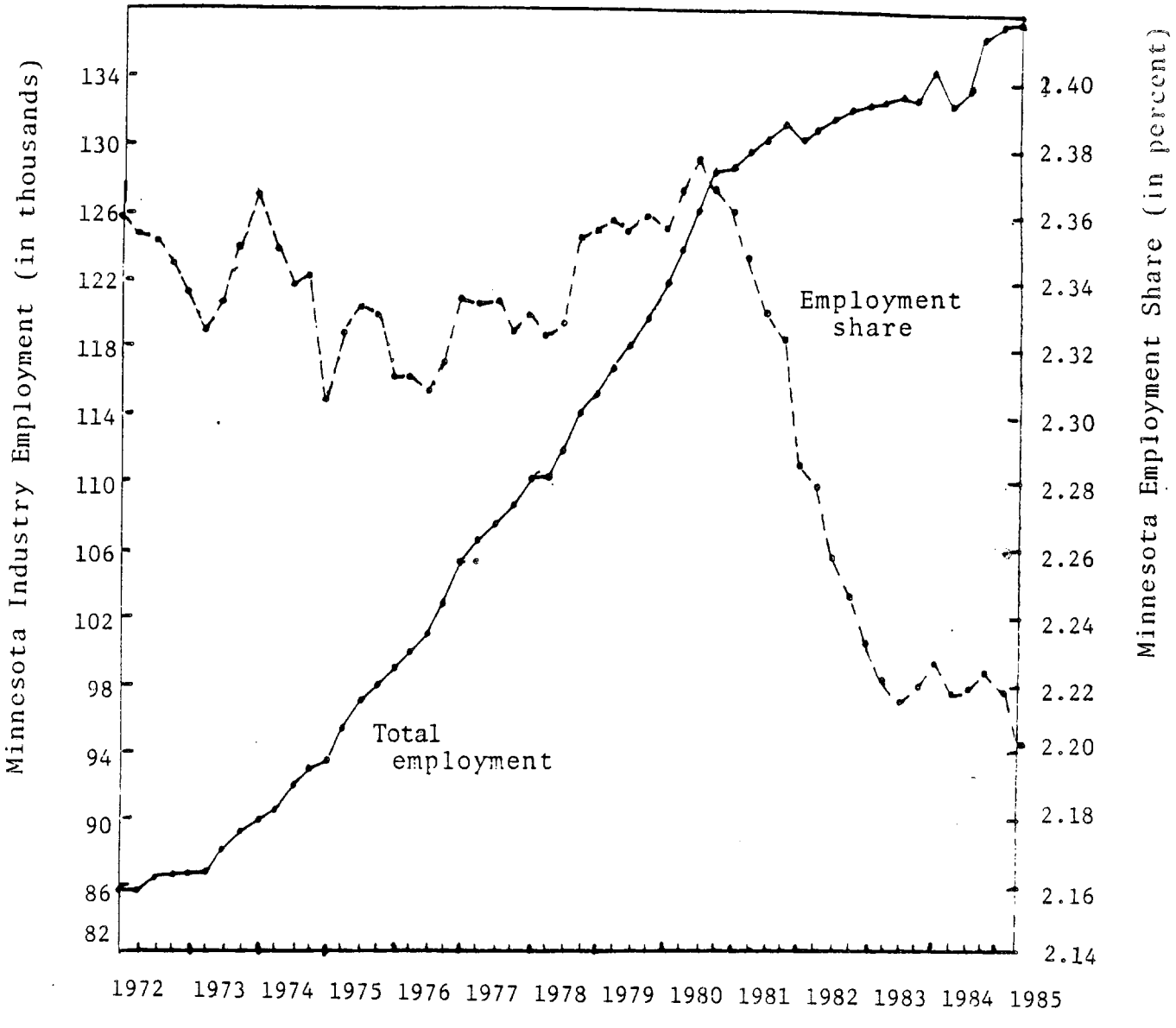
Business services jobs have nearly tripled since 1972--a growth rate that exceeds the U.S. average for this industry--a Minnesota industry that also is cyclically sensitive in both total jobs and job share



Source: Minnesota Department of Economic Security, Current Statistics Program (seasonally adjusted data series) and U.S. Department of Commerce (unpublished data series)

Figure 5

Health services jobs increased by 60 percent in the 1972-84 period but lost in total U.S. job share with much of the growth having occurred by 1981 when hospital jobs had peaked for this period.



Source: Minnesota Department of Economic Security, Current Statistics Program (seasonally adjusted data series) and U.S. Department of Commerce (unpublished data series).

services. Much controversy arises, of course, from employment comparions based on different data sources. For example, 168 thousand employed persons reported the health services industry as their principal source of job remuneration in 1980 in the 1980 U.S. Census of Population. In comparison, the 124 thousand full-time and part-time private wage and salary jobs are reported in the U. S. Department of Commerce Regional Economic Information System. However, these estimates do not include the self-employed and those on government payrolls who are nonetheless part of the health services industry as reported by the U.S. Bureau of the Census.

The second group of industries, those that provide mainly personal and professional services for households, are shielded from the fluctuations of the general business cycle by the stability of personal consumption expenditures. This stability is partially illustrated by the large, but steady, increase in the health services industry employment in the 1970's, which is, in part, residentiary in its market orientation. However, some residentiary industries, like construction, suffer the vissitudes of the business cycle because of the particular role they perform in Minnesota's capital goods-producing sector.

Residentiary industry generally depends on export-producing industry as its economic base. Personal and professional services, as well as much of retail trade, finance, insurance, real estate, transportation, communications, and public utility businesses, are the indirect recipients of increases or decreases in Minnesota's export-producing activity. This relationship is gradually changing so that a larger and larger services-producing sector is supported by a much less rapidly growing export-producing sector. Thus, the ripple

effects of a given change in export-producing, or basic, employment are increasing in terms of related increases in residentiary employment. This structural change was demonstrated earlier by the association between changes in residentiary and export-producing employment in the 1972-1984 period.

STRUCTURALLY-CHANGING INDUSTRY

By taking out the short-term effects of cyclical change in industry employment, the underlying long-term shifts in Minnesota industry performance can be observed and measured. A first step is comparison of total persons employed at 10-year intervals, as reported by the U.S. Bureau of the Census and summarized in Table 2. According to these data, the total number of persons reporting their principal source of income from employment in goods-producing industries increased from 450 thousand in 1940 to 606 thousand in 1980 -- a 35 percent increase. At the same time, the total number of persons reporting their principal source of remuneration from employment in services-producing industries increased from 449 thousand to 1210 thousand -- a 170 percent increase. Thus, the rate of growth in services-producing employment was more than four times the rate of growth in goods-producing employment -- a dramatic indication of the massive shifts in Minnesota economy from producing goods to producing services.

The more rapid growth of services-producing employment is attributed to a series of long-term changes in transporting, producing, and using agricultural, mineral, and forest products and the related material inputs. Minnesota industry has participated fully in these changes as shown by (1) decreasing dependence on goods-producing industries in the state's economic base, and (2) increasing levels of

Table 2

The U.S. Census of Population shows large shifts from agriculture to manufacturing and services among Minnesota residents reporting employment by industry providing principal source of income.

Industry	Total Employed Persons 1940	1950	1960	1970	1980	Annual Change 1940-70	1970-80
	thousand					percent	
Goods Producing Industry:							
Agriculture	285.8	263.7	181.5	113.9	108.7	-3.0	-.5
Mining	8.0	15.9	17.8	14.0	15.2	1.9	.8
Construction	38.0	64.3	70.7	83.0	99.4	2.6	1.8
Manufacturing, total	105.3	188.9	247.2	314.3	380.8	3.7	1.9
Food Products	35.4	46.7	59.5	47.6	46.0	1.0	-.3
Paper and Allied Prod.	4.8	8.6	12.5	24.4	26.4	5.6	.8
Printing and Publishing	13.6	18.2	26.1	32.0	36.5	2.9	1.3
Other Nondurables	13.8	20.7	18.7	21.3	22.8	1.5	.7
Lumber and Furniture	10.9	12.9	10.9	11.2	15.9	.1	3.6
Fabricated Metals	5.9	10.6	19.2	28.4	33.4	5.4	1.6
Nonelectrical Machinery	8.5	24.2	31.4	65.7	91.5	7.1	3.4
Electrical Machinery	3.3	9.5	14.1	22.5	40.7	6.6	6.1
Other Durables	9.2	37.4	54.6	61.2	67.6	6.5	1.0
Total Goods-Producing	437.1	532.8	517.3	525.2	604.1	.6	1.4
Services-Producing Industry:							
Trans., Comm., Public Util.	65.8	97.3	92.6	96.3	129.1	1.3	3.0
Wholesale Trade	35.5	50.2	53.5	70.7	92.2	2.3	2.7
Retail Trade	139.4	181.3	195.9	258.8	321.2	2.1	3.2
Fin., Ins., Real Estate	29.0	37.7	51.8	68.2	107.7	2.9	4.7
Services, total	179.1	203.3	273.3	412.9	559.8	2.8	3.1
Business Services	19.9	31.5	29.6	48.5	72.5	3.0	4.1
Health Services 1/	22.0	28.0	55.0	96.0	168.0	5.0	5.8
Other Services	138.0	145.0	189.8	269.6	321.2	2.3	1.8
Public Administration	30.4	40.0	48.0	55.6	69.6	2.0	2.3
Total Services-Producing	479.2	609.8	715.0	962.5	1279.5	2.4	2.9
	.0	.0	.0	.0	.0		
Total Employed Persons	916.3	1142.7	1232.3	1487.7	1883.6	2.1	2.7

1/ Estimated for 1940, 1950, 1960 and 1970; reported for 1980.
Source: U. S. Bureau of the Census

industry output per worker.

The changing structure of the Minnesota economy is revealed in the mix of export-producing industries. The historically important basic industries -- agriculture and food products manufacturing, mining, and timber products manufacturing -- now account for much less than half of the state's economic base. Each year, this share drops even more. Meanwhile other basic industries--machinery and other manufacturing; transportation, communications and public utilities; finance, insurance and real estate; and private sectors account for an increasingly larger share of Minnesota's basic employment, as shown in Figure 6.

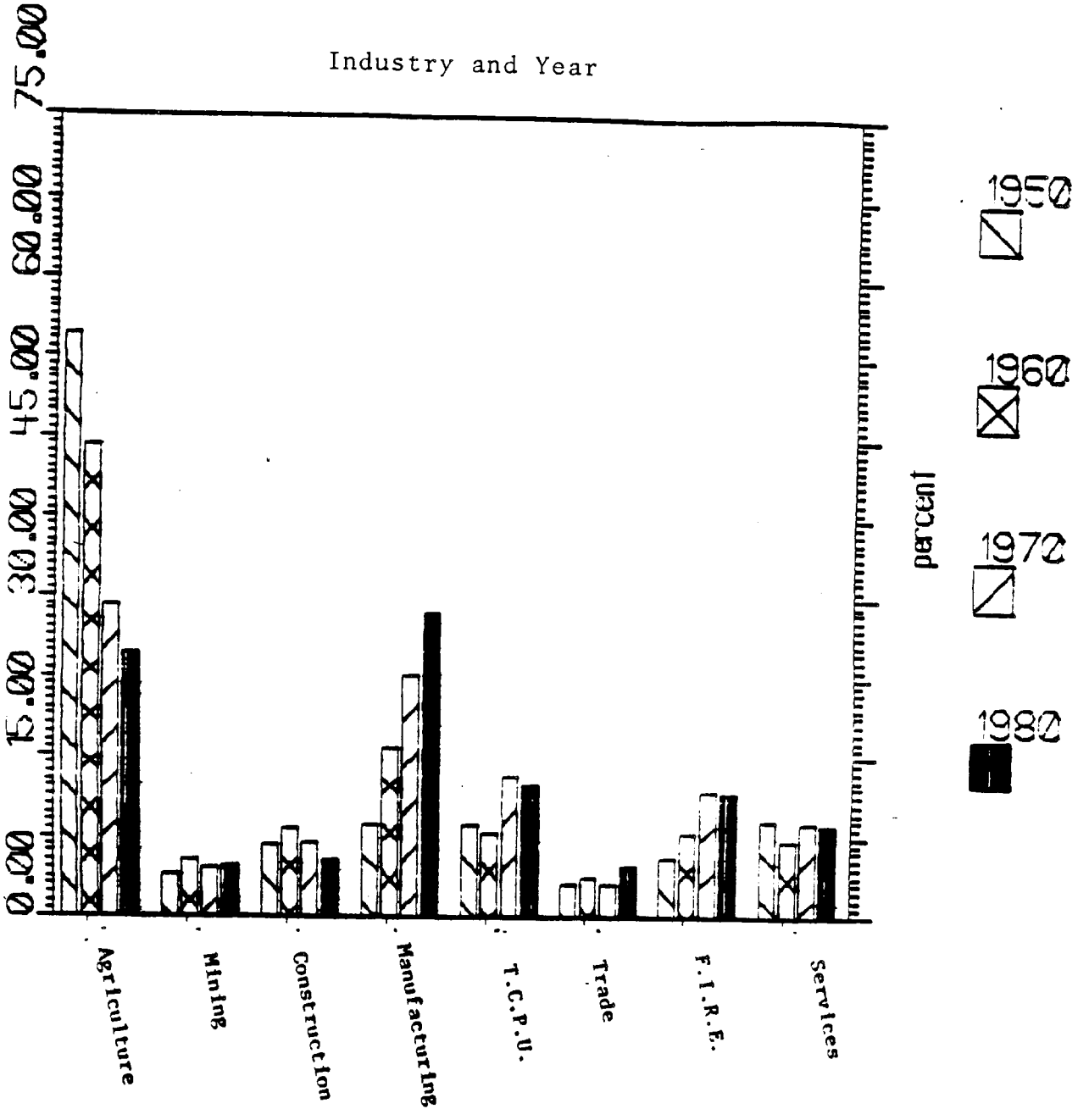
Over the long run, the diversification of Minnesota's economic base is shown in the industry employment changes during the 1940-80 period. Agriculture and food products manufacturing, for example, dropped from 61 percent of the state's economic base to 30 percent, while all other industry increased from 39 percent to 70 percent of the state's economic base.

A closer look at the composition of all other basic industry reveals the increasing importance of manufacturing. Printing and publishing, nonelectrical machinery, and scientific and controlling instruments manufacturing show the strongest growth, even exceeding U.S. averages.

Professional services, along with business services, also increased in importance during this period. These increases contributed to the rapid growth of the services-producing industries. Total persons employed in Minnesota's services-producing industries increased from 449 thousand or 50 percent of total employment in 1940 to 1210 thousand

Figure 6

Minnesota export-producing employment, by industry providing principal source of income, has shifted from primarily agriculture in 1950 to primarily manufacturing and service industries in 1980.



Source: Based on U.S. Census of Population, Minnesota, 1950, 1960 1970, and 1980 using location quotient approach and substate region data to determine export-producing employment in each detailed industry group.

or 67 percent of total employment in 1980. Meanwhile, total persons employed in Minnesota increased from 899 thousand, or 32 percent of total population, in 1940 to 1816 thousand, or 44 percent of total population in 1980.

Minnesota's economic geography also changed during the 1940-80 period from place specialization to place diversity. The Minneapolis-St. Paul area expanded from a trade and service center for a goods-producing hinterland to manufacturing, and professional and business services catering to world markets. At the same time, agriculture-dependent rural counties experienced the effects of industrial overspill from the metropolitan centers. As a result of rural industrialization, less than two dozen Minnesota counties have more than two-thirds of their economic base in agriculture.

Industry diversification has heightened rather than reduced cyclical fluctuations in the Minnesota economy. Minnesota export-producing industries quickly transmit changes in general economic conditions to local suppliers and work force. Industry diversification, on the other hand, has lessened the state's vulnerability to structural change by providing existing industries a broad range of opportunities for entering new markets and acquiring new products and production techniques.

EXPORTS, PRODUCTIVITY AND ECONOMIC GROWTH

Minnesota's economic growth is directly linked to its economic base and the growth of trade, imports as well as exports. Much attention is focused on the role of exports -- the sale of Minnesota-produced goods and services to out-of-state customers -- the source of Minnesota's economic growth. Much less attention is placed on role of imports in

accounting for this growth. Without imports, of course, much value added by Minnesota businesses would not be possible. Minnesota, in short, is a trading economy, highly dependent on both imports and exports and highly sensitive to the economic well-being of its trading partners.

Worldwide economic growth in 1970's, coupled with sharp increases in purchases of U.S. farm products by the Soviet Union, supported large increases in Minnesota exports of manufactured products--agricultural and nonagricultural -- to the rest of the world. These exports more than doubled in value from 1972 to 1977, with the largest increases being in wheat and its products and nonelectrical machinery.

Although the worldwide economic downturn in the early 1980's dampened U.S. export growth, large gains still occurred in feedgrains and soybeans and, also, food products. Food and feed products on the one hand and capital goods on the other thus accounted for much, if not all, of the growth in Minnesota's export trade in the 1972-82 period. Since 1982, however, net exports generally have declined because of import expansion, coupled with reduced exports to rest of the world.

The bottom line of all effective and meaningful economic development is not simply export expansion, but the productivity of all employed resources. Such results are best demonstrated in U.S. industry trends. Increasing world-scale competition has forced goods-producing industries to move quickly to adopt cost-reducing measures, while residentiary services-producing industries are protected from much outside competition by high transportation costs. and the advantages of proximity to their customers. Minnesota industry remains competitive in large part because of the productivity of its

work force that is sustained by early adoption of cost-reducing technology and business services.

Comparison of output per worker in goods-producing and services-producing industries shows an early narrowing, but a more recent widening of the differences between the two trends, as illustrated below:

	Goods-Producing		Services-Producing		All Industry	
	1967-80	1980-84	1967-80	1980-84	1967-80	1980-84
	(Percent)					
Output per Worker	1.0	3.0	1.0	1.2	0.6	1.5
Output	1.7	2.2	3.9	3.7	2.7	2.9
Employment	0.6	-0.8	2.9	2.5	2.1	1.4

Over the 1967-80 period output per worker grew at an overall rate of one-percent annually in both goods producing and services-producing industries. In the 1980-84 period, however, output per worker increased 3.0 percent and 1.2 percent, respectively, in the two industries. The all industry growth was 0.6 percent and 1.5 percent, respectively, for the two periods.

The aggregate output per worker ratios mask important changes in both industry mix and total hours worked. A major industry breakdown of goods-producing and services-producing industries is again used in presenting changes in individual industry output per hour ratios over the 1958-84 period, as follows:

	1958-79	1979-82	1982-84
		(percent)	
Goods Producing:			
1 Agriculture	3.8	0.0	6.6
2 Nonagricultural total(incl.service)	1.7	-0.7	3.1
3 Mining	1.3	-1.3	6.3
4 Construction	0.0	-1.6	6.6
5 Manufacturing,total	2.2	-1.2	7.4

6	Mfg., durables	2.2	-1.2	7.4
7	Mfg., nondurables	2.9	0.6	3.3
Services Producing:				
8	Tran., comm., utilities,total	2.8	0.5	2.9
9	Transportation	2.3	-0.7	1.5
10	Communications	4.5	2.6	5.8
11	Public Utilities	2.2	-3.0	3.5
12	Trade,total	2.1	-0.3	3.8
13	Wholesale trade	2.2	-0.5	6.5
14	Eating & drinking places	-0.2	-0.5	0.4
15	Other retail	2.8	0.0	3.0
16	Finance, insurance & real est.	1.4	1.1	0.5
17	Other services	1.5	-0.5	0.8
18	Government enterprise	1.0	2.1	-0.4

More detailed data generally show higher output per hour ratios than the aggregate data because of large reductions in the hours worked per person. The shift to a shorter work week is obscured when reporting on a per worker rather than a per hour basis. The data also show large differences in output per worker trends and year-to-year fluctuations in output per hour ratios among the major industry groups.

A further breakdown of manufacturing industry is used to show output per hour ratios for 8 nondurable goods and 10 durable goods manufacturing industries, as follows:

	1958-79	1979-82 (percent)	1982-84
Nondurable Manufacturing:			
Food products	2.5	3.5	3.9
Textile mill products	3.2	2.7	3.2
Apparel and other textile products	2.2	2.3	2.4
Paper and allied products	2.8	1.5	4.6
Printing and publishing	1.5	0.0	8.1
Chemicals and products	3.3	-3.2	8.1
Rubber and miscellaneous plastic products	1.0	1.8	5.1
Leather	1.2	3.3	4.2
Durable Manufacturing:			
Lumber and wood products	3.2	6.5	6.9
Furniture and fixtures	2.3	2.8	2.9
Stone, clay and glass	1.7	-0.3	5.2
Primary metals	1.8	-3.3	5.2
Fabricated metals products	1.4	-1.2	5.4
Machinery, except electrical	2.4	-0.3	8.3

Electric and electronic equipment	3.7	1.9	6.6
Transportation equipment	2.4	-4.1	8.2
Instruments and related products	3.0	0.7	3.3
Miscellaneous manufacturing	2.4	-0.2	4.1

Generally, the 18 manufacturing industries show high year-to-year variability in output per hour ratios. The variability in these ratios in the manufacturing industries is exceeded only in agriculture and construction. Both the manufacturing industries and the construction industry are cyclically-sensitive and, hence, the year-to-year variability coincides with the general business cycle. Agricultural hourly productivity rates, on the other hand, are affected by sharp changes in market demand or product supply that are not necessarily associated with the general business cycle and corresponding changes in total hours worked.

An alternate approach to the representation of year-to-year changes in job productivity is by segmentation of individual time series according to the troughs and peaks of the general business cycle, as shown in Table 3. Included with the output per hour ratios are total real output and total hours worked in the 18 industry groups. A least-squares fit of the yearly observations for each four consecutive business cycles provides the estimates of the year-to-year changes in the three statistical series. These data show, for example, that both the rates of increase in total real output and the rates of decrease in total hours worked were less in each succeeding business cycle. In agriculture, the rates of increase in output per hour also were less in each succeeding cycle--indeed, a common pattern among goods-producing industries.

Table 3

Total real output, total hours worked and total output per hour declined sharply in the last 25 years, with the largest reductions in two of the three measures, namely output and hours worked, occurring in the most recent five-year period.

Industry Group	Total Real Output				Total Hours Worked				Output per Hour			
	1958-65	1965-73	1973-79	1979-84	1958-65	1965-73	1973-79	1979-84	1958-65	1965-73	1973-79	1979-84
	(percent)											
1 Agriculture	1.7	1.6	1.6	1.0	-3.8	-3.1	- .7	- .9	5.8	4.8	2.2	1.9
2 Nonagriculture	4.4	3.4	3.2	1.5	1.5	1.3	2.3	.7	2.9	2.1	.9	.8
3 Mining	3.2	2.5	.0	- .6	-2.0	- .1	4.6	-2.2	5.3	2.6	-4.4	1.7
4 Construction	3.7	1.3	1.3	.6	1.1	2.0	3.3	-1.0	2.6	- .7	-1.9	1.6
5 Manufacturing	4.9	2.7	2.8	- .1	1.7	.3	.9	-2.0	3.1	2.5	1.8	2.0
6 Durable mfg.	5.8	2.3	2.7	- .7	2.3	.2	1.3	-2.6	3.4	2.1	1.4	2.0
7 Nondurable mfg.	4.0	3.2	2.9	.6	1.0	.3	.4	-1.1	2.9	2.9	2.5	1.7
8 Tr.,Comm.,Util.	4.2	4.7	3.8	1.1	.1	.1	1.6	- .4	4.1	3.6	2.1	1.5
9 Transportation	3.2	3.2	3.5	-1.2	- .2	.2	1.7	-1.5	3.4	3.1	1.8	.4
10 Communications	5.5	7.6	7.8	3.9	.8	3.5	1.5	- .2	4.7	4.0	6.2	3.7
11 Public Utilities	4.9	5.3	3.2	1.7	.3	1.7	1.7	2.2	4.5	3.5	.5	- .4
12 Trade	4.3	4.2	3.1	2.7	1.1	1.5	2.1	1.1	3.2	2.7	.9	1.6
13 Wholesale Trade	4.9	4.9	3.3	3.1	1.8	1.6	3.0	.7	3.1	3.3	.3	2.4
14 Eating&Drink.Pl.	1.5	2.0	2.4	4.0	.6	2.2	3.9	3.4	1.0	- .2	-1.4	.5
15 Other Retail Tra.	5.4	4.6	3.2	1.8	1.0	1.2	1.2	.5	4.4	3.3	1.9	1.3
16 Fin.,Ins.,RealEs.	4.3	4.8	4.8	3.5	2.0	3.3	3.6	2.4	2.2	1.4	1.2	1.0
17 Other Services	4.7	5.3	4.6	3.8	2.7	2.6	4.1	3.9	2.0	2.6	.5	- .1
18 Government Enter.	3.5	3.1	2.5	.7	3.1	2.0	.8	- .1	.4	1.0	1.6	.8

Source: U.S. Bureau of Labor Statistics (Unpublished data), November 1985

The changing patterns of productivity in the U.S. economy in the four business cycles from 1958 to 1984 (with the last two cycles being counted as one) are illustrated in a series of three graphs. The generally declining levels of real gross output in the goods-producing industries since 1958 are shown in Figure 7. During much of this period, the services-producing industries contributed to an expanding real output. In the 1979-84 period, however, the growth in real output was generally less than in any other period.

Increases in total hours worked also have become smaller and smaller in each period as shown in Figure 8. They actually declined in absolute levels in the goods-producing industries as well as in transportation and government enterprise.

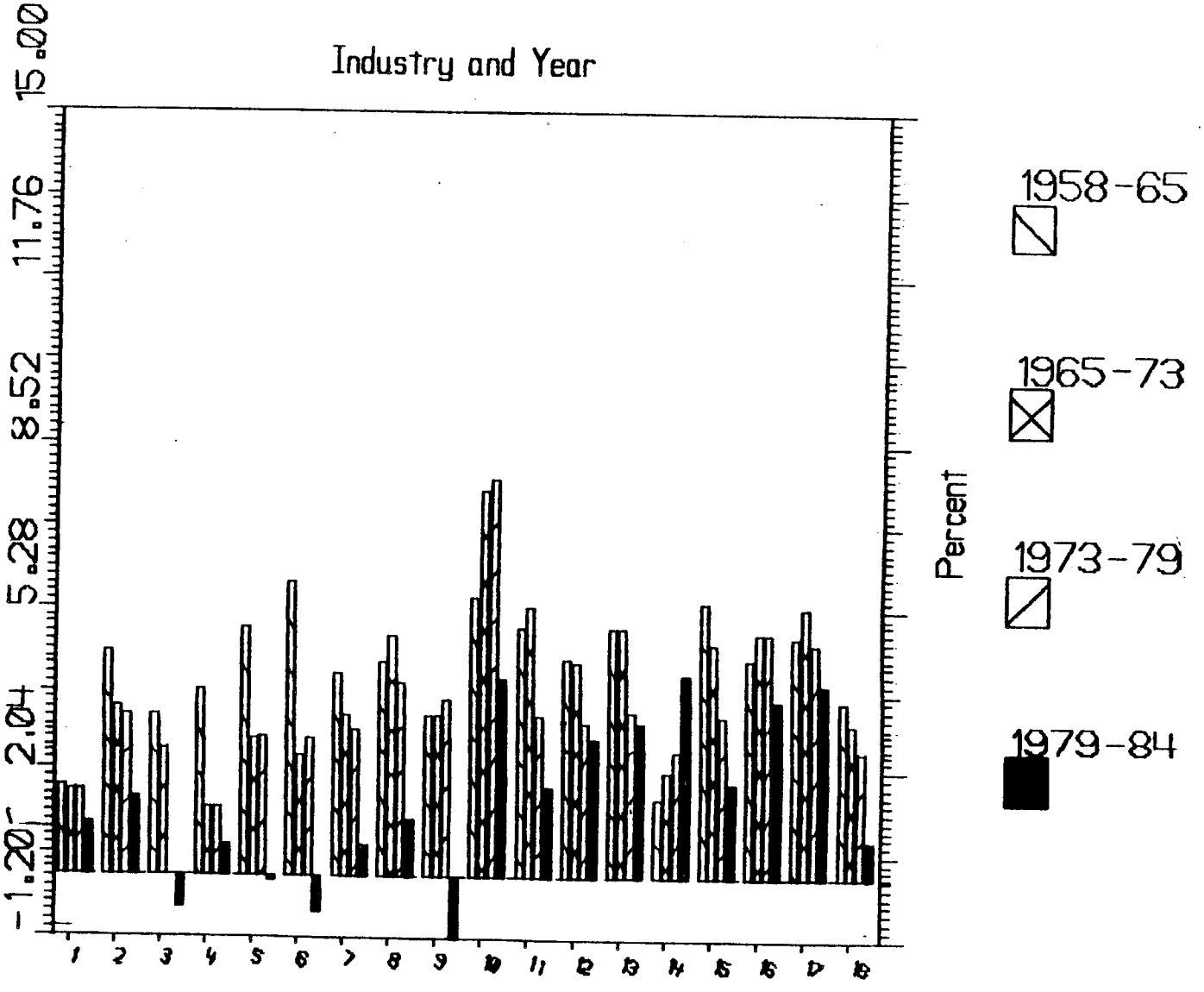
The output per hour ratios bear part of the burden of declining rates of increase in total output and total hours worked. In fact, the decline in output per hour ratios was even sharper in some industry groups than the decline in total hours worked, as shown in Figure 9.

The series of three charts illustrate the dramatic shifts in the organization of the productive workforce in the U. S. economy. Of particular importance to the Minnesota economy is the shift to services and the prospects for improved productivity rates in the services-producing industries. Minnesota, with its above-average growth in services-producing industry, would benefit from such increases in worker productivity. An above-average sensitivity to the business cycle, however, is likely to dampen the potential increases in productivity insofar as output per worker would decline sharply in recession periods.

Growth in real GNP is a function of growth in output per worker

Figure 7

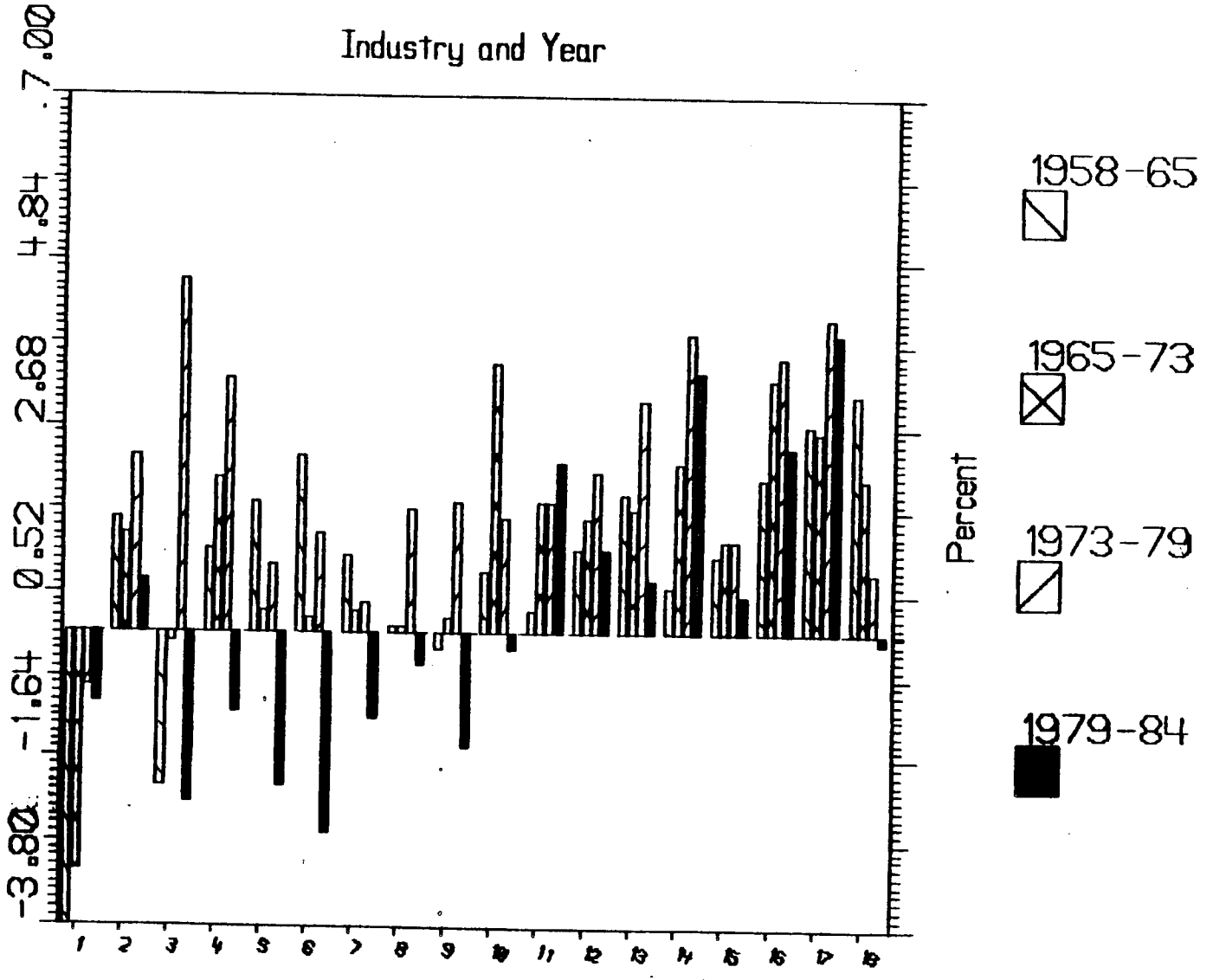
Growth rates in total real output declined in each of four segments of the 1958-84 period in 11 of 18 industry groups with net losses occurring in four industries, namely, mining, total manufacturing, durable goods manufacturing, nondurable goods manufacturing, and transportation.



Source: U.S. Bureau of Labor Statistics (Unpublished data), November 1985.

Figure 8

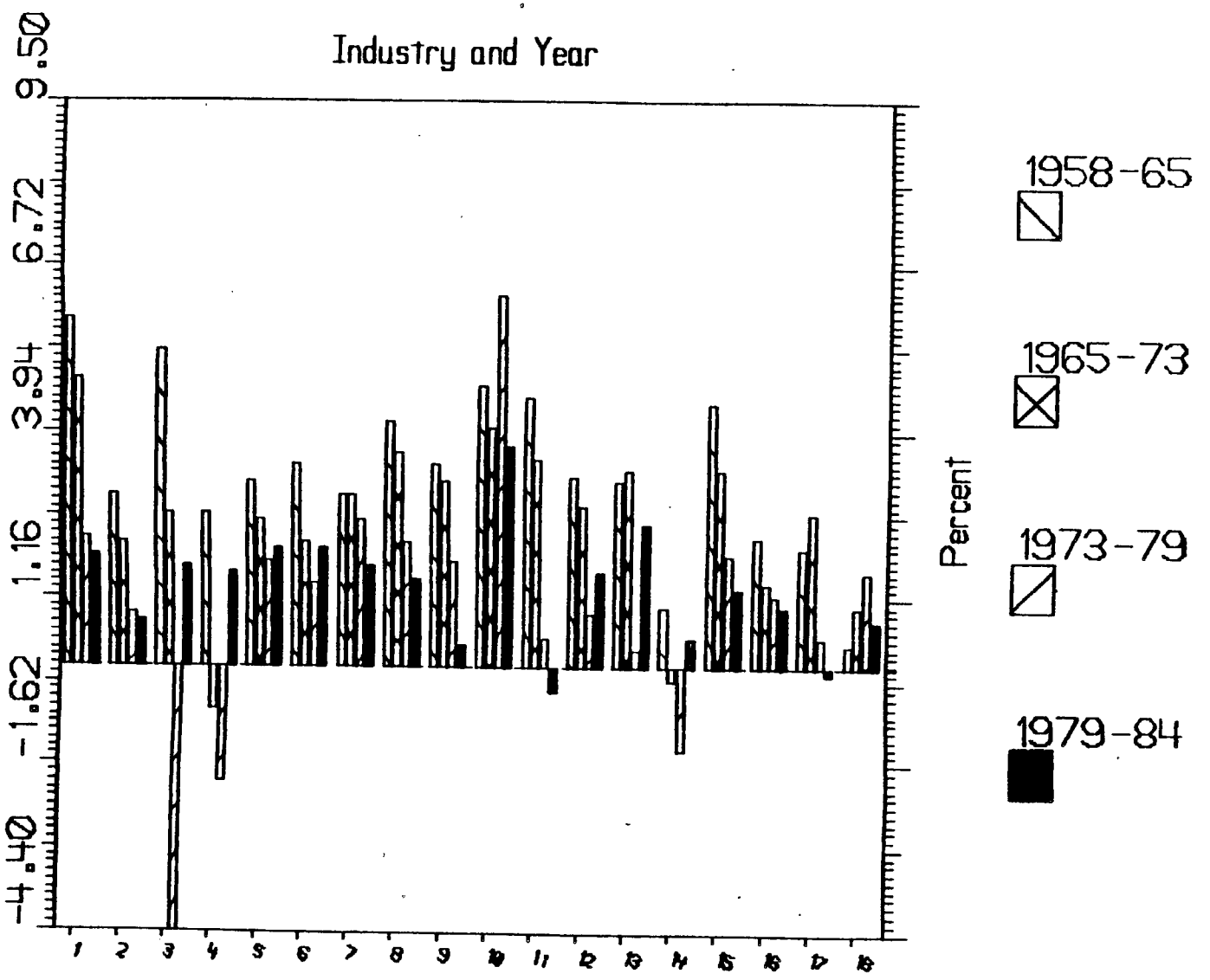
Growth in total hours worked declined in the last five year segments of the 1958-84 period in 17 of 18 industry groups, with an absolute fall in farms worked occurring in each of the five goods-producing industries.



Source: U.S. Bureau of Labor Statistics (Unpublished data), November 1985.

Figure 9

Output per hour declined in the 1958-85 period in each of the 18 industry groups with the largest reductions occurring in mining, construction, public utilities, and eating and drinking places.



Source: U.S. Bureau of Labor Statistics (Unpublished data), November 1985.

and, also, employment. Most of the 2.9 percent growth in real GNP in the 1967-80 period--nearly two thirds--is attributed to growth in the employed labor force. The above-average growth in Minnesota employment in the 1967-80 period contributed to above-average growth in its own Gross State Product.

A larger share of GNP growth is attributed to growth in output per worker in the 1980-84 period than in the 1967-80 period. Limited export market expansion, coupled with newly emerging demographic constraints, made labor productivity growth an increasingly important determinant of the 2.8 percent real GNP growth in the 1980-84 period. Similarly, the Minnesota economy depends increasingly on above-average growth in worker productivity to achieve above-average growth in its industry gross product. Thus, the rapid shift to services, together with an increasingly severe demographic constraint on the future growth of the Minnesota labor force, make doubly important a renewed focus on productivity in the work place, particularly in the services-producing industries.

POPULATION AND INCOME

Minnesota per capita income has increased gradually from $521, or 12 percent below the U.S. average of $589 in 1940 to $9688, or two percent above the U.S. average of $9503 in 1980. In 1984, it reached $13.5 thousand, or nearly four percent above the U.S. average of $13 thousand.

Much of the increase in Minnesota's standing nationally in personal income growth in recent years is attributed to the steady growth in total earnings of the employed work force. However, this growth lagged corresponding U.S. growth in the 1940's and 1950's because of lagging

population growth. In 1940, for example, total Minnesota population was 2.8 million, or 2.1 percent of the U.S. total of 132 million. By 1960, Minnesota population exceeded 3.4 million. It had dropped to 1.9 percent of total U.S. population of 180 million. In 1980 Minnesota population had increased to nearly 4.1 million when total U.S. population exceeded 227 million. Minnesota population had dropped to 1.8 percent of the U.S. total.

In short, the increase in per capita income must be attributed to two critical factors--the shift in basic employment from agriculture to manufacturing and the rapid increase in labor force participation, particularly female, which more than compensated for the still-lagging population growth. In addition, persons 16 years and older have become an increasingly larger part of the total population, which further increased the employment-population ratio in the 1940-80 period.

Income Receipts

The personal income of Minnesota residents is received from many sources other than wage and salary disbursements. These include: other labor income; property income -- interest, rent and dividends; and transfer payments -- unemployment insurance, worker's compensation, and retirement income.

Like wage and salary disbursements, both property income and transfer payments vary from peak to trough of the general business cycle. In Minnesota, property income increased from $421 per person, or 14 percent of total income in 1967 to $1600 per person, or 16 percent of total income in 1980. Transfer payments, on the other hand, increased from $252 per person, or nine percent of total income in 1967, to $1146 per person, or 12 percent of total income in 1980.

Thus, total earnings had declined from 78 percent to 72 percent of total Minnesota personal income in the 1940-80 period. Nonetheless, wage and salary income accounts for the largest share of total personal income, while proprietorial, or self-employed, income accounts for the smallest share.

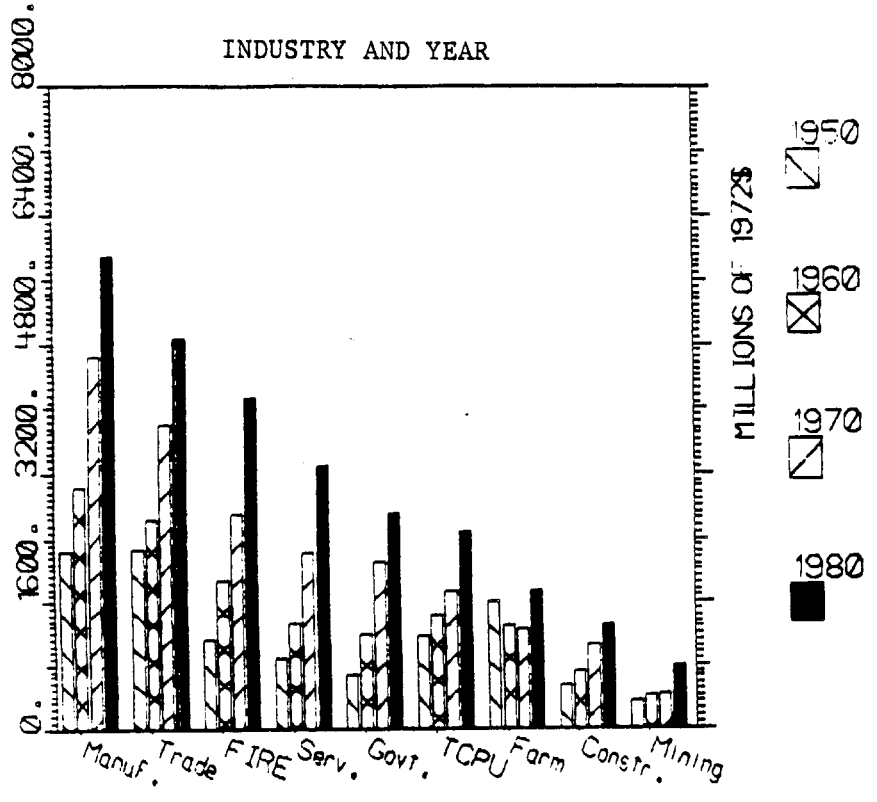
The accounting of income received by Minnesota residents is extended from personal income to total value added in the measurement of Gross State Product. Total value added originating in the Minnesota economy is presented graphically for the 30-year period from 1950-80 in Figure 10. Nine large industry groups are used to show the varying income and employment trends affecting individual industries in the state. When the nine industry groups are ranked according to their total value added in 1980, the largest is manufacturing and the smallest is mining.

Manufacturing also accounts for the largest share of the increase in total value added by all Minnesota industry over the 1950 to 1980 period. Agriculture, and more recently, mining, have been the largest losers in value added share. When comparing growth of gross state product from 1950 to 1980 with its industry distribution in 1980, the data show manufacturing with a 22 percent share of the growth in GSP increased its distribution from 20.7 percent of the total in 1950 to 21.6 percent of the total in 1980. Conversely, the farm sector's 0.7 percent share of the growth in GSP resulted in a decrease in its distribution from 14.9 percent in 1950 to 6.4 percent in 1980.

The contribution of the manufacturing industries to Gross State Product peaked in 1980. It still accounted for the largest share of Gross State Product, as shown in Figure 11. When compared with

Figure 10

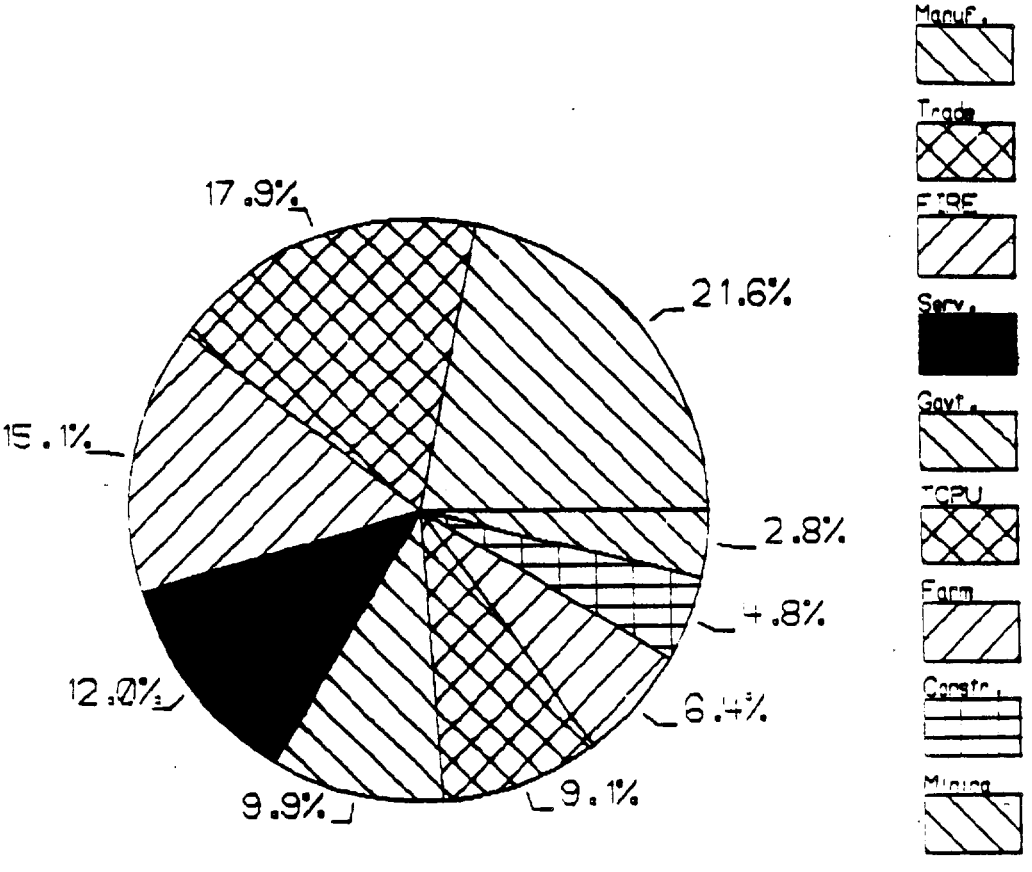
Manufacturing accounts for the largest contribution to Minnesota Gross State Product among nine industry groups and mining the smallest--a ranking sustained over the 30-year period from 1950 to 1980.



Source: Minnesota Council of Economic Advisors, 1974, and Minnesota Department of Economic Development, 1983.

Figure 11

Manufacturing, trade, finance, insurance, real estate, and government accounted for three-fourths of Minnesota Gross State Product in 1980.



Source: Minnesota Department of Economic Development, 1983.

earnings, the percentage of shares of all industry groups, except FIRE (finance, insurance, and real estate) are smaller because of the large rental property income and small labor earnings originating in the real estate industry. The Gross State Product accounts for the remuneration of all primary inputs--labor, capital, and enterpreneurship.

Income Distribution

The need for redistribution of total area income among its recipients -- household, business, and government -- remains a gnawing concern of a caring and compassionate society. It is also a concern of state government in its various efforts to improve individual access to public services and reduce economic disparities between regions.

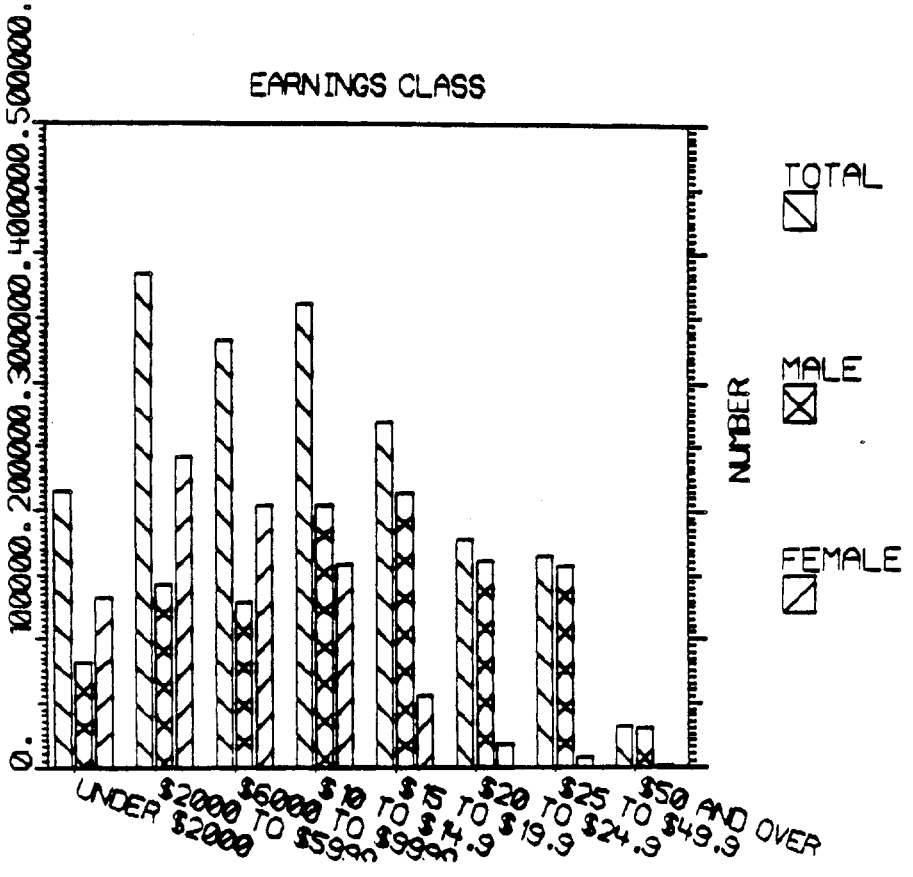
Disparities in income received among socio-economic groups and substate regions is attributed to differences in basic economic activity and related differences in industry staffing patterns and earnings. The geographic disparities due to industry mix are reinforced by popular attitudes and prevailing management practices.

According to data from the 1980 U.S. Census of Population, the ranking of earnings by occupation yields a biomodal distribution. One peak in earnings occurs in the $2,000 to $5,999 range while a second peak occurs in the $10,000 to $14,999 range, as shown in Figure 12. When earnings are separated into male and female, each gender has a single highest frequency earnings class. Disparities in earnings between male and female workers in the same occupation account for part of the two peaks. Generally, the lower-paying, part-time service jobs acount for the lower peak while higher-paying full-time professional, managerial and technical jobs account for the upper peak.

Because of increasing female participation in the labor force, the

Figure 12

Because female workers generally earned less than male workers and had more of the part-time jobs, the overall distribution of earnings per worker had two modes in 1980--one of dominantly female and part-time workers, the other of dominantly male and full-time workers.



Source: U.S. Census of Population, Minnesota.

underlying bimodal distribution of earnings per worker has become more apparent in recent years. However, this pattern largely disappears in household income distributions because of the large number of two worker households. Having both male and female labor force participation in the same household increases total household income. Thus, the lower mode does not appear in income distribution of tax filers or households.