Staff Papers Series

P81-10

May 1981

MINNESOTA'S SHIFT TO SERVICES --

ITS IMPACT ON JOBS, INCOME, AND TAXES

Wilbur R. Maki

Department of Agricultural and Applied Economics

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

MINNESOTA'S SHIFT TO SERVICES --

ITS IMPACT ON JOBS, INCOME, AND TAXES

Wilbur R. Maki

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

CONTENTS

Acknowledgements

The contribution of my colleagues, Peter Stenberg, Mason Chen and Carlo del Ninno, in the preparation of the data for this study and the funding of this effort by the Minnesota Agricultural Experiment Station are acknowledged. I also am grateful for the generous help of Pat Meagher and Michael Scully, Minnesota Tax Study Commission, and of Dan Salomone and Leonard Anderson, Minnesota Department of Revenue, in making available to us recently published tax and other state revenue estimates and of Rudy Pinola, Minnesota Department of Employment Security, in providing us with the updated Minnesota industry employment projections to 1985. Of course, errors and omissions in the use and interpretation of these data I acknowledge as my responsibility.

Abstract

Economic trends depicting recent shifts of total employment in Minnesota to services-producing industries are presented for comparison with corresponding trends in personal income and state tax receipts. In this report, simple tabular presentations accompany the discussion of these trends and their immediate and long-term implications for the Minnesota economy. A shift-share model was used to partition the external and local sources of employment change which accounted for the industry employment shifts in the 1975-1980 period. An expanded version of this model and a detailed industry data base are available for verification of the findings presented in this report. Later reports in this series will present results of alternate state economic forecasting systems.

Summary and Conclusions

This report continues with the purpose and findings of an earlier report series on Minnesota employment and income trends. In this report, the shift to the service economy is confirmed in the disproportionately large increases in services-producing rather than goods-producing jobs and,also, in part-time rather than full-time employment. Accompanying these employment increases were corresponding decreases in earnings per worker, which reduced per capita personal income levels while high employment levels were maintained. State tax receipts responded in a predictable manner, with receipts being lower than if past employment and earnings patterns had prevailed.

Whatever surprises accompanied Minnesota's shift to services were due, in part at least, to prevailing perceptions about the Minnesota economy. Two long-held perceptions in particular were not entirely supported by recent experiences, namely, that the Minnesota economy is only slightly affected by the national business cycle and that it also lags the national economy. In fact, the opposite is equally, if not more true. In 1979 and 1980, the Minnesota economy was extremely sensitive to national trends and the Minnesota economy not only responded immediately to these trends, but it anticipated them in a larger time frame. To the extent that these perceptions were embedded in the theory and practice of state revenue forecasting, the forecasts inevitably would fail to fully account for new sources of change in state revenue collections.

A satisfactory explanation of the shift to services requires a detailed breakdown of both the goods-producing and the services-producing sectors of the Minnesota and the U.S. economies. Such a detailed breakdown is available, but it is not presented in this report. Rather, abbreviated statistical series covering the 1975-1980 period are used to show the importance of the

services-producing sector in the Minnesota, as compared with the U.S., economy. These series show the negative correlation of the sharp increase in ratios of services-producing to goods-producing employment with a decline in per capita personal income. The income decline is also documented by lower earnings per worker. A larger income disparity occurs between service-producing and goods-producing employment in Minnesota than in the U.S. as a whole while at the same time services-producing employment relative to goods-producing employment is larger in Minnesota than in the U.S. as a whole.

Until the first quarter-year of 1980, the Minnesota economy outpaced the U.S. economy in almost every major sector. Only exceptions occurred in mining and in transportation, communications, and utilities. Over 70 percent of the employment growth from the third quarter-year of 1979 to the first quarter-year of 1980 was due to the above-average performance of individual industry groups.

When overall employment declined in the U.S. economy in the next six-month period, so did Minnesota industry employment and it dropped even more sharply again because of individual industry performance, especially construction, manufacturing, wholesale and retail trade, and government. Nearly 80 percent of the employment drop in this period was due to the below-average performance of individual industry groups in the Minnesota economy.

Immediate and long-term implications of the shift to services are cited with reference to the level and spatial-economic origins of state tax receipts. First, the shift to services is likely to result in corresponding spatial-economic, that is, geographic and industry, shifts. With geographic decentralization of goods-producing industries, the economic base of nonmetropolitan areas expands relative to metropolitan areas, which, thus, provides the potential for the expansion of services-producing industries.

Earnings per worker in both goods-producing and services-producing industries are lower in nonmetropolitan than metropolitan areas. While agricultural employment has been declining historically, it is declining less rapidly, if at all. In some areas it actually has increased. Earnings per worker in agriculture also are increasing relative to their historical levels. Indeed, employment and earnings in agriculture may help bolster otherwise lagging nonmetropolitan area growth in average earnings per worker.

Along with the geographic dispersion of industry, current trends point to growing disparities in personal income levels between nonmetropolitan and metropolitan areas and within metropolitan areas. Manufacturing and other goods-producing industries in the Metropolitan Council Region, for example, are of high value added, especially when compared with imports, and, also, when compared with exports from the nonmetropolitan areas of Minnesota. Nearly a fourth of the value added by agriculture and agriculture-related industry occurs in this region. Thus trade enhances productivity of the metropolitan regional work force and, in addition, specialized business and professional services gravitate to this region. These services are produced with a wide range of occupational skills and they provide for a correspondingly wide range in the level of earnings per worker.

Finally, industry employment and earnings projection series for Minnesota and U.S., prepared by the U.S. Department of Commerce, Regional Economic Analysis Division, are presented for comparison with recent state economic trends. These projections show generally above-average growth in industry employment and earnings and, also, personal income. Machinery and other durable goods manufacturing, along with wholesale trade and agriculture, are projected as the principal basic industries, although many other individual industries are projected as being export-producing.

A summing up of study findings is incomplete without special reference to the tasks ahead in adequately accounting for the correlation between jobs, income and taxes. During the 1975-79 period, for example, total jobs in Minnesota increased from 1,813,769 to 2,104,477 -- a 16 percent increase. Total personal income increased from $22,686,000,000 to $35,991,000,000 -- a 59 percent increase, while total state tax revenues increased from $2,219,000,000 to $3,242,000,000 -- a 46 percent increase, in comparable four-year periods. These comparisons are summarized, and expanded to an intermediate year and annual rates, as follows:

Indicator	1975	1978	1979	Annual Change 1975-78 (pct.)	1978-79 (pct.)	1975-79 (pct.)
Jobs (no.)	1,813,769	2,017,084	2,105,577	3.6	4.3	3.8
Income (mil.$)	22,686	31,620	35,881	11.7	13.8	12.2
Taxes (mil.$)	2,219	3,134	3,242	12.2	3.4	9.9

Clearly, the apparently strong positive correlation between jobs, income and taxes in the 1975-78 period was not sustained in the 1978-79 period.

A further breakdown of personal income sources show a wide diversity of growth patterns among individual income sources, as shown below:

Source	1975-76	1976-77	1977-78	1978-79
		(percent)		
Farm earnings	-40.2	139.9	1.4	8.7
Nonfarm:				
Wages & salaries	112.0	11.2	14.6	14.8
Proprietorial inc.	23.9	19.3	9.7	10.7
Net earnings	8.4	17.2	13.1	14.0
Property income	8.0	9.0	12.7	13.0
Transfer payments	9.2	6.4	7.3	11.1
Total pers. income	8.5	14.7	12.4	13.5

This diversity of performance is related to the sensitivity of different economic units to the general business cycle. The levels of business activity and income, for example, anticipate a general business downturn and subsequent decline in nonfarm wages and salaries.

A further breakdown of state tax revenues also presents a wide diversity of growth patterns among individual tax sources, as shown below:

Source	1975-77	1977-78	1978-79	1979-80
		(percent)		
General sales	9.4	15.0	13.2	8.1
Motor fuels	3.7	4.6	5.3	-5.5
Individual income	12.6	12.3	16.8	1.3
Corp. net income	31.6	13.6	21.8	-3.4
Total taxes	12.0	11.0	13.6	2.8

This diversity of performance also is related to the sensitivity of different economic units to the general business cycle. Changes in levels of business activity and income signal corresponding changes in state tax revenues. Income tax adjustements for the fiscal year ending in 1980 further reduced total state tax receipts.

These findings have two different implications, namely, that individual industries, businesses and households are sensitive to the general business cycle, although their timing differs, and that detailed economic statistics which track these changes in business activity and income provide essential information for anticipating corresponding changes in state tax revenues. Additional quarterly data are required, however, to show the reductions in tax receipts due to changes in tax structure and the implications of these changes for the individual and for state government.

MINNESOTA'S SHIFT TO SERVICES -- ITS IMPACT ON JOBS, INCOME, AND TAXES

Wilbur R. Maki

A topic of unusual quietude in an otherwise turbulent year has been the recent shift to the service economy. With this shift, the continuing growth in jobs was sustained, but personal income growth lagged and so did tax receipts. While the topic is not entirely new to students of Minnesota's economy, it is perceived as only another causal factor in Minnesota's fiscal difficulties.[1/]

The purpose of this report is to sort out various industry trends, as measured by changes in employment and income payments, and then consider their likely effects on state government financing. First, however, key economic indicators for tracking industry shifts are discussed and their implications for future economic development of the Minnesota economy are presented.

Services-Producing vs. Goods-Producing Employment

Impending shifts in the relationships between jobs, personal income, and state revenues were evident in 1980 in the decline in personal income, relative to the U.S. average, and the actual increase in service employment. In this report, service employment refers to jobs in noncommodity-producing industries, like transportation, communications, utilities; wholesale and retail trade; finance, insurance and real estate; private services; and government. Goods-producing employment, on the other hand, refers to jobs in agriculture, mining, construction and manufacturing.

1/ See references cited, p. 27 , for example, the two recent reports on Minnesota employment and income trends (5 , 6).

The phenomenal growth in the post-1970 goods-producing work force had peaked by 1978, as shown in Table 1.1. Rapid growth in manufacturing jobs and, also, in earnings per worker had made possible above-average increases in per capita income levels in Minnesota. In 1977 to 1979 and possibly in 1980, Minnesota per capita even exceeded U.S. averages (although some preliminary estimates show a relative decline in 1980). Both manufacturing and construction employment dropped below their earlier levels while service industry employment, with its lower earnings per worker, increased dramatically. Thus, the services-producing industries made up for a substantial part of the 1980 employment decline in the goods-producing industries in Minnesota. They also provided many of the jobs for the new entrants into the Minnesota work force, and they helped reduce an inevitable slowing down in the rate of growth in per capita personal income that would have accompanied a drop in employment.

Two simple statistics are used to illustrate the immediate impact of the shift to services-producing employment, namely, the ratio of services-producing wage and salary employment to goods-producing wage and salary employment and per capita personal income. The two statistics are inversely correlated. The larger the employment ratio, the smaller the per capita income. In Minnesota, the higher-than-average combined income tax rate further reduced per capita disposable income, that is, personal income less income taxes, below the U.S. average.

The income-reducing effect of increasing service employment is due to the much lower <u>average</u> earnings per worker in service-producing than in goods-producing industries, as shown in Table 1.1. Minnesota earnings trends parallel those in the U.S. as a whole.

Quarterly employment and income are presented in this report to show the sequence of changes among these variables. In Table 1.2, quarter-to-

Table 1.1. Selected employment and income indicators, Minnesota and U.S., 1975-1980.

Indicator	Units	1975	1976	1977	1978	1979	1980[1/]
Minnesota:							
Wage & sal. emp., total[2/]	thou.	1,575.5	1,625.1	1,681.5	1,771.4	1,852.5	1,889.8
Services-producing	thou.	1,143.2	1,181,7	1,225.4	1,279.0	1,337.7	1,384.9
Goods-producing	thou.	432.3	443.4	456.1	492.4	514.8	504.9
Services-prod. emp. per 100 goods-prod.	no.	264	267	269	260	260	274
Wages & sal. per worker[2/]	dol.	9,148	9,791	10,426	11,330	12,384	5/
Services-producing	dol.	8,290	8,800	9,370	10,151	5/	5/
Goods-producing	dol.	11,417	12,435	13,269	14,391	5/	5/
Services-prod. as prop. of goods-prod.	pct.	72.6	70.8	70.6	70.5	5/	5/
Per capita per. income[3/4/]	dol.	5,785	6,214	7,106	7,858	8,865	9,518
Per capita dis. income[4/]	dol.	4,885	5,220	5,072	6,585	7,362	7,900
United States:							
Wage & Sal. emp., total	thou.	83,569	85,971	89,003	93,098	5/	5/
Services-producing	thou.	59,600	61,145	63,233	66,057	5/	5/
Goods producing	thou.	22,969	24,826	25,770	27,041	5/	5/
Services-prod. emp. per 100 goods-prod.	no.	249	246	245	244	5/	5/
Wages & sal.per worker[2/]	dol.	9,571	10,283	10,976	11,778	5/	5/
Services-producing	dol.	8,843	9,475	10,066	10,780	5/	5/
Goods-producing	dol.	11,383	12,275	13,209	14,214	5/	5/
Services-prod. as prop. of goods-prod.	pct.	77.7	77.2	76.2	75.8	5/	5/
Per capita income[3/4/]	dol.	5,861	6,401	7.043	7,854	8,773	9,456
Per capita dis. income[4/]	dol.	5,072	5,487	6,000	6,673	7,399	7,963
Minnesota as prop. of U.S.:							
Per capita pers. inc.	pct.	98.7	97.1	100.9	100.1	101.0	100.7
Per capita disp. inc.	pct.	96.3	95.1	99.5	98.7	99.5	99.2

1/ Preliminary 1980 estimates are based on data from Minnesota Department of Employment Security, Review of Labor and Economic Conditions, 1980-81.

2/ U.S. Department of Commerce, Regional Economic Information System (unpublished), April 1981.

3/ U. S. Dept. Commerce, Regional Economic Measurement Division, State Personal Income, 1958-78, Survey of Current Business, 59(8): 28-31. 1979.

4/ U. S. Dept. Commerce, Regional Economic Measurement Division, State Personal Income, 1972-79, Survey of Current Business, 60(8): 57-69. 1980.

5/ Not available.

Table 1.2. Estimated labor force, and employed and unemployed persons in specified quarter-year, Minnesota and United States, 1978-1980. 1/

Year and Quarter-Year	Minnesota				United States					
	Total Labor Force	Unemployed		Employed	Total Labor Force	Unemployed		Employed		
		Total	Unemp. as Prop. of L.F.			Total	Unemp. as Prop. of L.F.	Total	Agricultural	Nonagricultural
	(thou.)	(thou.)	(pct.)	(thou.)	(thou.)	(thou.)	(pct.)	(thou.)	(thou.)	(thou.)
1978:										
Qtr. I	1,909.1	84.1	4.9	1,814.9	98,106	6,705	6.9	91,401	3,851	88,550
Qtr. II	1,985.5	73.3	3.7	1,912.2	100,118	5,824	5.8	94,294	3,500	90,794
Qtr. III	2,028.0	68.1	3.4	1,959.9	101,841	6,055	5.9	95,786	3,800	91,986
Qtr. IV	2,021.3	67.8	3.4	1,953.5	101,615	5,605	5.5	96,010	3,214	92,796
1979:										
Qtr. I	1,993.5	89.9	4.5	1,903.6	101,260	6,360	6.3	94,900	2,828	92,072
Qtr. II	2,077.8	78.9	3.8	1,998.9	102,287	5,683	5.6	96,604	3,389	93,215
Qtr. III	2,069.1	71.0	3.4	1,998.1	104,244	6,013	5.8	98,231	3,732	94,499
Qtr. IV	2,086.6	85.5	4.1	2,001.1	103,847	5,798	5.6	98,049	3,240	94,809
1980:										
Qtr. I	2,079.7	125.3	6.0	1,954.4	103,265	6,947	6.7	96,318	2,860	93,458
Qtr. II	2,163.3	128.3	5.9	2,035.0	104,502	7,485	7.2	97,017	3,418	93,599
Qtr. III	2,137.8	121.8	5.7	2,016.0	105,948	7,962	7.5	97,987	3,708	94,278
Qtr. IV	2,098.9	115.9	5.5	1,983.0	105,160	7,400	7.0	97,760	3,254	94,505

1/ Minnesota Department of Employment Security, Review of Labor and Economic Conditions, Vol. 4, No. 4 to Vol. 7, No. 2, 1978, 1979 and 1980.

quarter changes in the total labor force and the employed labor force can be viewed over a 12-quarter period. In 1978, Minnesota unemployment rates were almost a third below U.S. rates, but the differential lessened in 1979 until the Minnesota rate was only slightly below the U.S. level in 1980, Quarter I.

The employed labor force represented in Table 1.2 is based on a count of persons employed rather than positions or jobs held by an employed person. Because one person may hold more than one job, a person count is generally lower, by 5 to 10 percent or more, than a position or job count. Both definitions of employment are used in this study, with the labor force designation representing a person-count and the work force designation representing a job-count.

A second important distinction in employment measurement is the site of the count, that is, the residence of the employed person, or the job site, which is the place of work. In Minnesota, for example, in-commuting is slightly greater than out-commuting (with adjoinging states). Thus, a negative residence adjustment is required to account for the net in-commuting of employed persons. For small areas, commuting imbalances may be very large, but for the state as a whole, the adjustment is almost nominal (as shown, later, in Table 4.1).

Reported employment by place of residence thus differs from reported employment by place of work. However, individual quarterly industry estimates are available only by place of work for Minnesota.

Earnings, Income and Taxes

Wage and salary earnings account for a major portion -- more than 60 percent -- of total personal income. Because of transfer payments to individuals, fluctuations in earnings and total personal income tend to be counterbalancing. Also, property-type income tends to cushion the impact of

variability in earnings on total personal income. Personal income tax liability, of course, is attributed to total income, not simply earnings.

Relationship of employee earnings and personal income to state tax revenues can be ascertained from historical data (shown later in Table 4.1). Both proprietoral and wage and salary are included in the earnings total. Also, earnings in agriculture are included to show the relative importance of this source of personal income and, also, to show its year-to-year variability. The relationship between total tax revenues and total personal income can be represented as a summary statistic, for example, the percentage change in state tax revenues associated with a 1-percent change in total personal income.

Summary statistical series on employment trends are presented in the next section. Following discussion of the recent shifts to service-producing employment, the long-term industry employment projections prepared in the U.S. Department of Commerce, Regional Economic Analysis Division, are presented for comparison with current employment patterns and employment projections prepared in the Minnesota Department of Employment Security. Implications of industry employment trends for total earnings and total personal income are also discussed in terms of both the current situation and projected long-term trends. State tax revenues are related, finally, to personal income. Implications of personal income trends for state revenues are discussed briefly in the final section of this report.

INDUSTRY EMPLOYMENT

Current industry employment estimates are published by the Minnesota Department of Employment Security, as summarized in Table 2.1. These estimates cover nonagricultural wage and salary positions. They compare closely with the industry employment estimates prepared by the U.S. Department of Commerce, Regional Economic Measurement Division (which were used earlier in Table 1.1).

Employment Change Sources

The shift-and-share method of identifying employment change sources, which was reported earlier (5), is used in this study, also. This method provides for a systematic industry-by-industry comparison of employment trends, with the U.S. economy being the frame of reference for all industry comparisons.

The shift-and-share method is based on the standard compound interest formula,

$$X_{it+n} = X_{it}(1 + r)^n, \tag{2.1}$$

where, X_{it+n} = value of i-th variable in future period, t+n;

X_{it} = value of i-th variable in base period, t;

r_i = per period rate of growth in i-th variable;

n = number of periods from base period to future period.

In the shift-and-share method, however, the growth rate, r, is partitioned into three growth rates depicted by the symbols, A, B_i, and C_{is}, in the new formula,

$$X_{it+n} = X_{it}\ (1 + A + B_i + C_{is})^n, \tag{2.2}$$

where, A = growth rate component represented by an aggregate index, e.g., overall U.S. employment;

B_i = growth rate component represented by an industry-specific index, e.g., specific U.S. industry employment;

Table 2.1. Nonagricultural wage and salary positions in specified industry, Minnesota and U.S., by quarter-year, 1978, 1979 and 1980. 1/

Industry	1978 Qtr. III	1979 Qtr. I	1979 Qtr. II	1979 Qtr. III	1979 Qtr. IV	1980 Qtr. I	1980 Qtr. II	1980 Qtr. III	1980 Qtr. IV
					(1,000)				
Minnesota:									
Mining	17.7	17.4	17.1	17.3	17.2	16.8	15.2	15.0	14.1
Construction	78.5	86.4	84.3	88.1	89.1	91.8	77.8	74.6	73.2
Manufacturing, total	359.3	374.7	372.2	375.0	380.7	390.8	377.4	368.3	366.5
Durables	216.3	228.0	226.2	230.9	234.4	241.3	229.1	222.9	222.5
Nondurables	143.0	146.7	146.0	144.1	146.3	149.5	148.3	145.4	144.0
Trans.,comm.,util.	92.8	98.7	100.0	100.9	101.2	101.1	100.0	99.6	98.9
Trade	423.9	438.5	436.4	435.9	444.8	456.3	448.5	447.5	488.3
Fin.,ins.,real est.	88.1	90.2	90.4	90.8	92.4	95.2	95.5	96.7	96.6
Services	331.5	342.1	344.6	351.6	354.6	367.3	368.2	374.5	375.8
Government	287.4	291.6	291.3	291.6	295.3	298.4	303.2	292.6	299.6
Total	1,679.2	1,739.6	1,736.3	1,751.1	1,775.3	1,817.7	1,785.8	1,768.8	1,773.0
United States:									
Mining	884	913	927	965	987	1,002	1,019	1,016	1,054
Construction	4,296	4,406	4,568	4,670	4,722	4,806	4,428	4,358	4,469
Manufacturing, total	20,285	20,900	20,893	21,009	20,922	20,876	20,298	19,926	20,263
Durables	12,149	12,644	12,644	12,753	12,636	12,622	12,162	11,864	12,125
Nondurables	8,136	8,256	8,249	8,256	8,264	8,254	8,136	8,062	8,138
Trans.,comm.,util.	4,841	5,003	5,013	5,176	5,223	5,200	5,161	5,118	5,138
Trade	19,501	19,909	19,968	20,133	20,282	20,486	20,483	20,568	20,638
Fin.,ins.,real est.	4,708	4,827	4,866	4,998	5,043	5,086	5,137	5,172	5,227
Services	16,055	16,408	16,621	17,161	17,318	17,497	17,636	17,790	17,963
Government	15,530	15,473	15,603	15,603	15,697	15,735	16,387	16,142	16,165
Total	86,101	87,839	88,459	88,459	90,172	90,688	90,548	90,090	90,917

1/ Minnesota Department of Economic Security, Review of Labor and Economic Conditions, Vol. 5, No. 4 to Vol. 7, No. 2, 1979 and 1980.

C_{is} = growth rate component represented by an industry-specific and an area-specific index, e.g., specific Minnesota industry employment.

Employment change attributed to the three components is commonly designated as employment change due to a national-growth effect, an industry=mix effect, and a regional-share effect.

The employment data in Table 2.1 were used to derive the A, B_i and C_{is} components of the aggregate growth rate, r (as represented by Equation 2.1 and 2.2). The derived values of the three growth rates, in percentage form, are presented in Table 2.2. While two different time periods -- a two-quarter and four-quarter period -- were used in the derivation of the growth rate components, the actual rates can be standardized for a common time frame, for example, a one-quarter, or a two-quarter, period.

Results tabulated in Table 2.2 show that the national growth rate declined from 4.251 percent for the four-quarter period from 1978, Qtr. III to 1979, Qtr. III to 1.032 percent for the two-quarter period from 1979, Qtr. III to 1980, Qtr. I, and declined further to 0.659 percent for the two-quarter period from 1980, Qtr. I to 1980, Qtr. III. U.S. industry groups with above-average growth were mining; finance, insurance, and real estate; and services. All other industry groups declined in at least one of the three periods for the U.S. as a whole.

While industry growth trends in Minnesota generally followed U.S. trends, industry-to-industry differences occurred, which are identified by the regional-share coefficients in Table 2.2. Employment in mining, for example, declined in Minnesota relative to the U.S. Employment also declined in one or more periods for every other industry group, although in the first two periods eight industry groups outside of mining experiences above-average growth in at least one of the two periods. In the third period, every

Table 2.2. National-growth, industry-mix and regional-share coefficients, Minnesota, Qtr. III, 1979 - Qtr. I, 1980 and Qtr. I, 1980 - Qtr. III, 1980.

	Industry-Mix			Regional-Share		
Industry	1978,Qtr.III to 1979,Qtr.III	1979,Qtr.II to 1980,Qtr.I	1980,Qrt.I to Qtr.III	1978,Qtr.III to 1979,Qtr.III	1979,Qtr.III to 1980,Qtr.II	1980,Qtr.I to Qtr.IV
Mining	4.912	2.801	2.057	-11.423	-6.724	-12.111
Construction	4.455	1.879	-8.622	3.524	1.288	-9.415
Manufacturing, durable.	0.721	-2.060	-5.346	1.778	5.531	-1.620
Manufacturing, nondurable	-2.776	-1.056	-1.667	-0.706	3.772	-0.416
Trans., comm., utilities	2.669	-0.569	-0.918	1.808	-0.265	0.093
Trade	-1.010	0.721	1.060	-0.410	2.927	-2.329
Finance, ins., real est.	1.909	0.728	2.350	-3.095	3.085	-0.115
Services	2.638	0.925	2.334	-0.825	2.507	0.286
Government	-3.485	-0.483	3.246	0.695	1.782	-4.530
Total	4.251 1/	1.032 1/	-0.659 1/	---	---	---

1/ National-growth coefficient.

industry group, except services and transportation, communications and utilities, experienced below-average growth. In mid-1980, growth in industry employment in Minnesota was lagging growth in corresponding industry employment in the U.S. as a whole.

Three components of aggregate industry growth in Minnesota are summarized in Table 2.3. Each component was derived from Equation (2.2) using the forms,

$X_{it}(A)$ = national-growth effect for i-th industry employment;

$X_{it}(B_i)$ = industry-mix effect for i-th industry employment;

$X_{it}(C_{is})$= regional-share effect for i-th industry employment.

The shift-and-share findings on sources of industry employment change show the following:

(1) In the four-quarter period from 1978, Qtr. III to 1979, Qtr. III the Minnesota economy behaved like the U.S. economy.

(2) In the two-quarter period, 1979, Qtr. III to 1980, Qtr. I the Minnesota economy performed better than the U.S. economy as measured by employment change; exceptions were mining, and transportation, communications and utilities.

(3) In the two-quarter period, 1980, Qtr. I to 1980, Qtr. III, the Minnesota economy performed worse than the U.S. economy, except for services and transportation, communications and utilities.

In aggregate terms, performance of the Minnesota economy paralleled the performance of the U.S. economy rather closely. Admittedly, the pattern of employment change varied from quarter-to-quarter and industry-to-industry. The close correspondence of industry employment changes in Minnesota and the U.S. over a recent eight-quarter period is not an indication, however, that personal income and state tax revenues can be predicted from U.S. industry trends, as shown in the next section.

Table 2.3. Estimated employment change due to national-growth, industry-mix and regional-share effects in specified industry, Minnesota, 1978, Qtr. III - 1980, Qtr. III.

Industry	Change, 1978 Qtr.III to 1979 Qtr.III				Change, 1979 Qtr.III to 1980 Qtr. I				Change, 1980 Qtr. I to 108- Qtr. III			
	National Growth	Industry Mix	Regional Share	Total	National Growth	Industry Mix	Regional Share	Total	National Growth	Industry Mix	Regional Share	Total
	(thousand)											
Mining	0.8	0.9	-2.1	-0.4	0.2	0.5	-1.2	-0.5	-0.1	0 3	-2.0	-1.8
Construction	3.3	3.5	2.8	9 6	0.9	1 7	1 1	3.7	-0 6	-7 9	-8.7	-17.2
Manufacturing, durable	0.3	1.6	3.7	14.6	2.4	-4.8	12.8	10.4	-1.6	-12 9	-3.9	-18 4
Manufacturing, nondurable	6.1	-4.0	-1.0	1.1	1.5	-1.5	5.4	5.4	-1.0	-2.5	-0 6	-4.1
Trans., comm., util.	3.9	2.5	1.7	8.1	1.1	-0 6	-0.3	0.2	-0.7	-0.9	0.1	-1.5
Trade	18.0	-4.3	-1.7	12.0	4.5	3.1	12.8	20.4	-3.0	4.8	-10.6	-8.8
Fin., ins., real est.	3.7	1.7	-2.7	2.7	0.9	0 7	2.8	4.4	-0.6	2.2	-0 1	1 5
Services	14.1	8.8	-2.7	20.1	3.6	3.3	8.8	15.7	-2.4	8.6	1.2	7.2
Government	12.2	-10.0	2.0	4.2	3.0	-1.4	5.2	6.8	-2.0	9.7	-13 5	-5.8
Total	71.4	0.6	0	72.0	18.1	1.0	47.4	66.5	-12.0	1.4	-38.3	-48.9

Projected Employment Changes

A recently prepared industry projection series for individual states provides a frame of reference for the employment (and, also, income) trends presented earlier in this report. The projection series is partially presented here in several tables, starting with Table 2.4, which show the industry distribution of Minnesota and U.S. employment for two years -- actual 1978 and projected 2000.

A proportionately larger share of Minnesota than U.S. total employment was reported in farming, wholesale trade, retail trade, services, and state and local government in 1978. The difference in the two percentages is a measure of excess employment, that is, the portion of total industry employment in excess of the employment based on the U.S. percentage share. Excess employment in the i-th industry is thus represented by the form,

$$EX_{is} = \left(\frac{X_{is}}{\sum_i X_{is}} - \frac{X_i}{\sum_i X_i} \right) \sum_i X_{is} \qquad (2.3)$$

where, EX_{is} = excess employment in i-th industry in Minnesota;

X_{is} = total employment in i-th industry in Minnesota

X_i = total employment in i-th industry in U.S.

The more the disaggregated the industry breakdown, the larger the total excess employment for a state. Hence, the highly aggregated industry grouping in Table 2.4 results in an underestimate of total excess employment in Minnesota and an overestimate of the proportion that each industry with derived excess employment is of total excess employment.

While inadequate as a measure of export-producing employment in Minnesota, the excess employment trends depict national economic trends of critical importance to industry employment prospects in Minnesota. These trends show

Table 2.4. Proportion of total employment and excess employment in specified industry, Minnesota, 1978 and 2000.[1/]

Industry	Proportion of Total Employment				Minnesota Excess Employment			
	Estimated 1978		Projected 2000		Estimated 1978		Projected 2000	
	Minn.	U.S.	Minn.	U.S.	Total	Prop. of Total	Total	Prop. of Total
	(pct.)	(pct.)	(pct.)	(pct.)	(thou.)	(pct.)	(thou.)	(pct.)
Farm	6.3	2.7	4.5	1.7	71.0	63.4	73.0	71.2
Agr. services, for.,fish.	0.5	0.7	0.5	0.7	0	0	0	0
Mining	0.9	0.9	0.6	0.9	2/	2/	2/	2/
Construction	5.2	5.3	5.4	5.3	0	0	2.1	2.1
Mfg.,durable goods	11.1	12.4	12.2	12.0	2/	2/	5.2	5.1
Mfg., nondurable	7.4	8.3	6.5	7.3	2/	2/	2/	2/
Trans.,comm.,util.	5.0	5.1	4.6	4.8	2/	2/	2/	2/
Wholesale trade	5.9	5.2	5.7	5.2	13.8	12.2	14.3	14.1
Retail trade	17.2	16.0	17.0	16.8	23.4	20.7	6.2	6.1
Fin.,ins.,real est.	4.8	5.1	5.6	5.9	2/	2/	2/	2/
Services	20.5	20.4	23.4	23.5	2.2	1.9	2/	2/
Fed., civilian	1.5	3.0	1.2	2.4	0	0	0	0
Fed., military	1.0	2.3	0.7	1.8	0	0	0	0
State & local	12.8	12.7	11.8	11.8	2.0	1.8	0.5	0.5
Total	100.0	100.0	100.0	100.0	113.2 2/	100.0	101.3 2/	100.0

1/ Derived from data in Table 3.4.

2/ Total excess employment for all industry is underestimated because of aggregation of individual export-producing industries with all industry in a given industry group which results in the elimination of these industries in the computations; hence, the proportion of total excess employment in a specified industry, as shown in columns 6 and 8, is over-estimated for each industry.

the importance of agriculture as a basic industry and, also, of wholesale trade. Durable goods manufacturing, specifically, machinery and scientific and professional instruments, would become an increasingly important part of Minnesota's economic base if the underlying assumptions of the U.S. Department of Commerce projection series were to hold true for Minnesota.

While Minnesota's economic base is projected to shift towards manufacturing it is also projected to shift away from services and retail trade. A slightly smaller share of total employment is projected for retail trade in 2000 and a substantially larger share is projected for services. For both industries, the employment percentage would decline relative to the corresponding U.S. employment percentage. Implicit in these trends is either or both a decentralization of retail trade and services from metropolitan areas to nonmetropolitan areas in the multi-state Upper Midwest Region and increase in nonmetropolitan area income levels relative to metropolitan area income levels. These findings would contradict earlier statements to the effect that income disparities between metropolitan and nonmetropolitan areas would increase rather than decrease because of selective industry decentralization and growth in nonmetropolitan areas. Further income implications of recent and projected employment trends are discussed in the next section on earnings and personal income.

Alternate Projection Series

The U.S. Department of Commerce projection series is compared, finally, with the employment projection series prepared in the Minnesota Department of Employment Security (8,9). The alternate series also starts with a 1978 base year but covers only the seven-year period to 1985.

Employment in major industry groups is listed from the U.S. Department of Commerce and the Minnesota Department of Employment Security reports in Table 2.5. Because the base period and the projection period differ in the

Table 2.5. Estimated and projected employment in specified industry groups, by data source, Minnesota and United States, 1969-1990.

	Mn. Dept. of Employment Security [1]					U.S. Dept. of Commerce [2]				
	Estimated		Projected	Annual Change		Estimated		Projected	Annual Change	
	1970	1978	1985	1970-78	1978-85	1969	1978	1990	1969-78	1978-90
	(thou.)	(thou.)	(thou.)	(pct.)	(pct.)	(thou.)	(thou.)	(thou.)	(pct.)	(pct.)
Goods-Producing:										
Farm	176.3	133.4	122.8	-3.1	-1.2	131	126	121	-0.4	-0.3
Agr. serv.,for.,fish.	[3]	[3]	[3]	[3]	[3]	1-	13	14	5.8	0.6
Mining	14.6	16.8	16.4	1.7	-0.3	15	17	17	1.4	0
Construction	88.7	116.7	127.2	3.5	1.2	82	104	134	2.7	2.1
Mfg.,total	318.6	366.1	433.4	1.8	2.4	335	367	460	1.0	1.9
Durables	181.6	220.9	266.2	2.5	2.7	194	220	294	1.4	2.4
Nondurables	137.0	145.2	167.2	0.7	2.0	151	147	166	0.5	1.0
Total	598.1	633.1	699.8	0.7	1.4	573	627	746	1.0	1.5
Services-Producing:										
Trans.,comm.,util.	93.4	111.5	129.4	2.2	2.1	89	99	116	1.2	1.3
Wholesale trade	83.9	107.9	136.5	3.2	3.4	81	117	145	4.2	1.8
Retail trade	257.9	351.1	440.4	3.9	3.3	250	342	416	3.5	1.6
Fin.,ins.,real est.	66.9	90.7	117.3	3.9	3.7	67	95	132	4.0	2.8
Services	407.2	550.5	674.5	3.8	2.9	272	408	550	4.6	2.5
Government	56.5	81.2	94.0	4.6	2.1	259	304	346	1.8	1.1
Total	965.8	1,292.9	1,592.2	3.7	3.0	1,015	1,362	1,706	3.3	1.9
All Industry	1,563.9	1,926.0	2,292.0	2.6	2.5	1,588	1,989	2,452	2.5	1.8

[4] Public education included in educational services.

1/ Minnesota Department of Employment Security, Minnesota Employment Outlook to 1985, Research and Statistical Services Office, Minnesota Department of Employment Security, 390 North Robert Street, St. Paul, MN 55101, January 1981.

2/ U.S. Department of Commerce, Regional Economic Analysis Division, Regional and State Projections of Income, Employment, and Population to the Year 2000, Survey of Current Business, 60(11): 44-70, 1980.

3/ Included in farm employment.

4/ Public education included in educational services.

two series, annual rates of change were derived for comparison. The annual rates differ slightly because of base-year and target-year differences and, also, because of slight differences in industry coverage (for example, farming and services). However, for the common base year, 1978, the two series are almost identical.

Major industry relationships are represented by the ratio of total-to-goods-producing employment. This ratio, which is an approximation of the long-term economic base multiplier, is summarized for the two series and the individual years as follows:

Year	Minn. DES	U.S. Dept. of Commerce
1969	(2.56)	2.77
1970	2.61	(2.81)
1978	3.04	3.17
1985	3.28	(3.24)
1990	(3.46)	3.29

Historical and projected annual rates of change for the first series are extended to 1969 and 1990 to obtain corresponding values of this ratio for the Minnesota DES series, while the annual rates of change for the USDC series are interpolated to obtain the corresponding values for 1970 and 1985. The definitional and classification differences reduce the "backcast" value for the Minnesota DES series and increase it for USDC series, while the "forecast" value is larger for the Minnesota DES series than the USDC series. The latter indicates a lagging rate of growth in services-producing employment relative to goods-producing employment in the 1985-1990 period.

A detailed industry breakdown of the Minnesota DES projection series is presented in Table 2.6 for comparing employment growth in individual goods-producing and services-producing industries. High rates of employment growth are indicated for selected durable goods manufacturing industries and selected trade and service industries (which are two of several services-producing

Table 2.6. Estimated and projected employment in selected industry, Minnesota, 1970-1985. 1/

Industry	Total Estimated 1970	Total Estimated 1978	Total Projected 1985	Annual Change 1970-1978	Annual Change 1978-1985
	(no.)	(no.)	(no.)	(pct.)	(pct.)
Manufacturing, Durables:					
Ordnance	9,370	11,300	14,100	2.4	3.2
Lumber & wood prod.	8,140	12,780	14,710	5.8	2.0
Furn. & fixtures	3,920	4,420	5,050	1.5	1.9
Stone, clay & glass prod.	7,980	10,160	11,610	3.1	1.9
Primary metals	7,080	7,180	7,550	0.2	0.7
Fabr. metals	20,080	25,650	31,670	3.1	3.1
Machinery, exc. elect.	63,580	76,680	93,800	2.4	2.9
Electrical machinery	28,130	27,720	32,660	-0.2	2.4
Transportation equip.	9,540	13,000	13,740	3.9	0.8
Prof., scient. and control. instr.	16,180	23,400	30,230	4.7	3.7
Misc. manufacturing	7,570	8,640	4,060	1.7	3.6
Total	181,570	220,940	266,180	2.5	2.7
Manufacturing, Nondurables:					
Textile mill prod.	2,710	3,270	3,610	2.4	1.4
Apparel and textile prod.	8,470	7,150	7,110	-2.1	-0.1
Food and kindred prod.	54,680	50,340	52,410	-1.0	0.6
Paper and allied prod.	30,810	31,970	41,000	0.5	3.6
Printing and publishing	23,750	31,100	36,440	3.4	2.3
Chemicals and allied prod.	6,560	7,000	8,470	0.8	2.8
Petroleum refining & prod.	2,010	1,690	1,730	-2.1	0.3
Rubber products	6,170	10,700	14,340	7.1	4.3
Leather products	1,830	1,950	2,100	0.8	1.1
Total	136,990	145,160	167,220	0.7	2.0
Transportation:					
Railroad	19,560	16,160	15,560	-2.4	-0.5
Local & interurban	7,180	10,550	12,470	4.9	2.4
Trucking and warehousing	22,870	30,100	36,280	3.5	2.7
Air	7,390	10,530	12,190	4.5	2.1
Other 2/	2,810	3,970	4,810	4.4	2.8
Total	59,810	71,310	81,300	2.2	1.9
Retail Trade: 3/					
Building materials	20,800	27,860	30,340	3.7	1.2
General merchandise	54,590	61,880	79,310	1.6	3.6
Food and diary stores	36,080	44,950	55,950	2.8	3.2
Auto dealers, gasoline sta.	37,790	43,700	53,860	1.8	3.0
Apparel and accessories	12, 640	17,120	21,090	3.9	3.0
Furn. and appliances	9,840	14,280	18,300	4.8	3.6
Misc. retail	28,330	40,460	49,080	4.6	2.8
Total	200,070	250,230	307,650	2.8	3.0
Finance, Insurance, Real Estate:					
Finance	28,320	37,980	52,700	3.7	4.8
Insurance	26,200	33,900	41,280	3.3	2.9
Real estate	12,370	18,870	23,350	5.4	3.1
Total	66,890	90,740	117,330	3.9	3.7

Table 2.6. Estimated and projected employment in selected industry, Minnesota, 1970-1985. 1/ (concluded)

Industry	Total Estimated 1970	Total Estimated 1978	Total Projected 1985	Annual Change 1970-1978	Annual Change 1978-1985
Services: 3/					
Hotels and lodging	18,750	27,700	34,930	5.0	3.4
Personal and repair	29,530	33,740	39,100	2.6	2.1
Business	24,750	40,570	59,600	6.4	5.6
Misc. professional	18,970	31,150	43,820	6.4	5.0
Eating and drinking places	57,810	100,890	132,490	7.2	4.0
Auto. repair	9,630	14,990	21,000	5.7	4.9
Motion pictures	3,520	4,600	5,600	3.4	2.8
Amusement and recreation	7,910	12,990	16,820	6.4	3.8
Med. and related	102,790	156,520	205,770	5.4	4.0
Educational	136,200	146,270	150,680	0.9	0.4
Nonprofit	31,040	64,300	80,420	9.5	3.2
Private households	24,120	17,660	17,020	-3.8	-0.5
Total	465,010	651,380	806,950	4.3	3.1
Public Administration: 3/					
Federal	26,240	26,030	27,310	-0.1	0.7
State	10,200	14,440	16,910	4.4	2.3
Local	20,085	40,730	49,820	9.2	2.9
Total	56,530	81,200	94,040	4.6	2.1

1/ Minnesota Department of Employment Security, Minnesota Employment Outlook to 1985, Research and Statistical Services Office, Minnesota Department of Employment Security, 390 North Robert Street, St. Paul, MN 55101, January 1981.

2/ Water and pipeline, and services.

3/ Eating and drinking places, public education and private households are included in services.

industry groups included in the expanded industry listing. Note, here, the two different uses of the term "services".) Further expansion of the durable goods manufacturing industries depends, of course, on the export market prospects for these Minnesota-based export-producing industries. Many of the specialized services-producing industries also are engaged in export-producing activities or they are closely related to the export-producing manufacturing industries.

Minnesota industry groups with projected annual growth rates in excess of three percent (the projected 1978-1985 rate for services-producing industries), include six manufacturing industries -- four durable goods (ordnance, fabricated metals, professional, scientific and controlling instruments, and miscellaneous manufacturing) and two nondurable goods (paper and allied products, and rubber products). Three retail trade gropus -- general merchandise, food and dairy, and furniture and appliances -- also are projected with annual growth rates higher than the average for services-producing industries.

The highest rates of growth are projected among the industry groups designated as services, starting with business services and including miscellaneous professional services (e.g., legal and engineering), automobile repair, eating and drinking places, and medical and related services. Employment in private households, educational services, and personal services is either declining or increasing at below-average rates. Employment in finance and real estate also is projected to increase at above-average rates.

EARNINGS AND PERSONAL INCOME

Income implications of the quarter-year employment changes cited in the preceding section are reported in Table 3.1. The employment series in this table is computed from the employment series presented in Table 2.1. While the employment series compare closely with the corresponding employment series in Table 1.1, the personal income series differ. The quarter-year income estimates in Table 3.1 are generally higher than the quarter-year income levels reported by the Minnesota Department of Employment Security.

Minnesota - U.S. Comparisons

The summary employment and income comparisons in Table 3.1 were noted earlier in the finding of the inverse correlation between increases in services-producing employment and slowing down of increases in total personal income. The quarter-year data show that the increase in services-producing employment in 1980, Qtr. IV was associated with a relative decline in personal income in 1980, Qtr. IV. The increase in services-producing employment, however, followed a decrease in Minnesota services-producing employment from its 1980, Qtr. I peak.

Projected employment, earnings and income in Minnesota and the U.S. are compared for the 22-year period from 1978-2000 in Table 3.2. The economic projections are based on certain assumptions regarding relationships between aggregate population, employment, earnings, and income. For example, total employment in Minnesota is projected to increase from 2 million in 1978 to nearly 2.7 million in 2000 while total population is projected to increase from 4 million to nearly 5 million.

Annual rates of change in the indicators in Table 3.2 are summarized in Table 3.3. These rates show a general slowing down in employment and income growth which can be attributed to a slowing down in population growth.

Table 3.1. Nonagricultural wage and salary positions and per capita personal income, Minnesota and U.S., by quarter-year, 1979 and 1980. 1/

Indicator	Unit	1979 Qtr. I	1979 Qtr. II	1979 Qtr. III	1979 Qtr. IV	1980 Qtr. I	1980 Qtr. II	1980 Qtr. III	1980 Qtr. IV
Minnesota:									
Nonagr. wage & salary positions	thou.	1,740	1,736	1,752	1,775	1,818	1,786	1,769	1,773
Services-producing	thou.	1,262	1,262	1,272	1,282	1,319	1,316	1,311	1,319
Goods-producing	thou.	478	474	480	487	499	470	458	454
Services-prod. per 100 goods-prod.	no.	264	266	265	264	264	280	296	291
Per capita pers.inc. 2/	dol.	8,366	8,765	8,930	9,133	9,346	9,330	9,580	9,815
United States:									
Nonagr. wage & salary positions	thou.	87,839	88,859	89,761	90,172	90,688	90,548	90,098	90,917
Services-producing	thou.	61,620	62,471	63,117	63,541	64,004	64,803	64,790	65,131
Goods-producing	thou.	26,219	26,388	26,644	26,631	26,684	25,745	25,300	25,786
Services-prod. per 100 goods-prod.	no.	235	237	237	239	240	252	256	253
Per capita pers.inc. 2/	dol.	8,419	8,650	8,857	9,052	9,228	9,285	9,526	9,787
Minnesota as prop. of U.S.:									
Empl. ratio	pct.	112	112	112	110	110	111	112	115
Per capita pers. inc.	pct.	99	101	101	101	101	101	101	100

1/ Minnesota Department of Economic Security, Review of Labor and Economic Conditions, Vol, 5, No. 4, to Vol. 7, No. 2, 1979 and 1980.

2/ Based on U.S. Department of Commerce personal income estimates in Table 3.5 and Table 3.6.

Table 3.2. Estimated and projected employment, population and income indicators, Minnesota and U.S., 1969-2000. 1/

Indicator	Units	Estimated 1969	Estimated 1978	Projected 1990	Projected 2000
Minnesota:					
Employment	thou.	1,588	1,989	2,452	2,662
Population	thou.	3,758	4,008	4,577	4,984
Total earnings	mil. 1972 $	12,449	16,934	27,244	36,687
Total pers. income	mil. 1972 $	15,094	21,120	33,709	45,141
Earnings per worker	1972 $	7,839	8,514	11,111	13,782
Per capita pers. inc.	1972 $	4,017	5,269	7,365	9,058
Earn. per $1,000 pers. inc.	1972 $	825	802	808	813
Emp. per 1,000 pop.	no.	423	496	536	534
United States:					
Employment	thou.	85,416	101,118	121,986	130,943
Population	thou.	201,298	218,051	242,979	259,815
Total earnings	mil. 1972 $	679,459	879,168	1,371,068	1,810,100
Total pers. income	mil. 1972 $	834,162	1,139,744	1,772,173	2,336,905
Earnings per worker	1972 $	7,955	8,694	11,240	13,824
Per capita pers. inc.	1972 $	4,144	5,227	7,294	8,993
Earn. per $1,000 pers. inc.	1972 $	815	771	774	775
Emp. per 1,000 pop.	no.	424	464	502	504

1/ U.S. Department of Commerce, Regional Economic Analysis Division, Regional and State Projections of Income, Employment, and Population to the Year 2000, Survey of Current Business, 60(11): 44-70, 1980.

Table 3.3. Estimated and projected annual change in selected employment, population, and income indicators, Minnesota and U.S., 1969-78 and 1978-2000. 1/

Indicator	Minnesota		United States	
	Estimated 1969-1978	Projected 1978-2000	Estimated 1969-1978	Projected 1978-2000
	(percent)			
Employment	2.5	1.3	1.9	1.2
Population	0.7	1.0	0.9	0.8
Total earnings	3.5	3.6	2.9	3.3
Total personal income	3.8	3.5	3.5	3.3
Earnings per worker	0.9	2.2	1.0	2.1
Per capita pers. inc.	3.0	2.5	2.6	2.5
Earn. per $1,000 pers. inc.	-0.3	0.1	-0.6	0.0
Emp. per 1,000 pop.	1.8	0.3	1.0	0.4

1/ U.S. Department of Commerce, Regional Economic Analysis Division, Regional and State Projections of Income, Employment, and Population to the Year 2000, Survey of Current Business, 60(11): 44-70, 1980.

For Minnesota, however, projected population growth is greater than the historical rate of growth from 1968 to 1979. Growth in projected earnings per worker also is greater than its historical rate. The Minnesota economy thus outpaces the U.S. economy in the U.S. Department of Commerce state projection series.

Industry Comparisons

To identify industry sources of above-average projected growth in the Minnesota economy, industry-specific employment and earnings trends are available in Table 3.4. Industries with above-average growth in Minnesota industry earnings, employment and earnings per worker are as follows:

Earnings	Employment	Earnings per Worker
Mfg.,durable goods	Agr. services,for.,fish.	Farm
Fin.,ins.,real est.	Construction	Mining
Services	Mng.,durable goods	Mfg.,durable goods
	Fin.,ins.,real est.	Fin.,ins.,real est.
	Services	Services

Thus, the three industry groups with above-average projected growth in total earnings also are projected with above-average growth in employment and earnings per worker. Projected decline in total farmings and mining employment contrasts with a projected above-average increase in earnings per worker. Above-average increases in total employment in agricultural services and construction, however, are not accompanied by above-average increases in earnings per worker.

Above-average growth is projected in U.S. industry earnings, employment, and earnings per worker as follows:

Table 3.4. Projected earnings and employment trends in specified industry, Minnesota and U.S., 1978-2000. 1/

Industry	Earnings			Employment			Earnings per Worker		
	Estimated 1978	Projected 2000	Annual Change, 1978-2000	Estimated 1978	Projected 2000	Annual Change, 1978-2000	Estimated 1978	Projected 2000	Annual Change, 1978-2000
	(mil. $)	(mil. $)	(pct.)	(thou.)	(thou.)	(pct)	($)	($)	(pct.)
Minnesota:									
Farm	1,209	2,022	2.4	126	119	-0.2	9,600	16,990	2 6
Agr. services, for.,fish.	55	114	3.4	10	14	1.5	5,500	8,140	1.8
Mining	261	433	2.3	17	17	0	15,350	25,470	2.3
Construction	1,114	2,385	3.5	104	144	1.5	10,710	16,560	2.0
Mfg , dur. goods	2,479	6,039	4.1	220	325	1.8	11,270	18,580	2.3
Mfg , nondur.	1,600	3,044	3.0	147	174	0.8	10,880	17,490	2.2
Trans.,comm.,util.	1,319	2,813	3.5	99	123	1.0	13,320	22,870	2.5
Wholesale trade	1,346	2,719	3.2	117	153	1.2	11,500	17,770	2.0
Retail trade	1,749	3,512	3.3	342	453	1.3	5,110	7,750	1.9
Fin ,ins.,real est.	952	2,284	4.1	95	150	2.1	10,020	15,230	1.9
Services	2,560	6,944	4.6	408	624	2.0	6,270	11,130	2.6
Fed , civilian	369	657	2.7	30	33	0.4	12,300	19,910	2.2
Fed., military	46	74	2.2	19	19	0	2,420	3,890	2.2
State & local	1,904	3,648	3.0	255	314	1.0	7,470	11,620	2.0
Total or average	16,934	36,687	3.6	1,989	2,662	1.3	8,510	13,780	2.2
United States.									
Farm	22,125	29,921	3.3	2,757	2,262	-0.9	8,030	13,230	2.3
Agr. services, for.,fish.	3,637	7,371	3.3	660	867	1.2	5,510	8,500	2.0
Mining	13,701	30,285	3.7	901	1,133	0.9	15,210	26,730	2.6
Construction	53,248	111,246	3.4	5,387	6,979	1.2	9,880	15,940	2 2
Mfg , dur. goods	149,450	307,089	3.3	12,519	15,731	1.0	11,940	19,520	2.3
Mfg., nondurable	81,065	148,660	2.8	8,377	9,595	0.6	9,680	15,490	2.2
Trans.,comm.,util	67,166	142,582	3.5	4,159	6,254	0.9	13,020	22,800	2.6
Wholesale trade	57,615	113,518	3.1	4,248	8,822	1.2	10,980	16,640	1.9
Retail trade	87,791	173,671	3.1	16,198	21,980	1.4	5,420	7,900	1.7
Fin ,ins.,real est.	50,805	116,804	3.9	5,190	7,753	1.8	9,790	15,070	2.0
Services	147,968	268,580	4.2	20,630	30,727	1 8	7,170	12,000	2 4
Fed., civilian	35,123	61,411	2.6	3,044	3,103	0 2	11,540	19,790	2.5
Fed , military	13,231	21,039	2.1	2,351	2,342	0	5,630	8,980	2 1
State & local	96,243	177,922	2.8	12,862	15,420	0.8	7,480	11,540	2.0
Total or average	879,168	1,810,100	3.3	101,118	130,943	1.2	8,690	13,820	2.1

1/ U.S. Department of Commerce, Regional Economic Analysis Division, Regional and State Projections of Income, Employment and Population to the Year 2000, Survey of Current Business, 60(11): 44-70, 1980.

Earnings	Employment	Earnings per Worker
Mining	Retail trade	*Farm
Construction	*Fin.,ins.,real est.	*Mining
Trans.,comm.,util.	*Services	Construction
*Fin.,ins.,real est.		*Mfg.,dur. goods
*Services		Mfg.,nondurable
		Trans.,comm.,util.
		*Services
		Fed., civilian

Above-average increases in the three indicators for both Minnesota and the U.S. are identified by an asterisk. Thus, eight of the 13 Minnesota industry groups are among the U.S. industry groups with above-average rates of growth. One exception is durable goods manufacturing which has one of the highest Minnesota industry growth rates but much lower growth rates for the U.S. as a whole.

An even more detailed breakdown of industry output, employment and earnings than Table 3.4 is essential for assessment of Minnesota industry export and residentiary market prospects and input requirements. This report, however, is confined to the use of a limited data series in the presentation of study findings. Later reports will make use of detailed industry analyses and forecasts (as identified in earlier reports in the series, for example, see ref. 1).

Additional income series are available for assessing overall effects of changes in individual industry employment and earnings. Two of these series are presented in Table 3.5, namely, total personal income and total nonfarm income (i.e., total personal incomes less net income of farm proprietors and other farm workers). Total population and nonagricultural wage and salary employment estimates are presented, also, for deriving corresponding quarterly per capita and per worker income levels.

Because of the high rate of price inflation in 1978 to 1980 period, a correspondingly high rate of statistical correlation is evident among the

Table 3.5. Estimated total personal income, nonfarm income, population and nonagricultural wage and salary employment (positions) by quarter-year, Minnesota and United States, 1978-1980.

Year and Quarter-Year	Total Personal Income 1/		Nonfarm Income 1/		Population 1/3/		Nonagr. Wage & Salary Emp. 2/	
	Minnesota	United States	Minnesota	United States	Minnesota	United States	Minnesota	United States
	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(thou.)	(thou.)	(thou.)	(thou.)
1978:								
Qtr. I	30,470	1,624,665	28,654	1,592,585	3,990	217,396	1,663.1	84,089
Qtr. II	31,113	1,680,604	29,185	1,647,300	4,001	217,808	1,672.7	85,463
Qtr. III	31,706	1,733,783	30,146	1,702,695	4,013	217,221	1,679.2	86,101
Qtr. IV	33,288	1,795,758	31,413	1,758,846	4,028	218,634	1,712.0	86,954
Annual	31,644	1,708,702	29,852	1,675,206	4,008	218,015	1,681.8	85,652
1979:								
Qtr. I	33,889	1,844,221	32,340	1,805,162	4,052	219,061	1,739.6	87,839
Qtr. II	35,579	1,899,261	33,392	1,855,905	4,059	219,576	1,736.3	88,459
Qtr. III	36,284	1,954,591	38,078	1,914,685	4,063	220,681	1,751.5	89,761
Qtr. IV	37,044	2,010,035	35,609	1,972,827	4,065	222,064	1,775.3	90,172
Annual	35,699	1,927,027	34,855	1,887,145	4,060	220,078	1,790.7	89,058
1980:								
Qtr. I	38,009	2,062,761	36,802	2,031,514	4,067	223,537	1,817.7	90,668
Qtr. II	37,964	2,088,490	36,782	2,058,969	4,069	224,920	1,785.8	90,548
Qtr. III	39,001	2,155,782	37,869	2,127,019	4,071	226,304	1,768.8	90,090
Qtr. IV	39,978	2,228,272	38,810	2,199,092	4,073	227,687	1,773.0	90,917
Annual	38,738	2,133,827	37,566	2,104,148	4,070	225,612	1,786.3	90,556

1/ U.S. Dept. of Commerce, Bureau of Economic Analysis, State Personal Income, First Quarter, 1979, BEA 79-49, United States Department of Commerce News, August 15, 1979; also, BEA 79-70, BEA 80-26, BEA 80-43, BEA 80-67, BEA 81-07, BEA 81-25.

2/ Minnesota Department of Employment Security, Review of Labor and Economic Conditions, Vol. 4, No. 4 to Vol. 7, No. 2, 1978, 1979 and 1980.

3/ Quarter-year estimates based on interpolated annual estimates reported by U.S. Department of Commerce.

Minnesota and U.S. income series. Also, population and nonagricultural employment increased gradually during this period. Because of the large increases each quarter in underlying general economic trends, the statistical correlation for the four quarter-year first-difference series is much less than for their absolute values.

Equivalent per capita and per worker income series are summarized in Table 3.6. Two important differences occur in these series, namely, the much lower estimates of per capita personal income reported in the Minnesota Department of Employment Security series than the corresponding series prepared in the U.S. Department of Commerce, adn the much higher nonfarm income estimated for Minnesota than for the U.S. as a whole. The Minnesota DES per capita personal income series is consistently lower for Minnesota and higher for the U.S. than the corresponding USDC series. Definitional differences may account for this discrepancy. For the nonfarm income series, however, higher labor force participation rates in Minnesota than in the U.S. as a whole account for the higher Minnesota than U.S. levels of nonfarm employment relative to population. Also, multiple job-holding is more prevalent in Minnesota than in the U.S. as a whole. A person-count, rather than a job-count, of employment would reduce the difference in the two nonfarm income series, but not entirely, because of higher labor force participation rates in Minnesota.

Table 3.6. Estimated per capita personal income and nonfarm income per nonfarm wage and salary position, by quarter-year, Minnesota and United States, 1978-1980.

Year and Quarter-Year	Per Capita Personal Income				Nonfarm Income per Nonfarm Position 1/	
	U.S. Dept. of Commerce 1/		Mn. Dept. of Emp. Sec. 2/			
	Minnesota	United States	Minnesota	United States	Minnesota	United States
	(dollars)					
1978:						
Qtr. I	7,637	7,473	7,358	7,468	17,229	18,939
Qtr. II	7,763	7,716	7,588	7,669	17,454	19,275
Qtr. III	7,901	7,945	7,704	7,829	17,953	19,761
Qtr. IV	8,264	8,214	7,900	8,078	18,348	20,227
Annual	7,895	7,838	7,638	7,761	17,750	19,558
1979:						
Qtr. I	8,366	8,419	8,181	8,404	18.590	20,551
Qtr. II	8,765	8,650	8,263	8,536	19,232	20,980
Qtr. III	8,930	8,857	8,484	8,838	21,740	21,331
Qtr. IV	9,113	9,052	8,644	9,018	20,058	21,878
Annual	8,793	8,756	8,393	8,699	19,909	21,190
1980:						
Qtr. I	9,346	9,228	9,267	9,331	20,246	22,406
Qtr. II	9,330	9,285	9,380	9,300	20,597	22,739
Qtr. III	9,580	9,526	8,692	9,608	21,409	23,610
Qtr. IV	9,815	9,787	9,485	9,882	21,889	24,188
Annual	9,518	9,456	9,131	9,530	21,035	23,236

1/ Based on data reported in Table 3.5.

2/ Based on quarter-year real per-capita personal income reported by Minnesota Department of Employment Security in Review of Labor and Economic Conditions.

PERSONAL INCOME AND TAX REVENUES

Total personal income is equal to total earnings plus property income and transfer payments. Earnings account for about 80 percent of total personal income, although for the U.S. as a whole the percentage dropped below this level in the last decade (see, Table 3.2). In this section, personal income and state revenue trends and relationships are examined with reference to changes in personal income payments and state revenue source.

Personal Income Trends

The U.S. Department of Commerce, Regional Economic Measurement Division, maintains an annually updated Regional Economic Information System (REIS) which includes the personal income series presented in Table 4.1. This series starts with the total earnings of the employed work force in Minnesota and the U.S. It shows the contribution of the farm sector and the non-farm proprietorial sector to total personal income. In 1975, farm earnings and nonfarm proprietorial income accounted for 13 percent of total earnings and 10 percent of total personal income. In 1979, the two sectors still accounted for 13 percent of total earnings but 11 percent of total personal income. During the period, total earnings increased from 78 to 80 percent of total personal income. Large increases in transfer payments in the mid-1970's reduced the importance of total earnings in total personal income in the 1975 recession period.

Of the six components of personal income listed in Table 4.1, nonfarm wages and salaries increased most rapidly, well above the annual increases in total personal income. Nonfarm proprietorial income increased most rapidly in the early phase of post-1975 U.S. economic recovery and least rapidly just prior to 1980 recession. Farm earnings fluctuated widely in Minnesota (largely because of farm inventory fluctuations),but increased

Table 4.1. Estimated personal income from specified sources, Minnesota and U.S., 1975-1979. 1/

Item	1975	1976	1977	1978	1979 2/
Minnesota (in mil.dol.):					
Total earnings	17,747	19,216	22,440	25,407	28,987
Farm	1,260	754	1,809	1,834	1,994
Nonfarm, total	16,487	18,462	20,632	23,572	26,943
Wages & salaries	15,446	17,171	19,092	21,882	25,123
Proprietorial	1,042	1,291	1,540	1,690	1,870
Less: Social ins. contr.	994	1,066	1,175	1,352	1,546
Plus: Residence adj.	-26	-16	-21	-25	-53
Net earnings	16,727	18,133	21,244	24,029	27,388
Plus: Property income	3,087	3,334	3,633	4,095	4,628
Plus: Transfer payments	2,872	3,136	3,336	3,579	3,976
Total personal income	22,686	24,603	28,214	31,702	35,991
United States (in bil.dol.):					
Total earnings	951.1	1,049.4	1,168.0	1,317.7	1,488.7
Farm	28.1	23.9	26.3	33.3	41.8
Nonfarm, total	922.2	1,025.4	1,141.7	1,284.3	1,446.9
Wages & salaries	858.7	954.4	1,061.2	1,186.1	1,347.6
Proprietorial	63.5	71.0	80.5	98.2	99.3
Less: Soc. ins. contr.	50.2	55.2	60.9	69.2	80.2
Plus: Residence adj.	3/	3/	3/	3/	3/
Net earnings	900.6	993.8	1,106.7	1,248.1	1,408.1
Plus: Property income	169.8	186.6	208.6	236.3	271.8
Plus: Transfer payments	178.2	193.8	208.4	224.1	250.9
Total personal income	1,248.6	1,374.3	1,523.6	1,708.5	1,930.7

1/ Personal income estimates for 1975-1978 period from U.S. Dept. of Commerce, Regional Economic Information System, Unpublished data, April 1980.

2/ Personal income estimate for 1979 from U.S. Dept. Commerce, Regional Economic Measurement Division, State Personal Income, 1977-79, Survey of Current Business, 60(8): 57-69, 1980.

3/ $500 million or less.

sharply for the U.S. as a whole. Property income and transfer payments both declined as a percentage share of total personal income in Minnesota, although in the entire U.S., property income increased in relative importance.

Again, a more detailed presentation of the sources of instability in total personal income is essential in an assessment of the relationship between jobs and income. Quarter-year estimates of employment and earnings in individual industries provides an initial indication of forthcoming changes in personal income payments and state tax revenues, but additional data are needed to accurately assess the effects of changing industry and market conditions on personal income and state tax payments.

State Revenue Sources

The third set of variables identified in this report pertain to state revenue sources -- intergovernmental, tax, and charges and miscellaneous, as shown in Table 4.2. Local revenue sources are identified, also, because of the dominance of state revenue transfers to local governments. Finally, Minnesota state and local revenues are compared with corresponding U.S. revenues for the 1975-1979 period. Except for less dependence on property and sales taxes, and more dependence on individual income taxes, Minnesota generally conforms with the U.S. in revenue sources, as summarized in Table 4.2.

Annual growth in individual revenue sources parallel annual growth in personal income payments, except near the peak of the general business cycle and during the downswing into the recession period. Growth in sales tax revenues in both Minnesota and the U.S., for example, was lagging by mid-1979 (indicated as fiscal year starying in 1978 in Table 4.3 to correspond with calendar year 1978). Motor fuel tax receipts peaked a year later, along with individual income and corporate net income tax receipts.

Table 4 2. State and local government revenues from specified source, Minnesota and U.S., 1975-76 to 1979-80. 1/2/

Revenue Source	Minnesota					United States			
	1975-76	1976-77	1977-78	1978-79	1978-80 3/4/	1975-76	1976-77	1977-78	1978-79
All general revenues, total	5,401	5,952	6,593	7,328	5/	256,176	285,796	315,960	343,278
State revenues, total	3,580	3,868	4,298	4,803	5/	152,117	168,839	189,099	207,991
Intergovernmental, total	946	951	1,015	1,094	5/	44,717	48,675	53,571	57,087
Federal	869	912	972	1,048	5/	42,013	45,938	50,200	54,548
Local	77	39	43	46	5/	2,704	2,737	3,261	2,539
Taxes, total	2,219	2,486	2,759	3,134	3,202	89,255	100,058	113,261	124,906
Sales, total	905	983	1,085	1,178	1,216	47,390	52,362	58,270	63,668
General sales	427	467	537	608	650	27,333	30,896	35 280	39,505
Motor fuels	190	197	206	217	205	8,660	9,087	9,501	9,980
Alch. bev. & tob.	132	134	137	139	141	5,520	5,620	5,940	6,040
Other sales	156	185	205	214	220	5,878	6,758	7,549	8,143
Individual inocme	850	957	1,075	1,256	1,262	21,448	24,453	29,105	32,622
Corp net income	196	258	293	357	381	7,273	9,187	10,738	12,127
Motor veh & oper. lic.	103	111	124	129	141	4,356	4,587	4,836	5,155
Other taxes	165	177	182	214	202	8,789	9,469	10,312	11,334
Charges & misc.	416	430	524	575	5/	18,145	20,106	22,377	25,998
Local revenues, total	3,396	3,765	4,146	4,538	5/	162,931	178,979	194,883	211,986
Intergovernmental, total	1,745	1,966	2,141	2,346	5/	69,746	76,948	84,053	94,777
Federal	246	324	332	379	5/	13,567	16,637	19,393	20,616
State	1,499	1,642	1,809	1,967	5/	56,169	60,311	64,661	74,162
Taxes, total	1,043	1,116	1,253	1,317	1,469	67,557	74,794	80,381	80,606
Property	1,006	1,075	1,202	1,260	1,439	54,884	60,275	64,058	62,453
Other	37	41	51	57	30	12,673	14,518	16,322	18,151
Charges & misc	608	684	752	874	5/	25,628	27,237	30,449	36,603

1/ U S Bureau of the Census, Statistical Abstract of the U.S.: 1977, 198th edition, Washington, D.C., 1978; also, 1978, 1979 and 1980.

2/ U S Bureau of the Census, Governmental Finances in 1976-77, U.S. Government Printing Office, Washington, D.C., 1978; and later years.

3/ Private communication, Leonard F. Peterson, Research Office, Minnesota Department of Revenue, St. Paul, October 3, 1980.

4/ U S. Bureau of the Census, State Government Tax Collections in 1980, Series GF-80, No. 1, U.S. Government Printing Office, Washington, D.C., 1980

5/ Not available.

Table 4.3. Annual change in specified personal income payments and selected state taxes, Minnesota and U.S., 1975-1979.

Indicator	Minnesota				United States			
	1975-76	1976-77	1977-78	1978-79	1975-76	1976-77	1977-78	1978-79
	(percent)							
Personal income payments (calendar year):								
Farm earnings	-40.2	139.9	1.4	8.7	-14.9	10.0	12.5	25.5
Nonfarm,wages & sal.	12.0	11.2	14.6	14.8	11.1	8.0	11.8	13.6
Nonfarm, proprietorial	23.9	19.3	9.7	10.7	11.8	13.4	22.0	1.1
Social ins. contr.	7.2	10.2	15.1	14.3	10.0	10.3	13.6	15.9
Net earnings	8.4	17.2	13.1	14.0	10.3	11.4	12.8	12.8
Property income	8.0	9.0	12.7	13.0	9.9	11.8	13.3	15.0
Transfer payments	9.2	6.4	7.3	11.1	8.8	7.5	7.5	12.0
Total personal income	8.5	14.7	12.4	13.5	10.1	10.9	12.1	13.0
State tax revenues (fiscal year):								
General sales	9.4	15.0	13.2	8.1	12.9	14.3	12.0	1/
Motor fuels	3.7	4.6	5.3	-5.5	4.9	4.6	5.0	1/
Alch. bev. & tob.	1.5	2.2	1.5	1.4	2.1	5.4	1.7	1/
Individual income	12.6	12.3	16.8	1.3	13.9	19.0	12.1	1/
Corp. net income	31.6	13.6	21.8	-3.4	26.5	16.9	12.9	1/
Total taxes	12.0	11.0	13.6	2.8	13.2	12.1	10.3	1/

1/ Not available.

Again, the annual estimates lack the detailed breakdown essential for accurate assessment of the income tax relationships. Quarter-year data are needed for each revenue source, which must be related to appropriate income sources. For example, sales taxes are related in part to household consumption expenditures and in part to business production expenditures. A business slowdown reduces sales and use tax receipts. Similarly, proprietorial and corporate income taxes are sensitive to the level of individual business activity, which may experience a slowdown before any reductions in jobs, or total hours worked, or earnings per worker. Thus, correlation of growth in taxes with growth in income is low and even lower with growth in jobs. A detailed interindustry model of the Minnesota economy, with quarter-year breakdowns of activity relationships, is an essential prerequisite for the development of a tax forecasting system which meets the needs of legislative and administrative decision making in state and local governments. In addition, changes in tax laws and their administration must be incorporated into the forecasting procedures to account for their effects on the level of state tax receipts. Later reports in this series will focus on the construction and implementation of such a tax forecasting system.

REFERENCES CITED

1. Maki, W.R., Patrick D. Meagher, Leonard A. Laulainen, Jr. and Mason Chen. Users' Guide to the Minnesota Regional Development Simulation Laboratory. REIFS Report No. 8 and Staff Paper Series P79-28, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. 1979.

2. Maki, W.R. Alternate Forecast Methods for Water and Land Resources Planning in Minnesota. Staff Paper Series P79-29, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. 1979.

3. Maki, W.R. Regional Economic Forecasts for Water and Land Resources Planning. I. Forecast System. Staff Paper Series P79-33, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. 1979.

4. Maki, W.R. Regional Economic Forecasts for Water and Land Resources Planning. II. Forecast Series: Minnesota. Staff Paper Series P79-37, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. 1979.

5. Maki, W.R., G.H. Michaels, L.A. Laulainen, Jr. and M. Chen. Employment Trends and Projections for Minnesota and Its Substate Development Regions. Bulletin 531, Agricultural Experiment Station, University of Minnesota, St. Paul. 1979.

6. Maki, W.R. Income Trends and Projections for Minnesota and Its Substate Development Regions. Bulletin 537, Agricultural Experiment Station, University of Minnesota, St. Paul. 1980.

7. Maki, W.R. Socioeconomic Models for Development Planning. I. Model Validation. REIFS Report No. 17 and Staff Paper Series P81-9 , Department of Agricultural and Applied Economics, University of Minnesota, St. Paul. 1981.

8. Minnesota Department of Employment Security. Minnesota Employment Outlook to 1985. Research and Statistical Services Office, Minnesota Department of Employment Security, 390 North Robert Street, St. Paul, MN, 55101. January 1981.

9. U.S. Department of Commerce, Regional Economic Analysis Division. Regional and State Projections of Income, Employment, and Population to the Year 2000. Survey of Current Business, 60(11): 44-70. 1980.