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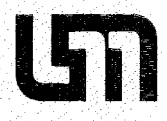
Staff Papers Series

Staff Paper P88-13 June 1988

STRENGTHENING MINNESOTA'S ECONOMIC BASE

Wilbur Maki



Department of Agricultural and Applied Economics

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

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STRENGTHENING MINNESOTA'S ECONOMIC BASE

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STRENGTHENING MINNESOTA'S ECONOMIC BASE

Summary

The basic industries of a region produce goods and services that are shipped to markets outside the region. They generate new dollars that circulate and recirculate within the region to create an economy-wide multiplier effect three to four times the value of the initial outshipments.

Basic industries in a region are revealed by above-average levels of employment, labor earnings, and output relative to corresponding US industry. Employment and labor earnings in excess of levels based on US industry percentage distributions are used as indicators of the region's basic employment and income. In addition, a 528-industry representation of the Minnesota economy is available that provides a detailed breakdown of all commodity disbursements to indvidual sectors in Minnesota and the rest of world and of all intermediate and primary input purchases associated with the production of these disbursements.

The new comparisons of excess employment, excess earnings and commodity exports of individual industry groups re-enforce and enlarge earlier findings that show manufacturing as the pre-eminant job and income generator in the Minnesota economy. In 1982, for example, manufacturing accounted for 36.7 percent of basic employment 53.5 percent of basic labor earnings, and 62.8 percent of total commodity exports. In comparison, agriculture and agricultural services together accounted for 22.5 percent of basic jobs, 8.8 percent of basic earnings, and 10.8 percent of total commodity exports. Thus, in 1982, manufacturing generated six times as many basic dollars and 1.4 times as many basic jobs as the combined agriculture and agricultural services group.

While manufacturing exports are the cutting edge of Minnesota's economic expansion, many industries participate in varying degrees in strengthening Minnesota's economic base. The 528-industry breakdown of the Minnesota economy reveals strong backward linkage to input-supplying industries in Minnesota. New manufacturing methods, coupled with a sharp fall in the value of the US dollar in foreign exchange, plus recent productivity improvements in US manufacturing, favor the strengthening of close working relationships between fabricators, which typically are large firms, and their suppliers, of which many are small firms. Close proximity to one another favors the building of linkages that lead to improved overall productivity in each workplace.

The geographical clustering of structurally-related industries facilitates overall industry growth in the seven-county Metropolitan Region. Greater Minnesota production sites are now sharing in the industry expansion because of low site and labor costs and improved production capabilities. The industry clustering is a response to the changing competitive conditions facing Minnesota manufacturers and their input-supplying industries.

The new findings show also the far greater importance of domestic rather than foreign export markets in accounting for Minnesota's economic growth. Of the $39.5 billion of total exports of Minnesota industries in 1982, $5.4 billion--less than 14 percent--were to foreign destinations. This ratio varied from industry to industry, being nil in construction but reaching 27.5 percent of total exports in the agriculture and agricultural services group.

While the fall in the foreign exchange value of the US dollar and the improved productivity of US manufacturers strengthens their competitive position in foreign markets, they also improve the competitive position of Minnesota manufacturers and other export-producing industry in US regional

markets. A 10-percent expansion in the domestic markets of Minnesota export-producing businesses, for example, is more than seven times larger in absolute terms than a 10-percent expansion its foreign markets.

As domestic markets become increasingly regionalized and production is targeted to the unique preferences of these markets, accurate information about the domestic market economy, including in-state markets, becomes an increasingly important asset in strengthening Minnesota's economic base. As noted in an earlier report in this series, the inter-regional trade between the two Minnesotas--the Metropolitan Region and Greater Minnesota--has reached the level that exceeds the foreign exports of the two regions in dollar value.

Minnesota's economic base, together with its residentiary industries, supports an overall occupational employment distribution that compares closely with the corresponding US employment distribution. Most recent findings on the US employment outlook to the year 2000, which apply to Minnesota, also, show widely varied growth rates for individual occupational groups. The 50 fastest-growing occupational groups in the US for example, range from paralegal personnel and medical assistants on the high side with a doubling in projected growth to receptionists and real estate appraisers on the low side with a 40 percent increase. Of the 50 fastest-growing occupations, 13 are in the managerial and administrative-support classification, 12 are professional, 8 are technical, 3 are marketing and sales, and 13 are service. Thus, 49 of the 50 fastest-growing occupations are white-collar.

While white-collar jobs are increasing in their share of total jobs, average labor earnings per job are projected to increase more slowly among white-collar jobs than blue-collar jobs. Projected productivity gains per worker are greater among blue-collar jobs. As noted in earlier reports in this series, factor productivity gains in the industries with the largest

proportion of white-collar occupations are among the smallest of all industries. The strengthening of Minnesota's economic base is confronted, therefore, by the increasingly important challenge of achieving a turnaround in the chronically low-productivity of labor and capital in the services-producing industries, particularly health care and education.

This report--the sixth in a series on education and economic growth--focuses on the strengthening of Minnesota's economic base. It looks at the changing character of basic industry, particularly its relation to the services-producing export-supporting industries, like business, legal, engineering, and other professional services. A 528-industry breakdown of the Minnesota economy is analyzed and presented in summary form to show the interindustry linkage of both the export-producing and residentiary sectors and the contributions of each to gross industry output and gross state product. Industry staffing patterns and income payments and expenditures of basic economic decision entities--households, businesses and governments--are also examined. Finally, the significance of trade, particularly domestic, for industry and regional growth in Minnesota is discussed.

STRENGTHENING MINNESOTA'S ECONOMIC BASE

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Reference to export-producing industry connotes an important dichotomy in industry classification in the designation of "export-producing" as "basic" and "residentiary" as "nonbasic." Initially, the designation of "basic" referred to goods-producing industry--farming, forestry and manufacturing, and oftentimes construction, because of its direct association with local investment and functional association with manufacturing processes. The services-producing industries, except for transportation, communications and public utilities--the regulated industries, were viewed as "overhead." They prospered on "gross margins" extracted from "real work", the results of which were seen, smelled and touched.

Currently, basic industries are perceived as producing goods and services for export to markets outside a designated region or locality. The differentiating characteristic of a basic industry is the residence of the purchaser of the goods or the services produced: Is it in the county, commuting area or state in which the production is located or is it not? The bottom line is the particular geographical delineation of the economic community that differentiates "residents" from "non-residents".

The degree of closure of a local economy depends on the extent to which interindustry transactions are internalized, that is, the amount of turnover of the basic dollars acquired by exports. In this chapter, the State of Minnesota is the relevant economic as well as political community that defines the geographical scale of "residentiary" activity and the size of the economic base multiplier.

Changing Character of Basic Industry

For many years, the view that one "basic" worker supports one additional "nonbasic" worker was widely held. The term economic base multiplier grew from this perception. Much emphasis was placed, therefore, on the promotion of basic industry development. Nonbasic industry growth would follow basic industry growth.

Because of the varying degree of closure of local economies of varying geographic size, population and income, the economic base multiplier could range from less than one to three or more. A large economic community with a large population and much purchasing power would benefit more from a given increase in basic dollars than a small economic community with few people and low purchasing power.

Recently the important role in economic development of services-producing industries and public infrastructure--roads, streets, sewers, water supply, air and rail terminals, ocean and river ports, in a broader sense, publically-supported education and health care services--has been acknowledged. The new information economy would quickly whither away without the services-producing activities that add value to the products of farming, mining and manufacturing. To strengthen the community economic base is, therefore, a challenge that is no longer limited to the expansion of goods-producing industry or simply export-producing industry in the largest urban regions. Strengthening of the economic base depends also on the mix and levels of export-support services and the role a given economic community plays in the national settlement system.

The strengthening of the economic base starts, nontheless, with export-producing industries--both goods-producing, like agriculture and manufacturing, and services-producing, like retail trade and transportation. Even a services-producing industry that disburses any part of its product to

buyers residing outside the community is at least in part export-producing. The direct export of services would be represented, for example, by the sale of management consulting or market research services by a Minneapolis firm to a manufacturer in Chicago.

The strengthening of the economic base must include, also, the intermediate product markets and the community infrastructure. Much of the growth in manufacturing and business services has occurred because of increasing demand for intermediate products, that is, input purchases of semi-finished products or production-related services by individual businesses.

Community infrastructure expenditures also are likely to increase in future years because of their perceived association with improvements in quality of business climate as well as quality of human life. Morever, the well-educated and well-trained worker that many new and expanding input-supplying businesses seek and employ exercises many location choices. The bottom line in these choices is the personal value placed on the combined monetary returns and amenities of a given workplace or place of residence. For such an individual the personal value of the amenities and services produced by the spending of tax dollars may be preferred to any comparable private expenditures.

Finally, the strengthening of the economic base may call for an expansion in the sale of goods and services to visitors. Tourism is a highly touted strategy of state economic development. But tourism is both cyclically sensitive and seasonal in its job-creating capacity. It is associated oftentimes with marginal, low-wage employment and low annual average incomes of its work force. Obviously, export-producing employment is not always a panacea for lagging economic development in a region. Much depends on the

income-creating capacity of the basic employment.

Export-producing industry is revealed by above-average levels of actual employment in a given industry, that is, employment in excess of the derived industry employment based on the US employment distribution for each industry. Excess employment estimates were prepared earlier from two different data source--the US Census of Population and the Minnesota Department of Jobs and Training. Both data series include workers on public payrolls in the industry of employment. Also presented earlier were yearly estimates of total employment, including farmers and self-employed, prepared by the U.S. Department of Commerce (the REIS series) and the monthly nonagricultural wage and salary employment estimates prepared by the Minnesota Department of Jobs and Training (the DJT series).

The REIS series are used in estimating the excess Minnesota industry employment, as shown in Table 6.1. Included, also, is the distribution of excess labor earnings from the REIS series and the value of out-of-state shipments of goods and services produced in Minnesota in 1982 prepared from Minnesota IMPLAN--a 528-industry economic model which provides a detailed breakdown of Minnesota commodity disbursements to individual sectors in Minnesota and the rest of world.

Comparisons of excess employment, excess earnings and commodity exports of individual industry groups again highlight the role of manufacturing as the pre-eminant income generator in the Minnesota economy. Its contribution to excess employment, however, is smaller than its contribution to excess earnings because of high earnings per job. Labor earnings correlate more closely with the value of export sales than employment. Thus, manufacturing accounted for approximately two-thirds of Minnesota export sales and nearly two-thirds of its basic earnings, but only one third of its basic employment

Table 6.1

Excess employment or excess labor earnings in an industry correlate with its export sales as an alternate measure of basic economic activity. In 1982, however, excess earnings compared more closely with export sales than excess employment, which underestimated the dollar value of the export component of goods-producing industry output. Manufacturing, for example, accounted for 62.8 percent of export sales, 53.5 percent of excess earnings and 36.7 percent of excess employment in 1982. Only 12.8 percent of the manufacturing exports were to foreign countries as compared with 27.5 percent of agriculture exports. The total value of Minnesota commodity exports in 1982 was $32.5 billion, of which $4.5 billion was to foreign destinations.

Industry	Employment		Earnings		Exports, Total		Exports, Foreign	
	Total (thou.)	Proportion (pct.)	Total (mil.$)	Proportion (pct.)	Total (mil.$)	Proportion (pct.)	Total (mil.$)	Proportion (pct.)
Goods-producing:								
Agr., ag services	63.2	22.5	441	8.8	3511	10.8	964	27.5
Mining	7.4	2.7	233	4.7	787	2.4	94	11.9
Construction	.0	.0	.0	.0	904	2.8	1	0.1
Manufacturing, total	103.0	36.7	2678	53.5	20412	62.8	2621	12.8
Mfg., nondurables	45.1	16.1	1165	23.3	9917	30.5	537	8.4
Mfg., durables	57.9	20.7	1514	30.2	10494	32.3	2084	19.9
Total goods-producing	173.7	61.9	3353	67.0	25614	78.8	3680	14.4
Services-producing:								
Trans. comm. utilities	13.3	4.7	367	7.3	1001	3.1	256	25.6
Wholesale trade	9.4	3.4	220	4.4	1204	3.7	375	31.1
Retail trade	37.8	13.5	344	6.9	114	0.4	4	3.2
Fin., in., real estate	5.8	2.1	114	2.3	2517	7.7	103	4.1
Private services	40.5	14.4	609	12.2	1992	6.1	94	4.7
Government	.0	.0	.0	.0	74	0.2	4	4.8
Total sevices-producing	106.8	38.1	1655	33.0	6902	21.2	836	12.1
All industry	280.4	100.0	5008	100.0	32517	100.0	4515	13.9

in 1982. Agriculture, with more part-time workers and lower labor earnings, accounted for 22.5 percent of Minnesota's excess employment but only 10.8 percent of Minnesota exports.

Industry Sales and Purchases

Industry sales and purchases of outputs and inputs in Minnesota are expected to closely track corresponding U.S. industry sales and purchases. For this purpose, the most recent Minnesota IMPLAN System--the 528 industry input-output model of the 1982 Minnesota economy--is aggregated into 15 producing sectors as shown in Table 6.2. Commodity disbursements to intermediate and final markets in Minnesota and the rest of world are compared with the input purchases required to produce these commodities. In 1982, the total value of all commodity disbursements, including non comparable imports and scrap, was $113.9 billion compared with the total value of all input purchases of $111 billion, the difference being noncomparable (i.e., noncompetitive) foreign imports and scrap.

Commodity Disbursements

The total value of commodity disbursments from individual Minnesota industries to intermediate and final demand sectors in Minnesota and outside ranged from $261 million for agricultural services, forestry and fisheries to $18.4 billion for nondurable goods manufacturing. Among the largest of the commodity groups in total sales were nondurable and durable goods manufacturing; finance, insurance and real estate; and private services--each with over $15 billion of total sales.

The market destination of commodity sales differed sharply among the 13 commodity groups shown in Table 6.3. Local intermediate markets were large relative to total sales for agriculture; agricultural services, forestry and fisheries; nondurable and durable goods manufactoring; transportation,

Table 6.2

Minnesota industry statistics on commodity disbursements and input purchases show widely varying patterns of domestic and foreign trade in 1982 as represented by local and export-import balances of individual industries. Direct commodity disbursements to markets outside Minnesota—domestic of $24.2 billion and foreign of $5.4 billion—exceeded direct import purchases—domestic of $18.7 billion and foreign of $24.0 billion—by $13.1 billion. This difference is due to the purchases of imports for resale to final markets—personal consumption expenditures, gross private capita formation and government purchases—rather than intermediate markets represented by the 15 producing sectors in the Minnesota economy.

	Commodity Disbursements					Input Purchases				
	Local		Export			Local		Import		
Commodity or Industry	Inter-mediate	Final Demand	Domestic	Foreign	Total	Inter-mediate	Primary Inputs	Domestic	Foreign	Total
	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)
Goods-producing:										
Agriculture	4368	185	2418	958	7929	3613	2606	2030	71	8320
Agr. serv. for., fish	120	5	130	6	261	48	108	27	2	185
Mining	62	-5	694	94	845	283	319	203	30	835
Construction	1512	5170	903	1	7586	2166	2962	2343	115	7586
Mgf., nondurable	4759	3438	9380	537	18114	8290	4597	5049	763	18699
Mfg., durables	2568	2104	8410	2084	15166	4166	6426	3981	542	15115
Total goods-producing	13389	10897	21935	3680	49901	18566	17018	13633	1523	50740
Services-producing:										
Trans., comm., utilities	4802	2868	745	256	8629	2582	4112	1773	248	8715
Wholesale trade	3185	1778	829	375	6167	16443	4107	390	26	6167
Retail trade	1391	6368	111	4	7874	2315	4765	674	56	7810
Fin., ins., real estate	4948	7948	2414	103	15413	3627	11131	580	19	15357
Private services	5197	8112	1898	94	15301	4195	8297	1554	125	14171
Government enterprise	331	157	70	4	562	321	526	60	11	918
Noncompetitive imports	2153	359	0	0	2512	0	0	0	0	0
Other sectors	0	399	6140	868	7407	0	7159	0	0	7159
Scrap, used & seconds	22	0	55	26	103	0	0	0	0	0
Total serv.-prod., exc.imp.,scrap	19854	27588	12207	704	61354	14684	40097	5031	487	60298
All industry	35418	38844	34197	5410	113869	33250	57115	18664	2010	111038

Table 6.3

Commodity disbursements differentiate export-producing from residentiary industry by the destination of the commodity shipments—local or export to other states or countries. In 1982, 35 percent of all commodity shipments were exports, of which more than four-fifths were to US destinations outside Minnesota. The largest share of commodity disbursements in 1982 was to the local final demand sectors, with the local intermediate demand and domestic export sectors close seconds. Foreign exports were only five percent of the total value of all commodity disbursements in 1982.

Commodity Group	Local Sales		Export Sales		Total Commodity
	Inter-mediate	Final	Domestic	Foreign	
	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)
Agriculture	55	2	31	12	100
Agr. serv., for., fish.	46	2	50	2	100
Mining	7	0	82	11	100
Construction	20	68	12	0	100
Mfg., nondurables	26	19	52	3	100
Mfg., durables	17	14	56	13	100
Total goods-prodcuing	27	22	44	7	100
Trans, comm., util.	55	33	9	3	100
Wholesale trade	52	29	13	6	100
Retail trade	18	81	1	0	100
Fin., ins., real est.	32	51	16	1	100
Private services	34	53	12	1	100
Goverment enterprise	59	28	12	1	100
Other sectors	0	5	83	12	100
Total services-producing	32	45	20	3	100
All commodities	31	34	30	5	100

communications and utilities; and finance, insurance and real estate. Local final purchases were large for construction; retail trade; and finance, insurance and real estate. Domestic exports were large for mining and nondurable and durable goods manufacturing. Foreign exports were large for agriculture and durable goods manufacturing.

Commodity exports thus originate disproportionately from so-called goods-producing commodity groups as compared with services-producing commodity groups. Much of the exports from the services-producing group are actually an outgrowth of exports of the goods-producing groups which in the case of capital goods depend on essential production inputs from the service sector for their continuing operation.

Industry Purchases

Industry purchases include intermediate products from other local industries, primary inputs from resource owners, and imports. In 1982, the three types of input purchases totaled to $33.2 billion, $57.1 billion, and $20.7 billion, respectively, the largest being the income payments of businesses for the value added by primary resource owners--labor, capital and government.

Value added distributions vary from industry to industry because of differences in (1) intermediate input purchases and (2) labor utilization. Material input purchases are large in construction and manufacturing because of the "roundaboutness" of production. They may be large also in agriculture and mining because of production specialization and externalization of all input-producing activities. Finally, a high level of labor utilization and low earnings per worker are associated with low investment per worker, which is generally the case in small business enterprise.

Domestic exports valued at $34.2 million in 1982 exceeded by $15.5 billion

total domestic imports of intermediate products valued at $18.7 billion. Foreign imports of intermediate products valued at $2.0 billion were $3.4 billion less than foreign exports valued at $5.4 billion. Domestic imports can be differentiated by industry of destination and industry of origin for purposes of comparison with domestic exports and, also, to show their relative° importance for each purchasing industry group. Minnesota's manufacturing industries, for example, are moderately dependent on domestic and foreign imports with purchases totaling $9 billion and $0.9 billion, respectively, in 1982. This compares with $17.8 billion worth of domestic exports and $2.6 billion of foreign exports originating from Minnesota manufacturers--the difference of $17.7 being equivalent to more than one-half of the $33.3 billion of total commodity disbursements of Minnesota manufacturers.

When local sales of locally-produced goods and services reduce import requirements of the Minnseota economy, some industries shift from a deficit-supply to an excess-supply situation. In short, they become part of the state's economic base. Conversely, when Minnesota export-producing industries shift from an excess-supply to a deficit-supply situation, they are re-classified as residentiary. Because of the change in value of the U.S. dollar during the 1982-85 period, some manufacturing industries lost market share, that is, the proportion of U.S. industry gross output accounted for by the corresponding Minnesota industry. Individual businesses may have lost most, if not all, of their out-of-state sales. Thus, a given business may momentarily shift out of its earlier status as part of the state's economic base. During the post-1985 period, the same business may have regained its market share and become export-producing again. Import substitution thus turns into export expansion as an industry accounts for an increasing share of

U.S. gross output.

Producing for Export Markets

Minnesota's basic industries demonstrate their comparative advantage in US and foreign markets by increasing their domestic and foreign market shares. The comparative advantage may occur because of (1) superior access to product markets and/or production inputs, (2) high productivity of input use among these industries, (3) low input costs, and/or (4) high product quality.

Product markets for Minnesota industries are largely domestic although foreign markets for several Minnesota industries are disproportionately large. Nonetheless, foreign export markets account for less than 14 perent of total exports. To know your "territory" in Minnesota economic terms is know your domestic regional markets, first, for an obvious reason: they are seven to eight times as important in total value of sales as foreign markets. Of course, as Minnesota businesses are squeezed out of their domestic markets by competing businesses in the rest of nation and even foreign imports, then foreign export markets became an alternative avenue of sales expansions, given the currently low value of the US dollar in foreign exchange.

Access to out-of-state markets for Minnesota industry products depends on production and transfer costs per unit of product. If unit costs of the delivered product rise above market price, then export market share is likely to fall for solely price-competitive products. However, if the particular product competes on the basis of price plus service, then export market share may not fall because of superior or essential and difficult to acquire services associated with product sales. The product may, indeed, become a loss leader that attracts clientele for the more profitable service component of a business.

Product and, also, factor markets are differentiated by commodity and the

use of the commodity in production or consumption. Commodity classes correspond with similarly titled industry groups. The market destination of a commodity is differentiated by whether or not it is used in the production of another product. If it is an input in a production process it is an intermediate, rather than a final, product. Primary inputs refer to the services provided by the primary economic units that are re-imbursed in the form of wages, salaries, profits and taxes.

Intermediate Product Markets

An increasing proportion of export-producing industry output is destined for intermediate product markets. Semi-finished manufactured products, for example, are purchased by other manufacturing industries that produce a finished manufactured product, like soap, for personal consumption. Hog slaughtering plants produce hog carcasses that are purchased by sausage manufacturers. The finished products are distributed to retailers and wholesalers. The business services industry similarly produces an intermediate product that is purchased in varying amounts by virtually every industry. Educational services, on the other hand, may be purchased by individual businesses as an input for an in-house employee training program. They may be purchased, also, as a consumptive, rather than a productive, good. They may provide immediate entertainment rather than remuneratively productive skills over many months of classroom attendance and/or on-the-job training.

The importance of intermediate-product markets is easily shown by the distribution of industry shipments to the several local and export markets listed earlier in in Table 6.2. Of the $113 billion in total industry shipments, $35.4 billion, or 31 percent, as shown in Table 6.3, was destined for local intermediate markets while $38.8 billion, or 34 percent, was destined for local final markets. Export markets accounted for about $40

billion, or 35 percent, of the total shipment value. Equivalent employment levels supported by each of the four product markets also differ from the distribution of product values among industries as a result, again, of product mix differences.

Industry-to-industry differences in sales to intermediate markets are marked by varying degrees of functional specialization. The agricultural services, forestry and fisheries group, for example, is almost totally tied to intermediate markets, largely agricultural, while retail trade is almost as much tied to final markets, largely consumer.

Final Product Markets

Domestic and foreign exports of the products of consumer-oriented industries, like retail trade and personal services, can be attributed largely to the purchases of visitors to Minnesota from other states and foreign countries. The Twin Cities Metropolitan Area accounts for most of the out-of-state visitors. For the Northeast and other regions in Greater Minnesota, the Twin Cities Metropolitan Area is also the origin of a majority of their visitors.

Other final product purchases are those of local households, government agencies, and households outside Minnesota. Federal government final purchases in Minnesota are treated as exports while business final purchases are treated the same as local household purchases, except that these purchases are confined to capital goods-producing industries--construction, durable goods manufacturing and related marketing services. Exports of capital goods to businesses outside Minnesota are growing, particularly in the case of fabricated metals, nonelectrical and nonelectrical machinery, and scientific and controlling instruments.

Industry Employment and Staffing Patterns

The output sales and input purchases of Minnesota industries helped support nearly 2.2 million jobs that produced a total industry output of $110 billion and total labor earnings of $35 billion in 1982, as shown in Table 6.4. These earnings were 62 percent of the $56.9 billion of value added by total industry production. Earnings per job ranged from $7.0 thousand in agriculture to $35.8 thousand in mining, while value added per job ranged from $12.5 thousand in retail trade to $74.1 thousand in finance, insurance and real estate and output per job ranged from $20.7 thousand in retail trade to $131.5 thousand in nondurable goods manufacturing. The larger differences in earnings and value added were due, in part, to corresponding differences in capital investment per worker and, in part, to the degree of product standardization and the nature of price competition. Differences in output per worker were due also to differences in the "roundaboutness" of production, as manifested by the large amount of purchased material inputs as well as capital inputs in the total product value.

The staffing pattern for each industry group is represented by its occupational profile, specifically, the distribution of jobs by occupational title in a given industry in Minnesota, as shown in Table 6.5 and Figure 6.1. The industry staffing patterns projected for 1982-2000 period correspond to the US and Minnesota occupational projections prepared by the US Bureau of Labor Statistics and the Minnesota Department of Jobs and Training. The Minnesota occupational distributions have not been adjusted to the latest BLS projection series to 2000 and, hence, they over-estimate some occupational requirements and under-estimate others.

Corresponding US occupational employment projections to 2000 are shown in Table 6.6 and Figures 6.2 and 6.3. With the new breakdown available from the

Table 6.4

Minnesota industry in 1982 generated nearly 2.2 million jobs, over $35.1 billion of total labor earnings, and $110.1 billion of industry output with labor earnings ranging from 11.1 percent to 85.4 percent of the value of industry output in 1982.

Industry	Total Jobs	Total Earnings	Industry Output	Output per Job	Earnings as Proportion of Output	Total Jobs in Specified Industry
	(thou.)	(mil$)	(mil. $)	(thou. $)	(pct.)	(pct.)
Agriculture	132.4	924	8320	62.8	11.1	6.1
Agr. serv. for., fish	15.8	158	185	11.7	85.4	0.7
Mining	11.5	412	836	22.6	49.3	0.5
Construction	90.8	2000	7586	73.9	29.8	4.2
Mgf., nondurable	142.2	3368	18699	131.5	18.0	6.6
Mfg., durables	214.7	5202	15113	70.4	34.4	10.0
Total goods-producing	607.4	12064	50739	83.5	23.8	28.2
Trans., comm., utilities	106.8	2801	8716	81.6	32.1	5.0
Wholesale trade	120.0	2804	6167	51.4	45.5	5.6
Retail trade	377.6	3558	7810	20.7	45.6	17.5
Fin., ins., real estate	150.1	1984	15357	102.3	12.9	7.0
Services	499.3	6877	14171	28.3	47.3	23.2
Government enterprise	26.2	401	918	35.0	50.4	1.2
Other government	266.0	4636	7159	26.9	62.7	12.4
Total services-producing	1545.8	23062	60299	39.0	76.2	71.8
All industry	2153.2	35126	111038	51.6	31.6	100.0

Figure 6.1

White-collar occupations--managerial, professional technical marketing and sales, administrative support, and services--accounted for 71.1 percent of total employment in 1982 and 75.6 percent of the employment growth from 1982 to 1985 and they are projected to account for the 73.1 percent of the total employment in 2000 and 79.5 percent of the employment growth from 1985 to 2000. The largest absolute growth is projected for administrative support and service occupations while the largest percentage growth is projected for marketing and sales occupations.

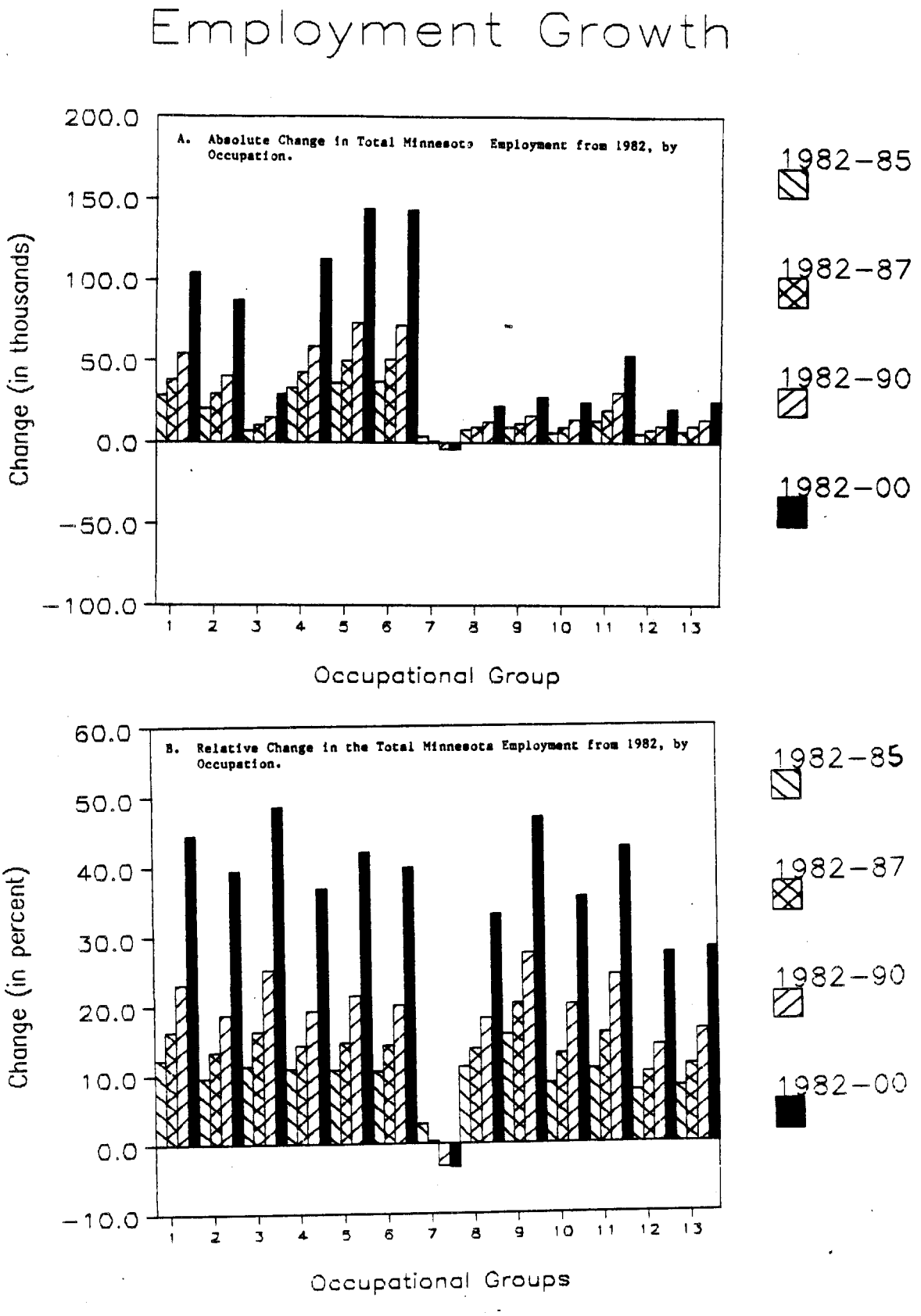


Table 6.5

The distribution of industry jobs by occupation is gradually changing due to changes in industry distribution. Occupational mix is changing, also, because of changing industry staffing patterns and the general business cycle. The largest absolute change occurred in the service occupations in the 1982-85 period. In the 1985-2000 period, the largest absolute change is projected for the administrative support occupations.

No.	Occupation	Estimated 1982	Estimated 1985	Projected 1987	Projected 1990	Projected 2000	Estimated 1982	Estimated 1985	Projected 2000	Annual Change 1982-85	Annual Change 1985-20
		(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)
	Total, all occupatio	2136.6	2352.5	2425.6	2544.6	2924.2	100.0	100.0	100.0	3.3	1.5
	White Collar:										
1	Manager & mgmt-rel o	234.4	262.9	272.3	288.8	338.3	11.0	11.2	11.6	3.9	1.7
2	Professional	219.4	240.2	248.6	260.2	305.9	10.3	10.2	10.5	3.1	1.6
3	Technical occupation	60.9	67.7	70.8	76.2	90.4	2.9	2.9	3.1	3.6	1.9
4	Marketing & sales	305.1	338.3	348.3	363.9	417.1	14.3	14.4	14.3	3.5	1.4
5	Administrative suppo	341.1	377.5	391.1	414.6	484.3	16.0	16.0	16.6	3.4	1.7
6	Service occupations	358.6	396.2	409.4	430.1	501.4	16.8	16.8	17.1	3.4	1.6
	Total white-collar	1519.5	1682.8	1740.5	1833.8	2137.4	71.1	71.5	73.1	3.5	1.6
	Blue Collar:										
7	Agr., fish., forestr	130.9	134.6	131.4	126.9	126.6	6.1	5.7	4.3	.9	- .4
8	Mechanic & repair	68.0	75.5	77.3	80.3	90.4	3.2	3.2	3.1	3.5	1.2
9	Construction trades	59.7	69.1	71.7	76.1	87.7	2.8	2.9	3.0	5.0	1.6
10	Precision production	70.1	76.1	79.2	84.1	95.0	3.3	3.2	3.2	2.8	1.5
11	Machine operation	126.0	139.4	145.9	156.6	179.5	5.9	5.9	6.1	3.4	1.7
12	Transp & mat moving	73.7	79.2	81.2	84.1	93.9	3.4	3.4	3.2	2.4	1.1
13	Helpers & laborers	88.5	95.7	98.5	102.9	113.5	4.1	4.1	3.9	2.6	1.1
	Total blue-collar	617.1	669.7	685.1	710.8	786.6	28.9	28.5	26.9	2.8	1.1

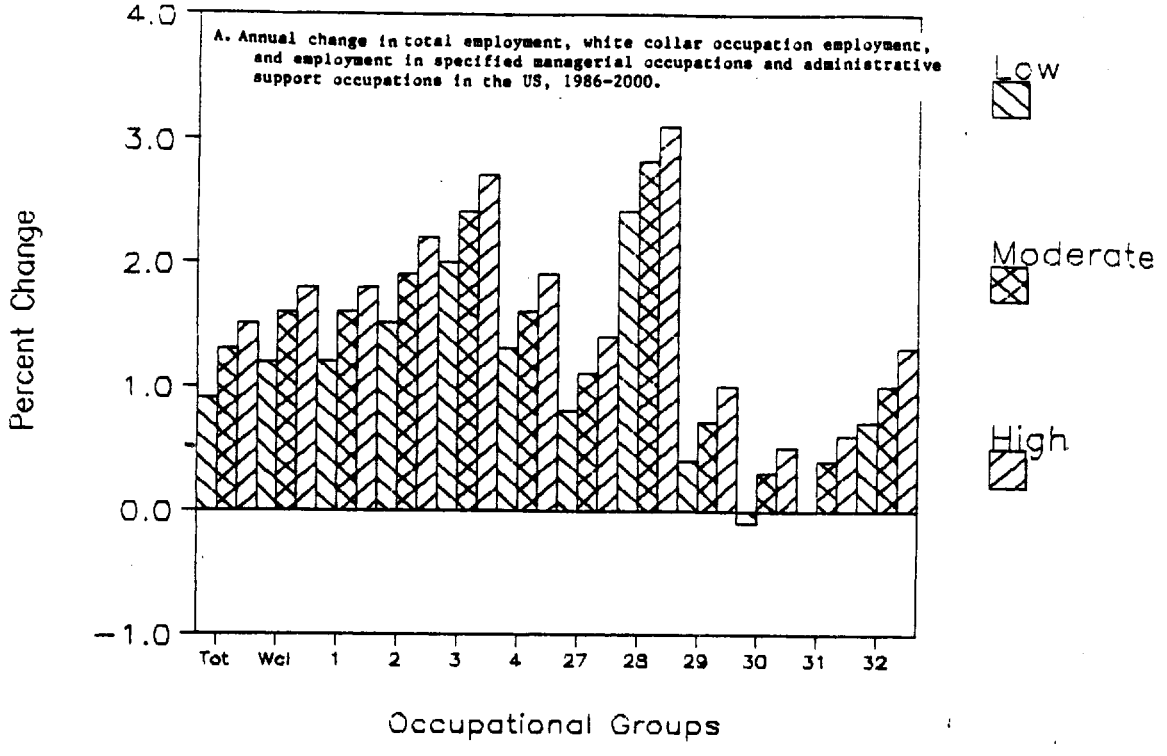
Table 6.6

Civilian employment in the US is projected to increase by 21.4 million the the 16-year period from 1986 to 2000 according to the latest BLS emplomemt growth projections. Managerial and professional occupations account for 30 percent of the increase while technical and administrative support occupations add another 17 percent. Blue-collar jobs, once the mainstay of the Minnesota economy, account for only 10 percent of projected employment growth. Among the 51 occupations, the computer systems analyst, operation research and mathematician group is the fastest growing.

No.	Occupation	Estinated 1986 Total	Estinated 1986 Proportio	Projected 2000 Total	Projected 2000 Proportio	Change 1986-2000 Total	Change 1986-2000 Proportio	Annual Growth
		(thou.)	(pct.)	(thou.)	(pct.)	(thou.)	(pct.)	(pct.)
Tot	Total, all occup	111623	100.0	133030	100.0	21407	100.0	1.3
	White-collar:							
	Manager & mgmt-rel occ	10583	9.5	13616	10.2	3033	14.2	1.8
	Manager & admin occup	7369	6.6	9441	7.1	2072	9.7	1.8
1	Genl mgr & top exec	2383	2.1	2965	2.2	582	2.7	1.6
2	Other managers & administ	4986	4.5	6476	4.9	1490	7.0	1.9
	Mgmt support occup	3214	2.9	4175	3.1	961	4.5	1.9
3	Accountants & auditors	945	.8	1322	1.0	377	1.8	2.4
4	Other management support	2269	2.0	2853	2.1	584	2.7	1.6
	Professional	12800	11.5	16116	12.1	3316	15.5	1.7
	Engineers, architects & s	1567	1.4	2062	1.6	495	2.3	2.0
5	Engineers	1371	1.2	1815	1.4	444	2.1	2.0
6	Architects & surveyors	196	.2	247	.2	51	.2	1.7
	Nat, comp & math scient	738	.7	1077	.8	339	1.6	2.7
7	Comp. sys., op. res., mat	418	.4	702	.5	284	1.3	3.8
8	Life & physical sciences	320	.3	375	.3	55	.3	1.1
	Teachers, lib & couns	4949	4.4	5720	4.3	771	3.6	1.0
9	Teach, preschool, kinderg	1702	1.5	2066	1.6	364	1.7	1.4
10	Teachers, second school	1128	1.0	1280	1.0	152	.7	.9
11	College & univ faculty	754	.7	722	.5	-32	- .1	- .3
12	Other teach & instruc	1097	1.0	1340	1.0	243	1.1	1.4
13	Lib, arch, curators	144	.1	165	.1	21	.1	1.0
14	Counselors	123	.1	148	.1	25	.1	1.3
	Health diag & train	2592	2.3	3674	2.8	1082	5.1	2.5
15	Health diagnosing	933	.8	1266	1.0	333	1.6	2.2
16	Health treating	1659	1.5	2408	1.8	749	3.5	2.7
	Other professional spec	3692	3.3	4660	3.5	968	4.5	1.7
17	Artists, producers	806	.7	1052	.8	246	1.1	1.9
18	Soc. scien., TV, writers	584	.5	771	.6	187	.9	2.0
19	Religious, recreat., soci	958	.9	1152	.9	194	.9	1.3
20	Judges & lawyers	565	.5	765	.6	200	.9	2.2
	Technical occupations	3650	3.3	5053	3.8	1403	6.6	2.4
21	Health tech & technol	1598	1.4	2261	1.7	663	3.1	2.5
22	Eng & science tech	1264	1.1	1549	1.2	285	1.3	1.5
23	Technicians	788	.7	1243	.9	455	2.1	3.3
	Marketing & sales	12606	11.3	16334	12.3	3728	17.4	1.9
24	Cashiers	2165	1.9	2740	2.1	575	2.7	1.7
25	Salespersons, retail	3579	3.2	4780	3.6	1201	5.6	2.1
26	Other sales	6862	6.1	8814	6.6	1952	9.1	1.3
	Admin support occup	19851	17.8	22109	16.6	2258	10.5	.8
27	Adjusters, invest & colle	762	.7	894	.7	132	.6	1.1
28	Computer oper & periphera	309	.3	457	.3	148	.7	2.8
29	Financial records	5093	4.6	5637	4.2	544	2.5	.7
30	Material recording, sched	2173	1.9	2264	1.7	91	.4	.3
31	Secretaries, steno	4414	4.0	4648	3.5	234	1.1	.4
32	Other admin. support	7100	6.4	8209	6.2	1109	5.2	1.0
	Service occupations	17536	15.7	22917	17.2	5381	25.1	1.9
33	Cleaning & bldg svce	3107	2.8	3819	2.9	712	3.3	1.5
34	Food preparation	7104	6.4	9705	7.3	2601	12.2	2.3
35	Health service occupation	1819	1.6	2549	1.9	730	3.4	2.4
36	Personal service occupati	1799	1.6	2259	1.7	460	2.1	1.6
37	Private household workers	981	.9	955	.7	-26	- .1	- .2
38	Protective service occupa	2055	1.8	2700	2.0	645	3.0	2.0
Wcl	Total white-collar	77026	69.0	96145	72.3	19119	89.3	1.6
	Blue-collar employment:							
	Agriculture, for	3556	3.2	3393	2.6	-163	- .8	- .3
39	Farm operators	1336	1.2	1051	.8	-285	-1.3	-1.7
40	Other farm, nursery	1120	1.0	816	.6	-304	-1.4	-2.2
41	Fisheries, forestry	216	.2	235	.2	19	.1	.6
42	Blue-collar work supv	1823	1.6	1967	1.5	144	.7	.5
43	Construction trades	4006	3.6	4710	3.5	704	3.3	1.2
	Mechanics, install, repai	4678	4.2	5365	4.0	687	3.2	1.0
44	Vehicle & mobile equip	1559	1.4	1759	1.3	200	.9	.9
45	Other mechanics	3119	2.8	3606	2.7	487	2.3	1.0
46	Precision prod occupation	3066	2.7	3200	2.4	134	.6	.3
	Machine setters	4964	4.4	4770	3.6	-194	- .9	- .3
47	Metal working	1450	1.3	1381	1.0	-69	- .3	- .3
48	Other machine operators	3514	3.1	3389	2.5	-125	- .6	- .3
49	Assembler & other occup	2701	2.4	2589	1.9	-112	- .5	- .3
50	Transp & mat moving	4789	4.3	5289	4.0	500	2.3	.7
51	Helpers, laborers	4273	3.8	4522	3.4	249	1.2	.4
Bcl	Total blue-collar	34597	31.0	36885	27.7	2288	10.7	.5

Figure 6.2

Projected annual growth in managerial occupation employment generally exceeds total employment growth while administrative support occupation employment lags total employment growth, which is true also for blue-collar occupations.



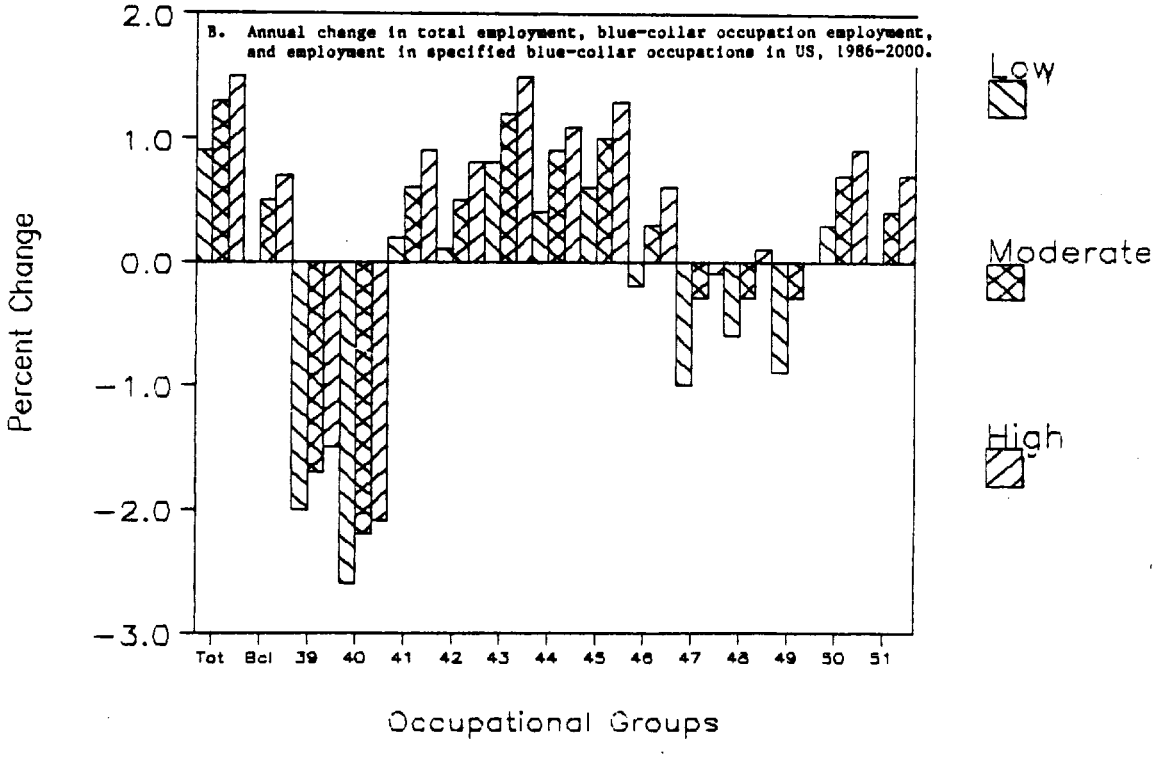
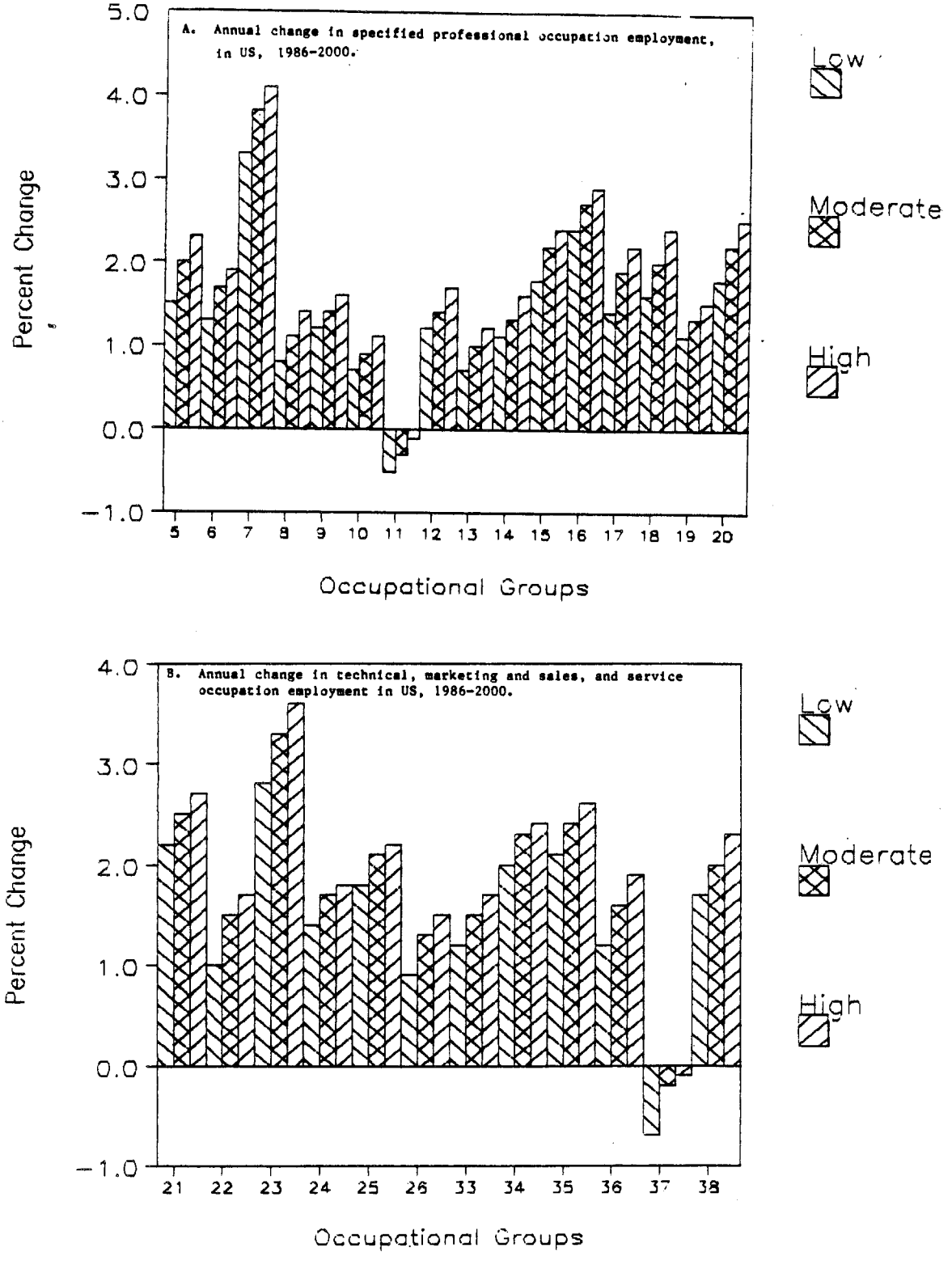


Figure 6.3

Largest relative (percentage) employment growth in the US is projected for the computer system analyst, operation, and mathematician professional occupation groups (7) with annual increases ranging from 3.3 percent to 4.1 percent in the three projection series. Declining employment is projected in two of the three series for college and university faculty (1), private household workers (37), farm operators (39), other farm and nursery workers (40), metal working machinests (47), other machine operators (48), and assemblers and related production workers (49).



BLS employment growth series, the 13 major occupational classes are disaggregated into 51 occupations with white-collar occupations being the large majority. White-collar occupations in the US are projected to increase from 69.0 percent of total employment in 1986 to 72.3 percent in 2000. Their annual growth is projected at 1.6 percent as compared with a 1.3 percent overall growth rate and a 0.5 percent blue-collar occupation growth rate.

Comparison of the occupational mix of the US economy in 1986 and projected 2000 shows an above-average increase in most white-collar occupational classes, the exceptions being selected professional specialties, like college and university faculty, and a variety of technical, marketing and sales, administrative support and service occupations. Blue-collar occupations are consistently projected with below-average growth.

The changing occupation mix is a result of a changing industry mix and differential roles of productivity experiment that results in reduced demand for blue-collar labor. Above-average growth in white-collar occupations can be a curse as well as a blessing, therefore, depending upon the alternate openings available for the displaced workers.

Changing patterns of occupational employment have important implications for both the Minnesota economy and its educational institutions. Job replacement still accounts for most job openings in this decade and the next, as shown in Table 6.7. The 50 largest occupational classes among a total 400 occupational classes with a total employment of more than 25 thousand and the US in 1986 accounts for approximately one-half of all jobs and 71 percent of all new jobs. The odds are 50 percent or better, therefore, that a job seekers next job is among the 50 largest occupational classes.

An alternative view of job access is given by a listing of the 50 fastest-growing occupational classes in Table 6.8. In contast to the 50

Table 6.7

The 50 occupations with the largest employment account for 50 percent of total employment in the US and 71 percent of the projected employment growth. The largest occupational group—retail salespersons—is projected to increase by 1.2 million, from a total employment of 3.6 million in 1986 to a total employment of 4.8 million in 2000.

Occupation	51-occ List	Estimated 1986 Total	Proportio	Total 2000	Change, 1986-2000 Total	Proportio	Relative
		(thou.)	(pct.)	(thou.)	(thou.)	(pct.)	(pct.)
Total,all occup		111623	100.0	133030	21407	100.0	19
Salespersons, retail	25	3579	3.2	4780	1201	5.6	34
Waiters & waitresses	34	1702	1.5	2454	752	3.5	44
Registered nurses	16	1406	1.3	2018	612	2.9	44
Janitors & cleaners	38	2676	2.4	3280	604	2.8	23
Genl mgr & top exec	1	2383	2.1	2965	582	2.7	24
Cashiers	24	2165	1.9	2740	575	2.7	27
Truck drivers, light	50	2211	2.0	2736	525	2.5	24
Other clerical	32	3732	3.3	4206	475	2.2	13
General office clerks	29	2361	2.1	2824	462	2.2	20
Food counter	34	1500	1.3	1949	449	2.1	30
Nursing aides	35	1312	1.2	1750	437	2.0	33
Nursing aides, orderlies	35	1224	1.1	1658	433	2.0	35
Secretaries	31	3234	2.9	3658	424	2.0	13
Guards	38	794	.7	1177	383	1.8	48
Accountants & auditors	3	945	.8	1322	376	1.8	40
Cooks, exc short order	34	1023	.9	1378	355	1.7	35
Computer programmers	23	479	.4	813	335	1.6	70
Food preparation workers	34	949	.9	1273	324	1.5	34
Receptionists	32	682	.6	964	282	1.3	41
Comp syst analysts, elec data	7	331	.3	582	251	1.2	76
Eng. tech	22	689	.6	933	245	1.1	35
Other teach & instruc	12	1097	1.0	1340	243	1.1	22
Cooks, restaurant	34	520	.5	759	240	1.1	46
Licensed practical nurses	21	631	.6	869	238	1.1	38
Gardners & grounds	40	767	.7	1005	238	1.1	31
Maintenance repair	43	1039	.9	1270	232	1.1	22
Stock clerks	25	1087	1.0	1312	225	1.1	21
First-line supv	32	956	.9	1161	205	1.0	21
Vehicle & mobile equip	44	1559	1.4	1759	200	.9	13
Dining room & cafe att	34	433	.4	631	197	.9	46
Elect & electron eng	5	401	.4	592	192	.9	48
Lawyers	20	527	.5	718	191	.9	36
Physicians and surgeons	15	491	.4	679	188	.9	38
Cooks, short order	34	591	.5	775	184	.9	31
Carpenters	43	1010	.9	1192	182	.9	18
Real estate agents	24	376	.3	542	166	.8	44
Other mech, install	45	931	.8	1095	164	.8	18
Bartenders	34	396	.4	553	157	.7	40
Food Svce & lodg mgr	2	509	.5	663	154	.7	30
Financial Manager	2	638	.6	792	154	.7	24
Teachers, second school	10	1128	1.0	1280	152	.7	13
Computer oper & peripheral equ	28	309	.3	457	148	.7	48
Electrical & elec tech	22	313	.3	459	145	.7	46
Blue-collar work supv	42	1823	1.6	1967	144	.7	8
Social welfare service	36	197	.2	336	139	.6	71
Sales agents, real estate	24	313	.3	451	138	.6	44
Adjusters, invest & collec	27	762	.7	894	132	.6	17
Teacher aides & educ	31	648	.6	773	125	.6	19
Computer operators	28	263	.2	387	124	.6	47
Social workers	19	363	.3	485	120	.6	33
Total, 50 largest		55457	49.7	70656	15199	71.0	27

Table 6.8

The 50 fastest-growing occupations in the US range from paralegel personnel, - which is projected to grow by 104 percent in the 16-year period from 1986 to 2000, to property and real estate managers, which is projected with 39 percent growth. In total, thes 50 occupations accounted for 11.2 percent of total employment in 1986 and 28.8 percent of the projected growth in employment from 1986 to 2000.

Occupation	51-occ Code	Estimated 1986 Total	Estimated 1986 Proportio	Total 2000	Change, 1986-2000 Total	Change, 1986-2000 Proportio	Change, 1986-2000 Relative
		(thou.)	(pct.)	(thou.)	(thou.)	(pct.)	(pct.)
Total,all occup		111623	100.0	133030	21407	100.0	19
Paralegal personnel	23	61	.1	125	64	.3	104
Medical assistants	35	132	.1	251	119	.6	90
Physical therapists	16	61	.1	115	53	.2	87
Physical & corr therapy	35	36	.0	65	29	.1	82
Data process equip	45	69	.1	125	56	.3	80
Home health aides	36	138	.1	249	111	.5	80
Comp syst analysts, elec data	7	331	.3	582	251	1.2	76
Medical records tech	21	40	.0	70	30	.1	75
Social welfare service	36	197	.2	336	139	.6	71
Empl interview, priv or pub	3	75	.1	129	54	.3	71
Computer programmers	23	479	.4	813	335	1.6	70
Radiologic tech	21	115	.1	190	75	.4	65
Dental hygenists	21	87	.1	141	54	.3	63
Legal assist & tech	23	170	.2	272	102	.5	60
Physician asst	15	26	.0	41	15	.1	57
Dental assistants	35	155	.1	244	88	.4	57
Operations & syst resear	7	38	.0	59	21	.1	54
Occupational therapists	16	29	.0	45	15	.1	52
Data entry keyers, comp	32	29	.0	43	15	.1	51
Peripheral elec data process	28	46	.0	70	24	.1	51
Optometrists	15	37	.0	55	18	.1	49
Recreational therapists	16	29	.0	43	14	.1	49
Social welfare service aides	36	59	.1	88	29	.1	49
Guards	38	794	.7	1177	383	1.8	48
Computer oper & peripheral equ	28	309	.3	457	148	.7	48
Elect & electron eng	5	401	.4	592	192	.9	48
Computer operators	28	263	.2	387	124	.6	47
Dining room & cafe att	34	433	.4	631	197	.9	46
Cooks, restaurant	34	520	.5	759	240	1.1	46
Electrical & elec tech	22	313	.3	459	145	.7	46
Travel agents	26	105	.1	154	49	.2	46
Opticians, disp & meas	21	50	.0	72	23	.1	46
Veterinarians & vet inspec	15	37	.0	54	17	.1	46
Brokers, real estate	24	63	.1	91	28	.1	45
Intervieuing clerks	32	104	.1	150	46	.2	45
Waiters & waitresses	34	1702	1.5	2454	752	3.5	44
Sales agents, real estate	24	313	.3	451	138	.6	44
Registered nurses	16	1406	1.3	2018	612	2.9	44
Real estate agents	24	376	.3	542	166	.8	44
Hotel desk clerks	32	109	.1	156	47	.2	43
Bakers	34	114	.1	162	48	.2	42
Hosts & hostesses	34	172	.2	245	73	.3	42
Securities & financial svcs	26	197	.2	279	82	.4	42
Receptionists	32	682	.6	964	282	1.3	41
Real estate appraisers	26	36	.0	51	15	.1	41
Office mach & cash reg	43	56	.1	78	22	.1	40
Public rel spec	18	87	.1	122	35	.2	40
Accountants & auditors	3	945	.8	1322	376	1.8	40
Bartenders	34	396	.4	553	157	.7	40
Property & real est	2	128	.1	178	50	.2	39
Total, 50 fastest-growing		12550	11.2	18709	6158	28.8	49

largest occupational classes, the 50 fastest-growing occupational classes account for slightly more than 11 percent of actual employment in 1986, but nearly 29 percent of the projected employment growth. Individual occupation employment growth ranges from 104 percent for paralegal personnel to 39 percent for property and real estate managers. Overall growth is projected at seventy of the 50 fastest-growing occupations are included among the 50 largest occupations.

The 50 largest and the 50 fastest-growing occupations are included largely in three occupational groups that are common the both the US and the Minnesota data series, namely managerial professional technical, administrative support, sales and services. The two 50-occupation series relate to the 13-occupation Minnesota and 57-occupation US series as follow:

Occupational Class	Largest Growth	Fastest Growing
Managerial, total	(4)	(3)
1. General managers and top executives	1	0
2. Other managers & administrators	2	1
3. Accountants & auditors	1	2
4. Other management support	0	0
Professional, total	(8)	(12)
5. Engineers	1	1
7. Comp. sys., op.res., math	1	2
10. Teachers, second school	1	0
12. Other teachers & instruc	1	0
15. Health diagnosing	1	4
16. Health treating	1	4
18. Soc.scient., TV, writers	0	1
19. Religious, recreat., social	1	0
20. Judges & lawyers	1	0
Technical, total	(4)	(8)
21. Health technicians & technical	1	4
22. Eng. & science tech.	2	1
23. Other technicians	1	3
Marketing and sales, total	(5)	(3)
24. Cashiers	3	3
26. Other sales	2	0
Administrative support, total	(9)	(10)
27. Computer operations & peripherals	1	0
28. Computer Operator & peripherals	2	3
29. Financial records	1	0
31. Secrtaries, steno	2	0
32. Other adm. support	3	4

Service occupations, total	(13)	(13)
33. Cleaning & building	0	0
34. Food preparation	8	6
35. Health service	2	3
36. Personal service	1	3
38. Protection service	2	1
Agr., for., fish., total	(1)	(0)
40. Other farm, nursery	1	0
42. Blue-collar supervisors	1	0
43. Construction trades	1	0
Mechanics, instal, repair	(3)	(1)
44. Vehicle & mobile equip	1	0
45. Other mechanics	2	1
Total	50	50

Although projected employment growth is concentrated in six white-collar occupational groups, a wide range and vaiety of skills and job performance requirements are associated with the 50 largest and the 50 fastest-growing occupational classes. In Minnesota, the shift from farming and mining to manufacturing has been accompanied by an above-average shift, also, from blue-collar to white-collar occupations, particularly in the managerial, professional and technical occupational classifications.

Income Payments and Expenditures of Decision Units

Expenditures of economic decision units are categorized, first, by process, that is, whether or not they are intermediate or final, and, finally, by decision unit--household, business and government. Intermediate purchases are represented by interindustry transactions, as shown in Table 6.9. Existence of intermediate purchases contributes to the short-term multiplier effect of changes in any industry sales and employment. The larger the intermediate input purchases, the larger is the short-term output multiplier.

Income payments received by households, businesses and governments are derived from value added by economic activity. Thus, income payments represent the renumeration for the use of primary inputs--labor, capital and

Table 6.9

Total industry disbursements to other industries in Minnesota and purchases from other industries in Minnesota were $34.6 in 1982 and total income payments to primary resources owners—labor, capital, and entrepreneurship was $34.6 billion. Purchases of goods and services from outside Minnesota totaled to $10.3 billion.

	Goods-producing						Services-producing									
		Ag. ser.,			Manufacturing		Tran.,	Trade		Fin.,						
Industry	Farm	for., fish	Mining	Const-ruction	Non-durables	Dur-ables	comm., util.	Whole-sale	Re-tail	ins., real est.	Private service	Govt. enter.	Noncom. imports	Other sectors	scrap	Sub-total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)
1. Farm	1363	3	0	0	2871	0	0	0	19	0	11	0	0	0	0	4369
2. Agr. serv.,for.,fish	69	1	0	8	1	13	0	5	1	20	2	0	0	0	0	120
3. Mining	5	0	3	33	6	15	0	0	0	0	0	0	0	0	0	62
4. Construction	90	3	12	11	123	113	286	44	59	441	221	110	0	0	0	1512
5. Mfg., nondur	602	6	23	206	2173	255	381	81	584	66	386	16	0	0	0	4759
6. Mfg., durables	61	1	26	519	248	1408	38	25	20	13	209	4	0	0	0	2568
Total goods-prod.	2190	14	59	777	5522	1804	705	155	683	540	829	130	0	0	0	13390
7. Tran, comm.,util.	238	6	123	195	839	573	1203	318	290	238	648	130	0	0	0	4802
8. Wholesale trade	360	9	32	386	875	773	95	95	212	25	296	6	0	0	0	3165
9. Retail trade	32	3	9	317	122	145	99	240	46	105	285	9	0	0	0	1319
10. Fin., ins., real est.	652	7	20	91	208	262	159	226	448	2012	846	19	0	0	0	4948
11. Pvt. services	140	7	37	396	651	568	326	587	806	817	1235	26	0	0	0	5197
12. Govt. enter.	1	1	2	5	62	27	14	23	30	89	75	3	0	0	0	331
Total services-prod	1423	34	224	1389	2758	2351	1876	1688	1632	3086	3366	191	0	0	0	19835
13. Non comp. imp.	0	0	1	0	1153	40	916	10	2	10	11	9	0	0	0	2153
14. Other sectors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. Scrap, used	0	0	0	010	11	1	0	0	0	0	0	0	0	0	0	22
Total serv.-sr. esc. imp. & scrap	1423	34	224	1389	2758	2351	1876	1688	1632	3086	3366	191	0	0	0	19835
16. Subtotal	3613	48	284	2166	9443	4206	3498	1853	2317	3636	4206	330	0	0	0	35400
17. Value added	2606	108	319	2961	4596	6426	4112	4107	4785	1113	8297	562	0	7159	0	57115
18. Domestic imports	2030	27	203	2343	5049	3981	1773	390	673	580	1554	60	0	0	0	18664
19. Foreign imports	71	2	30	115	763	542	248	26	56	19	125	11	0	0	0	2010
All purchases	8320	185	835	7586	835	7586	18699	15115	8710	15359	14171	918	0	7159	0	111038

entrepreneurship--in the production of various goods and services.

Value added categories include employee compensation, direct taxes, proprietorial income, and other value added, as shown in Table 6.10. Interindustry comparisons of value added components reveal large differences that are attributed to corresponding differences in capital utilization and market performance. Total income payments allocated to capital and entreprenuership range from $7 billion in the finance, insurance, and real estate industry group to -$46 million in mining.

Large industry differences occur also, in levels of employee compensation. This component of industry value added includes wage and salary payments and employer contributions to social insurance. The personal income of the self-employed work force is included in property-type income. Industry-to-industry differences in employee compensation per worker are attribtued to corresponding differences in staffing patterns together with occupational and size-of-business differences in wage and salary paymetns per worker.

Occupational differences in annual earnings per worker based largely on 1970-80 levels are summarized in Table 6.11. In 1982, average earnings ranged from 46.6 thousand in service occupations $27.0 thousand in managerial and management-related occupations. The low level of earnings was 59 percent below the overall average of $16.1 thousand while the high level of earnings was 67.6 percent above the overall average. Annual rates of change in real earnings generally were projected above their actual levels in the 1982-85 period. Growth in blue-collar earnings is generally larger than the white-collar earnings. The differential growth is attributed to the typically higher investment and higher productivity per worker in blue-collar jobs.

Final purchases equal total value added, plus imports, as shown in Table 6.12. Domestic exports exceeded foreign imports in 1982 by more than $13

Table 6.10

The total value added by Minnesota private industry of $57.1 billion in 1982 originated largely from the employee compensation received by households and the income of self employed workers. Durable goods manufacturing and private services were the two largest value added sources among the 15 industry intermediate market groups.

Purchasing Industry	Total Value Added	Employee Compen-sation	Indirect Business Taxes	Property Income	Other Income
	(mil.$)	(mil.$)	(mil.$)	(mil.$)	mil.$)
1. Farm	2606	437	148	1426	596
2. Agr. serv., for., fish.	108	70	4	11	23
3. Mining	319	286	59	-85	39
4. Construction	2961	2626	86	147	102
5. Mfg., nondurables	4596	2988	214	13	1381
6. Mgf., durables	6426	5032	163	13	1218
Total goods-producing	17016	11439	674	1525	3359
7. Tran., comm., util.	4112	2288	339	64	1421
8. Wholesale trade	41109	2541	763	115	688
9. Retail trade	4765	3138	859	221	548
10. Fin., ins., real estate	1113	2141	1928	-52	7114
11. Private services	8297	5773	138	881	1505
12. Government enterprise	526	551	0	0	-25
13. Noncomparable imports	0	0	0	0	0
14. Other sectors	7159	6296	0	0	883
15. Scrap, used & second	0	0	0	0	0
Total services-producing	40099	22728	4027	1249	12114
All sectors industry	57115	34167	4701	2774	15473

Table 6.11

Average earnings per worker in 1982 ranged from $27 thousand to $6.6 thousand or from 67.6 percent above to 59 percent below the all occupation average of $16.1 thousand. Annual rates of change ranged from -0.5 percent to 4.9 percent in the 1982-85 period. They are projected to range from 0.9 percent to 2.9 percent in the period from 1985 to 2000.

No.	Occupation	Estimated 1982	Estimated 1985	Projected 1987	Projected 1990	Projected 2000	Estimated 1982	Estimated 1985	Projected 2000	Annual Change 1982-85	Annual Change 1985-20
		(thou.$)	(thou.$)	(thou.$)	(thou.$)	(thou.$)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)
	Total, all occupatio	16.1	18.5	19.2	20.3	22.3	.0	.0	.0	.6	1.3
	White Collar:										
1	Manager & mgmt-rel o	27.0	30.7	31.7	33.2	36.3	67.6	66.4	62.6	.4	1.1
2	Professional	23.7	27.1	28.0	29.7	33.1	47.1	46.7	48.4	.5	1.4
3	Technical occupation	21.6	25.1	25.8	27.0	29.9	34.0	35.8	33.8	1.1	1.2
4	Marketing & sales	13.2	15.1	15.5	16.1	17.5	-18.4	-18.2	-21.8	.7	1.0
5	Administrative suppo	12.5	14.2	14.7	15.4	16.8	-22.8	-22.9	-24.6	.5	1.1
6	Service occupations	6.6	7.5	7.7	8.1	9.0	-59.0	-59.3	-59.9	.4	1.2
	Total white-collar	15.5	17.7	18.2	19.1	21.1	-4.1	-4.3	-5.6	.6	1.2
	Blue Collar:										
7	Agr., fish., forestr	6.8	8.9	10.5	13.4	13.6	-57.7	-52.0	-39.1	4.9	2.9
8	Mechanic & repair	22.7	25.7	26.6	28.1	31.2	40.7	39.1	39.5	.2	1.3
9	Construction trades	24.7	27.3	28.1	29.3	31.4	53.1	47.9	40.7	- .5	.9
10	Precision production	26.1	29.6	30.6	32.3	36.2	61.6	60.4	62.3	.3	1.4
11	Machine operation	18.4	20.9	21.6	22.8	25.7	14.0	13.0	15.0	.3	1.4
12	Transp & mat moving	22.8	25.5	26.2	27.5	30.0	41.5	38.0	34.4	- .2	1.1
13	Helpers & laborers	13.9	15.6	16.1	16.8	18.3	-13.7	-15.4	-17.9	- .1	1.1
	Total blue-collar	17.8	20.4	21.5	23.2	25.7	10.2	10.7	15.3	.8	1.6

Table 6.12

The $52.3 billion of total final purchases of Minnesota households, businesses and governments in 1982 originated largely from local businesses with the goods-producing and the services-producing sector accounting for $10.8 billion and $27.5 billion, respectively, and imports accounting for $14 billion.

Final Demand Sector	Total Final Purchases	Manufac-turing	Other Goods Producing	Trade	Fin., Insur., Real est.	Private Services	Other Services Producing	Imports Dom-estic	Imports For-eign
	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)	(mil.$)
1. PCE, Low	5075	504	18	1022	895	108	435	1082	38
2. PCE, Medium	18710	1827	58	4011	3713	3427	1296	4242	136
3. PCE, High	13122	1054	33	2743	303	2386	878	2905	92
4. State & Local Sales	-226	-2	-13	-124	-0	-87	-0	-0	-0
5. State & Local Education	2048	447	189	27	68	233	273	809	2
6. State & Local Non-educ.	3265	202	1146	32	122	949	75	739	0
7. Federal Sales	-21	-5	-3	-0	-2	-0	-11	-0	-0
8. Fed. Purchases, Non-mil.	842	69	163	8	16	63	291	157	73
9. Fed. Purchases, Military	1713	358	42	9	1	81	79	1130	13
10. CCC Purchases	0	0	0	0	0	0	0	0	0
11. Inventory Sales	-468	-200	-67	-29	-0	-0	-0	-0	-0
12. Inventory Purchases	120	4	16	0	0	0	0	100	0
13. Capital Formation	8128	1285	3770	461	104	72	0	2452	5
14. Total Final Demand	52309	5519	5352	8160	7948	8205	3316	13616	359

billion emphasizing again the much larger importance of domestic trade than foreign trade in Minnesota's economic base.

Industry Growth and Trade Strategy

Because of the overwhelming importance of domestic compared to foreign exports in Minnesota's economic future, the state of the US economy is the single most important factor affecting Minnesota's economic growth to 2000. Foreign markets enter the market expansion equation, of course, when the foreign exchange value of the US dollar is low as it is now. Even then, as foreign export expansion strategies are implemented by exporting firms, foreign imports increase until import substitution takes place because of increases in domestic production for domestic export. Minnesota industry output, labor earnings and employment are therefore critically dependent, not only on the economic health of Minnesota's principal trading partners abroad, but also on its domestic markets .

Industry Output, Labor Earnings and Employment

As shown in Table 6.13, Minnesota industry output is expected to increase from $104.6 billion in 1982 to $198.4 billion (in 1982 dollars) in 2000--a near-doubling of total industry sales. Since Minnesota's total population and its total purchasing power is expected to grow at slightly less than the US rate, above-average growth in out-of-state commodity shipments is implied.

Associated with the near doubling of industry sales in a projected 72 percent increase in total real earnings, that is, from $35.0 billion in 1982 to $60.2 billion (in 1982 dollars) in 2000. Thus, total labor earnings would decline from 33.5 percent of the total output value in 1982 to 30.4 percent in 2000. Income payments to the owners of capital and entrepreneurship would increase at the expense of income payments for labor services, indicating

Table 6.13

Gross Minnesota industry output was valued at $104.6 billion (in 1982 dollars) in 2000. Manufacturing accounts for $48.1 billion, or 51.3 percent of the total $93.9 billion increase. Meanwhile, total earnings are projected to grow from 35.0 billion in current dollars in 1982, to $67.7 billion in 1985 dollars in 2000 and REIS employment is projected to increase from slightly over 5.1 million to slightly over 2.9 million BLS employment, which was nearly 100 thousand less than REIS employment in 1982, is projected to increase from 2.0 million to nearly 2.8 million.

		1982			1985				2000			
No.	Industry Title	Gross Output	Total Earning	REIS Employ	BLS Employ	Gross Output	Total Earning	REIS Employ	BLS Employ	Gross Output	Total Earning	REIS Employ	BLS Employ
		(bil.$)	(bil.$)	(thou.)	(thou.)	(bil$)	(bil.$)	(thou.)	(thou.)	(bil.$)	(bil.$)	(thou.)	(thou.)
1	Agriculture	7657	1082	148.2	134.9	9472	1430	154.1	140.3	13572	1555	148.9	135.5
2	Mining	1654	412	11.5	10.5	1622	349	9.3	8.5	2440	628	12.3	11.3
3	Construction	4708	2000	90.8	78.5	6225	2665	108.1	93.5	8269	4014	138.9	120.1
	Manufacturing, total	35213	8570	356.9	354.3	42931	10692	389.0	386.5	83344	17537	502.2	499.4
	Mfg. nondurables	18893	3368	142.2	142.7	21103	4072	154.4	155.0	33229	5902	177.8	178.7
4	Food products	8664	1078	46.6	47.1	8842	1134	44.7	45.1	11438	1351	41.9	42.3
5	Textile & apparel	275	82	6.1	5.3	307	80	6.3	5.4	470	109	6.1	5.3
6	Paper products	3923	1003	31.3	31.5	4445	1259	33.6	33.8	7432	1696	36.4	36.6
7	Printing & publishing	2368	724	37.3	38.0	2956	962	45.7	46.6	5371	1609	61.4	62.5
8	Petroleum & chemical	2844	254	9.1	9.1	3464	330	10.3	10.2	6163	551	11.6	11.5
9	Rubber & leather	820	228	11.7	11.7	1090	307	13.9	13.9	2355	587	20.4	20.5
	Mfg durables	16320	5201	214.7	211.7	21828	6620	234.6	231.5	50115	11635	324.3	320.6
10	Wood prod & furniture	1013	314	16.3	15.7	1241	451	19.9	19.1	2263	653	25.6	24.5
11	Stone, clay, glass	650	184	9.5	8.3	736	212	9.5	8.3	1384	392	12.9	11.3
12	Primary metal products	576	147	5.6	5.6	772	182	6.3	6.2	1215	295	7.2	7.2
13	Fabricated metal products	2859	892	34.1	34.5	3326	1082	36.5	36.9	6987	1988	52.5	53.1
14	Nonelectrical machinery	6453	2188	82.6	82.5	9739	2844	91.1	91.0	24828	4882	126.4	126.2
15	Electrical machinery	1755	558	26.2	26.3	2087	678	28.0	28.1	4199	1048	32.3	32.4
16	Transportation equipment	968	147	5.5	5.6	1647	240	7.6	7.6	3285	388	9.9	9.8
17	Instruments & miscellaneo	2045	772	34.7	33.2	2281	931	35.8	34.4	5955	1989	57.6	56.2
	Total goods producing	49232	12064	607.3	578.3	60251	15137	660.5	628.7	107625	23735	802.2	766.3
18	Trans. comm. utilities	8861	2801	106.8	101.1	9278	3386	113.6	107.5	14842	5158	136.8	129.4
19	Wholesale trade	6433	2804	119.9	119.5	7469	3289	124.3	123.9	10803	4516	149.2	148.6
20	Eating & drinking places	2928	701	112.1	111.0	3099	870	125.5	123.8	4041	1344	158.7	171.1
21	Other retail trade	5767	2857	265.5	241.3	6602	3488	284.2	259.3	10580	4927	364.2	337.5
22	Fin. ins. real estate	8339	1984	150.1	112.3	9744	2863	175.9	131.6	13932	4512	224.1	167.6
	Private services	16081	6877	499.3	496.2	18346	9209	578.5	568.9	27919	15928	799.9	772.7
23	Personal & repair	4381	1206	138.7	148.9	5080	1668	162.9	172.7	7037	2812	206.0	211.1
24	Business services	2227	1001	75.3	65.0	2861	1624	105.5	91.0	4391	3466	155.5	134.1
25	Health care services	4940	2464	143.5	143.5	5219	3085	149.1	149.0	8048	5061	213.4	213.3
26	Legal & misc prof service	2516	1002	30.0	34.7	3081	1389	60.5	42.0	4903	2082	94.0	65.3
27	Educational services	539	322	24.3	30.1	625	371	27.4	34.0	921	646	35.7	44.3
28	Social, mus., member orga	1478	882	67.5	74.1	1680	1072	73.1	80.2	2619	1860	95.4	104.6
	Government, civilian	6912	4954	276.6	275.4	7347	6070	291.1	289.8	8677	7576	301.2	300.0
29	Federal civilian	1567	729	30.8	28.6	1668	868	31.7	29.5	1949	1100	32.0	29.7
30	State & local	5344	4225	245.9	246.8	5679	5203	259.4	260.4	6728	6476	269.2	270.3
	Total services producing	55321	22979	1530.3	1456.7	62085	29176	1693.1	1604.8	90795	43961	2134.1	2027.0
	Total civilian	104553	35043	2137.7	2035.0	122336	44313	2353.6	2233.6	198420	67696	2936.3	2793.2
31	Federal military	179	83	15.6	15.6	214	114	17.7	17.7	230	123	16.6	16.6

again, the increasing capital intensification of the Minnesota economy.

Two measures of industry employment are reported--REIS (US Regional Economic Information System series) and BLS (US Bureau of Labor Statistics) series. The REIS series are identical to the employment series report earlier in the fifth of the Staff Papers on Education and the Economy.

The Minnesota BLS series are used in the most recent BLS industry projections to 2000. The two series differed by approximately by 100 thousand in 1982 and they are projected to differ by 143 thousand in 2000 (because of differences in accounting for self-employed and/or part-time workers).

According to the REIS employment series, total industry employment is projected to increase from slightly more than 2.1 million in 1982 to almost 2.8 million in 2000--an increase of 655.5 thousand jobs, which reduces to a weekly increase of 700 jobs in the 18-year period. A majority of the new jobs are attributed to the growth of the export-producing manufacturing industries. For the manufacturing industries, total sales are projected to increase from $35.2 billion in 1982 to $83.3 billion (in 1982 dollars) in 2000--an increase of $48.1 billion, or 137 percent in the 18-year period. Total labor earnings in the manufacturing industries are projected to increase from $8.2 billion in 1982 to $15.2 billion (in 1982 dollars) in 2000--an increase of $7.0 billion or 81 percent over the base-year value. Corresponding REIS employment totals could increase, but at a lower rate than sales and earnings, specifically, from 356.9 thousand to 502.2 thousand, which is a 40.7 percent increase. Nontheless, the growth in manufacturing would account for above-average shares of total growth in each of three variables, as follows:

Indicator	Manufg	Total	Proportion
Gross Output (mil. 1982$)	48131	93867	57.4
Labor Earnings (mil. 1982$)	7032	25185	27.9
REIS Employment (thou.)	145.3	789.6	18.2

Because of manufacturing's importance in the states' economic base a large proportion of the indirect activity is attributed to manufacturing, which thus enhances its importance beyond the direct impact measures of industry output, labor earnings and employment.

Each of the industry indicators listed earlier are presented as ratios in Table 6.14. Output per hour, for example, is the ratio of total industry output to total hours worked while output per employee is the ratio of total industry output to total BLS employment. Total FTE (full-time equivalent) employment is the ratio of total hours worked to total full-time equivant hours owrked by year per employee. Thus, the FTE employment series is the third and the lowest in value of the three employment series presented in this report.

The value of industry output per hour among Minnesota's urban industries ranged from $148.3 in the petroleum industry to $10.40 per hour in educational services. These values are expected to increase to $253.50 and $12.30, respectively, by 2000 because of improvements in total factor productivity. The larger physical capital investment per worker in the petroleum industry is associated with the larger increase in output value due solely to factor productivity improvement. Earnings per hour are projected to increase, also, which in the 1925-2000 period correlate, in part, with improvements in labor productivity.

Annual rates of change in selected industry indicators are presented in Table 6.15. Civilian industry output, for example, increased at 5.4 percent annual rate in the 1982-85 period. It is projected to increase at a 3.3 percent rate in current dollars over the 1985-2000 period. Total labor earnings, which increased at a 4.0 percent annual rate, or a -3.1 percent

Table 6.14

Civilian output per hour—a measure of total industry productivity—ranges from $148.30 in the petroleum and chemicals industry group to $10.40 in educational services. Goods-producing industry productivity overall is twice the services-producing industry productivity in Minnesota. However, labor earnings per hour differ much less which indicates the much larger use of labor than capital in the services-producing industries. The contrast in total productivity between goods-producing and services-producing industries is even greater on a per employee basis because of the lesser hours worked per employee in the services-producing industries.

No. Industry	1982 Output per Hr	1982 Earn per Hr	1982 Output per Emp	1982 FTE Employ	1985 Output per Hr	1985 Earn per Hr	1985 Output per Emp	1985 FTE Employ	2000 Output per Hr	2000 Earn per Hr	2000 Output per Emp	2000 FTE Employ
	(dol.)	(dol.)	(thou.$)	(thou.)	(dol.)	(dol.)	(thou.$)	(thou.)	(dol.)	(dol.)	(thou.$)	(thou.)
1 Agriculture	25.2	3.6	56.8	146.0	30.2	4.6	67.5	151.0	44.9	4.6	100.1	145.3
2 Mining	72.2	18.0	157.0	11.0	86.2	18.6	190.0	9.0	98.7	22.6	216.8	11.9
3 Construction	30.5	12.9	60.0	74.3	33.1	14.2	66.6	90.5	34.4	14.8	68.8	115.7
Manufacturing, total	48.5	11.8	99.4	349.3	52.9	13.2	111.1	390.4	79.8	14.9	166.9	501.9
Mfg. nondurables	64.7	11.5	132.4	140.5	65.5	12.6	136.2	155.0	90.0	14.2	185.9	177.5
4 Food products	89.6	11.2	183.8	46.5	94.8	12.2	196.0	44.8	131.7	13.8	270.2	41.8
5 Textile & apparel	27.5	8.2	52.1	4.8	28.8	7.5	56.9	5.1	45.1	9.3	88.9	5.0
6 Paper products	58.3	14.9	124.6	32.3	59.9	17.0	131.6	35.7	93.2	18.9	203.2	38.3
7 Printing & publishing	31.4	9.6	62.3	36.3	31.6	10.3	63.5	45.0	43.0	11.4	85.9	60.1
8 Petroleum & chemical	148.3	13.2	312.2	9.2	159.6	15.2	339.0	10.4	253.5	20.1	533.9	11.7
9 Rubber & leather	34.7	9.7	70.3	11.4	37.5	10.6	78.4	14.0	55.1	12.2	115.0	20.5
Mfg durables	37.6	12.0	77.1	208.8	44.6	13.5	94.3	235.4	74.3	15.3	156.3	324.4
10 Wood prod & furniture	32.4	10.0	64.6	15.0	31.3	11.4	64.8	19.1	44.8	11.5	92.4	24.3
11 Stone, clay, glass	37.6	10.6	78.1	8.3	41.1	11.9	88.5	8.6	57.2	14.4	122.9	11.6
12 Primary metal products	51.2	13.1	103.5	5.4	58.3	13.8	124.4	6.4	79.5	17.2	169.4	7.3
13 Fabricated metal products	40.5	12.6	82.9	33.9	42.4	13.8	90.2	37.7	62.1	15.7	131.6	54.1
14 Nonelectrical machinery	37.9	12.9	78.2	81.8	50.4	14.7	107.1	92.8	93.1	16.3	196.8	128.3
15 Electrical machinery	32.5	10.3	66.6	26.0	35.5	11.5	74.3	28.2	62.1	13.8	129.5	32.5
16 Transportation equipment	83.4	12.7	174.4	5.6	99.5	14.5	217.9	8.0	155.8	16.4	334.0	10.1
17 Instruments & miscellaneo	29.9	11.3	61.6	32.8	31.7	12.9	66.4	34.6	50.9	15.1	106.0	56.2
Total goods producing	40.8	10.0	85.1	380.6	45.2	11.4	95.8	641.0	66.8	13.1	140.5	774.8
18 Trans. comm. utilities	42.8	13.5	87.7	99.6	41.6	15.2	86.3	107.1	56.8	17.6	114.7	125.6
19 Wholesale trade	27.0	11.8	53.8	114.6	30.1	13.3	60.3	119.3	37.0	13.8	72.7	140.3
20 Eating & drinking places	18.7	4.5	26.4	75.1	18.1	5.1	25.0	82.3	17.9	5.3	23.6	108.4
21 Other retail trade	14.1	7.0	33.9	196.2	15.2	8.1	35.5	208.2	19.3	8.0	31.3	263.3
22 Fin. ins. real estate	38.6	9.2	74.2	103.8	38.3	11.3	74.0	122.3	43.7	12.6	83.1	153.3
Private services	18.7	8.0	32.4	414.5	18.7	9.3	32.6	477.5	20.9	10.6	36.1	642.4
23 Personal & repair	17.4	4.8	29.4	121.3	17.1	5.6	29.4	142.6	19.4	6.9	33.3	174.1
24 Business services	19.6	8.8	34.3	54.7	17.5	10.0	31.4	78.4	18.3	12.9	32.7	115.2
25 Health care services	19.9	9.9	34.4	119.6	20.5	12.1	35.0	122.5	22.4	12.5	37.7	172.7
26 Legal & misc prof service	36.9	14.7	72.5	32.8	37.1	16.7	73.4	39.9	38.0	14.4	75.1	62.0
27 Educational services	10.4	6.2	17.9	25.0	10.7	6.4	18.4	28.1	12.3	7.7	20.8	35.9
28 Social, mus., member orga	11.6	6.9	20.0	61.1	12.2	7.8	20.9	66.1	15.3	9.7	25.0	82.4
Government, civilian	12.1	8.7	25.1	275.2	12.2	10.1	25.3	290.0	13.9	10.8	28.9	300.0
29 Federal civilian	26.4	12.3	54.8	28.6	27.2	14.1	56.6	29.5	31.6	15.8	65.6	29.7
30 State & local	10.4	8.2	21.7	246.6	10.5	9.6	21.8	260.5	12.0	10.2	24.9	270.3
Total services producing	20.8	8.6	38.0	1278.9	21.2	10.0	38.7	1406.8	25.2	10.8	44.8	1733.2
Total civilian	27.0	9.1	51.4	1859.5	28.7	10.4	54.8	2047.8	38.0	11.5	71.0	2508.1
31 Federal military	5.5	2.6	11.5	15.6	5.8	3.1	12.1	17.8	6.7	3.2	13.9	16.6

Table 6.15

Comparison of annual change from (1982 to 1985) in Minnesota industry output and earnings shows an almost twice as large increase in gross output in goods-producing industries than in services-producing industries, along with a slightly smaller increase in total earnings and total REIS employment. Projected per annum increases for 1986 to 2000 show a continuation of the 1982-85 trends, although total productivity increases are generally lower for both industry groups.

No. Industry	1982-85 Gross Output	1982-85 Total Earning	1982-85 REIS Employ	1982-85 BLS Employ	1985-2000 Gross Output	1985-2000 Total Earning	1985-2000 REIS Employ	1985-2000 BLS Employ
	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)
1 Agriculture	7.4	5.5	1.3	1.3	2.4	-.2	-.2	-.2
2 Mining	-.6	-9.0	-6.8	-6.8	2.8	3.2	1.9	1.9
3 Construction	9.8	5.8	6.0	6.0	1.9	2.0	1.7	1.7
Manufacturing, total	6.8	3.5	2.9	2.9	4.5	2.6	1.7	1.7
Mfg. nondurables	3.8	2.5	2.8	2.8	3.1	1.7	.9	1.0
4 Food products	.7	-2.2	-1.4	-1.4	1.7	.4	-.4	-.4
5 Textile & apparel	3.7	-4.6	1.1	.7	2.9	1.3	-.2	-.1
6 Paper products	4.3	3.8	2.4	2.4	3.5	1.2	.5	.5
7 Printing & publishing	7.7	5.8	7.0	7.0	4.1	2.7	2.0	2.0
8 Petroleum & chemical	6.8	5.0	3.9	3.9	3.9	2.7	.8	.8
9 Rubber & leather	9.9	6.2	6.0	6.0	5.3	3.6	2.6	2.6
Mfg durables	10.2	4.2	3.0	3.0	5.7	3.0	2.2	2.2
10 Wood prod & furniture	7.0	8.6	6.8	6.9	4.1	1.7	1.7	1.7
11 Stone, clay, glass	4.2	.9	-.0	-.0	4.3	3.4	2.0	2.0
12 Primary metal products	10.2	3.4	3.7	3.7	3.1	2.5	1.0	1.0
13 Fabricated metal products	5.2	2.6	2.2	2.2	5.1	3.3	2.5	2.5
14 Nonelectrical machinery	14.7	5.0	3.3	3.3	6.4	2.9	2.2	2.2
15 Electrical machinery	5.9	2.7	2.2	2.2	4.8	2.1	1.0	1.0
16 Transportation equipment	19.4	13.3	10.9	10.8	4.7	2.4	1.8	1.8
17 Instruments & miscellaneo	3.7	2.4	1.0	1.1	6.6	4.4	3.2	3.3
Total goods producing	7.0	3.7	2.8	2.8	3.9	2.2	1.3	1.3
18 Trans. comm. utilities	1.5	2.5	2.1	2.1	3.2	2.0	1.2	1.2
19 Wholesale trade	5.1	1.4	1.2	1.2	2.5	1.3	1.2	1.2
20 Eating & drinking places	1.9	3.4	3.9	3.7	1.8	2.1	1.6	2.2
21 Other retail trade	4.6	2.8	2.3	2.4	3.2	1.5	1.7	1.8
22 Fin. ins. real estate	5.3	8.7	5.4	5.4	2.4	2.3	1.6	1.6
Private services	4.9	6.0	5.0	4.7	2.8	2.9	2.2	2.1
23 Personal & repair	5.1	7.2	5.5	5.1	2.2	2.7	1.6	1.3
24 Business services	8.7	13.0	11.9	11.9	2.9	4.4	2.6	2.6
25 Health care services	1.8	3.7	1.3	1.3	2.9	2.6	2.4	2.4
26 Legal & misc prof service	7.0	7.2	6.5	6.5	3.1	1.9	3.0	3.0
27 Educational services	5.0	.8	4.1	4.1	2.6	3.0	1.8	1.8
28 Social, mus., member orga	4.4	2.6	2.7	2.7	3.0	2.9	1.8	1.8
Government, civilian	2.1	2.9	1.7	1.7	1.1	.7	.2	.2
29 Federal civilian	2.1	1.9	1.0	1.0	1.0	.8	.1	.1
30 State & local	2.0	3.1	1.8	1.8	1.1	.7	.2	.2
Total services producing	3.9	4.1	3.4	3.3	2.6	2.0	1.6	1.6
Total civilian	5.4	4.0	3.3	3.2	3.3	2.1	1.5	1.5
31 Federal military	6.2	6.8	4.4	4.4	.5	-.3	-.4	-.4

annual rate in constant dollars in the 1982-85 period, is expected to grow at a 2.1 percent annual rate in constant dollars over the 1985-2000 period. The outlook for labor earnings is based on a turn around on the currently declining competitive position of labor in the destribution of value added among the renumeratively productive resource owners.

Annual rates of change in industry indicator ratios are summarized in Table 6.16. A turn-around in labor earnings from the 1982-85 period in the 1985-2000 period occurs in 23 of the 31 industry groups. A turn-around in total hours worked per job is projected, also. This results in a more rapid decline in the annual rate of growth of output per employee and output per hour in the 1985-2000 period than in the 1982-85 period. Output per worker increased at 0.7 percent annual while output per employee increased at a 0.6 percent rate in the 1982-85 period. In the 1985-2000 period, the two rates are projected at 1.1 percent and 0.6 percent, respectively. Though hours per job generally increased in the 1982-85 period, they are projected to decline in the 1985-2000. Higher rates of productivity improvement are assumed for the 1985-2000 period than are currently estimated for the 1982-85 period.

Domestic and Foreign Export Markets

Growth in Minnesota industry output, earnings and employment thus depends on expanding export markets, particulary in the US. In large part, Minnesota's long-term economic well-being is determined by its industrial capabilities for profitably transforming a wide range of domestic imports of intermediate products into value-added domestic exports.

Any change in export market share and individual industry exports triggers related changes in imports and vice versa, unless import substitution occurs to replace previously imported inputs. Exports and imports are thus inexorably linked by the production systems they serve. This truism applies

Table 6.16

Comparison of annual changes in Minnesota industry ratios show large differences between goods-producing an services-producing industries in output per hour and earnings per hour—even larger than in the total output and total earnings comparisons. While total goods-producing output per hour increased at 3.5 percent per annum in the 1982-85 period, services-producing output per hour increased only 0.2 percent per annum. In contrast, real earnings per hour decreased by a larger percentage in the goods-producing industries than in the services-producing industries— -0.4 as compared with -0.9, respectively. Projected growth rates to 2000 are show a continuation of earlier gross output per hour, trends hit a reversal of earnings per hour trends.

		1982-85			1985-2000			
No.	Industry	Output per Hr	Earn per Hr	Output per Emp	Hours per Emp	Output per Hr	Earn per Hr	Output per Emp	Hours per Emp
		(pct.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)	(pct.)
1	Agriculture	6.1	4.3	6.0	- .2	3.7	- .7	2.7	- .0
2	Mining	6.1	-2.8	6.6	.5	.9	.5	.9	- .0
3	Construction	2.8	- .9	3.5	.8	.3	- .5	.2	- .0
	Manufacturing, total	3.9	- .2	3.8	.8	2.8	.1	2.8	- .0
	Mfg. nondurables	.4	- .8	.9	.5	2.1	.0	2.1	- .0
4	Food products	1.9	-1.0	2.2	.3	2.2	.1	2.2	- .1
5	Textile & apparel	1.6	-6.5	3.0	1.3	3.0	.6	3.0	- .0
6	Paper products	.9	.4	1.8	.9	3.0	- .1	2.9	- .0
7	Printing & publishing	.2	-1.6	.6	.4	2.1	- .1	2.0	- .0
8	Petroleum & chemical	2.3	.8	2.8	.3	3.1	1.1	3.1	- .1
9	Rubber & leather	2.6	-1.0	3.7	1.1	2.6	.2	2.6	- .0
	Mfg durables	5.9	.1	6.9	1.0	3.5	.1	3.4	- .0
10	Wood prod & furniture	-1.2	.3	.1	1.3	2.4	- .7	2.4	- .0
11	Stone, clay, glass	3.1	- .3	4.3	1.2	2.2	.5	2.2	- .0
12	Primary metal products	4.4	-2.1	6.3	1.8	2.1	.7	2.1	- .0
13	Fabricated metal products	1.5	-1.0	2.9	1.4	2.6	.1	2.6	- .0
14	Nonelectrical machinery	9.9	.6	11.0	1.0	4.2	- .1	4.1	- .0
15	Electrical machinery	3.0	- .2	3.7	.6	3.8	.4	3.8	- .0
16	Transportation equipment	6.1	.6	7.7	1.5	3.0	.0	2.9	- .1
17	Instruments & miscellaneo	1.9	.6	2.6	.6	3.2	.3	3.2	- .0
	Total goods producing	3.5	.4	4.0	.5	2.6	.2	2.6	- .1
18	Trans. comm. utilities	- .9	- .0	- .5	.4	2.1	.2	1.9	- .2
19	Wholesale trade	3.7	.1	3.8	.1	1.4	- .5	1.3	- .1
20	Eating & drinking places	-1.1	.3	-1.7	- .6	- .1	- .5	- .4	- .3
21	Other retail trade	2.6	.8	2.1	- .4	1.6	- .8	1.4	- .2
22	Fin. ins. real estate	- .3	2.9	- .1	.2	.9	- .0	.8	- .1
	Private services	.0	1.1	.2	.2	.8	.1	.7	- .1
23	Personal & repair	- .4	1.5	- .0	.4	.8	.6	.8	- .0
24	Business services	-3.6	.3	-2.9	.7	.3	.9	.3	- .0
25	Health care services	1.0	2.9	.6	- .5	.6	- .6	.5	- .1
26	Legal & misc prof service	.2	.5	.4	.2	.2	-1.8	.2	- .0
27	Educational services	1.0	-3.0	.9	- .1	1.0	.5	.8	- .1
28	Social, mus., member orga	1.6	- .1	1.6	.0	1.5	.7	1.2	- .3
	Government, civilian	.3	1.1	.3	.1	.9	- .3	.9	- .0
29	Federal civilian	1.0	.8	1.1	.1	1.0	- .0	1.0	- .0
30	State & local	.2	1.2	.2	.1	.9	- .3	.9	- .0
	Total services producing	.7	.9	.6	- .1	1.1	- .2	1.0	- .2
	Total civilian	2.0	.7	2.2	.1	1.9	- .1	1.7	- .1
31	Federal military	1.6	2.2	1.7	.1	.9	- .6	.9	- .0

also to US foreign trade and the tandem movements in exports and imports which persist even when the foreign exchange value of the US dollar has dropped to near half of its former value against the yen and the mark.

Individual industries vary in their dependency on exports and imports. This dependency is demonstrated by the level of individual commodity exports and imports. In 1982, exports as a proportion of total commodity disbursements in Minnesota varied from 69.2 percent for durable goods manufacturing to 1.5 percent for retail trade. Imports as a proportion of total commodity purchases varied from 3.9 percent for the finance, insurance and real estate group to 32.4 percent for the construction industry. In this report, all estimates of exports and imports are based on the US IMPLAN system and, hence, they may differ from sample survey and other data sources on commodity shipments from and to Minnesota industries.

The industry origins of foreign and domestic exports from and imports to Minnesota based on the Minnesota IMPLAN system are summarized in Table 6.17 for the purpose of comparing Minnesota industry trade balances with the rest of nation and rest of world. A Minnesota trade balance is derived for each industry group from the two pairs of trade flows--domestic and foreign--in the 528-industry Minnesota IMPLAN model. According to these data, the import purchases originating from corresonding export-producing industries outside Minnesota exceeded the total exports of Minnesota goods-producing industries. The positive trade balance of other sectors, largely value added transfers to Minnesota of the foreign operations of Minnesota corporations, compensated for the negative goods-producing industry trade balance sufficiently to yield a slightly positive overall trade balance for the 13 Minnesota industry groups.

US foreign exports provide another measure of comparison of foreign trade dependency, namely, the percentage of total US foreign trade originating from

Table 6.17

Minnesota foreign market share is the percent of US foreign exports orginating from Minnesota. Minnesota trade balance is equal to total exports less total imports. In 1982, total foreign exports were $5.4 billion and total foreign imports were $2.3 billion. Total domestic exports were $34.1 billion and total domestic imports were $35.0 billion. A net trade balance of $1.3 billion is derived from these data, which show, also, a trade deficit for the goods-producing sectors and a trade surplus for the services-producing sectors.

Producing Sector	Exports				Imports				Trade Balance		
	Foreign			Domestic	Foreign	Domestic			Total	Total	Net
	US	MN	Share	MN		Total	Inter	Final	Exports	Imports	Exports
	(bil.$)	(mil.$)	(mil.$)	(pct.)	(mil.$)	(pct.)	(mil. $)	(mil.$)	(pct.)	(pct.)	(pct.)
Goods-producing:											
1. Agriculture	1890	958	5.1	2418	51	1992	1666	326	3376	2043	1333
2. Ag. serv.,for.,fish	370	6	1.5	130	20	1092	405	687	135	1112	-977
3. Mining	6754	101	1.5	694	493	470	374	96	794	963	-169
4. Construction	42	1	2.1	903	0	1295	296	999	904	1295	391
5. Mfg., nondurables	58724	538	0.9	9380	977	12139	7453	4686	9918	13116	-3198
6. Mfg., durables	112014	2096	1.9	8410	1735	11771	6361	5410	105096	13506	-3000
Total goods-prod	179794	37090	2.1	21935	3276	18759	16555	12204	25633	32035	-6402
Services producing:											
7. Tran. comm., util.	15908	256	1.6	745	4	1627	1102	525	1001	1631	-630
8. Wholesale trade	18178	375	2.1	829	0	56	53	3	1204	56	1148
9. Retail trade	198	4	1.8	111	0	234	26	208	114	234	-120
10. Fin., ins., real est.	6282	103	1.6	111	0	234	26	208	114	234	-120
11. Private services	7965	94	1.1	1898	1	2415	1341	1074	1992	2416	-424
12. Government enterprise	280	4	1.3	70	0	57	38	19	74	57	17
13. Other sectors	48533	868	1.8	6140	0	953	0	953	7008	953	6055
Total services-prod.	97344	1704	1.8	12207	5	6231	2848	3383	13910	6236	7674
Total	277138	5404	1.9	34142	2281	34990	19403	15587	39543	38271	1272

Minnesota export-producing industry. In 1982, this share ranged from 0.9 percent of US manufactured nondurables to 5.1 percent of US farm commodities based, again, on the 528-industry Minnesota IMPLAN model.

Foreign imports of Minnesota producing and consuming sectors are almost entirely goods rather than services. They are attributed entirely to purchases of the producing sectors. Purchases of domestic imports, which were over $35 billion in 1982, are attributed to both the producing and the consuming sectors in Minnesota. In 1982, the intermediate demand sectors--the 13 producing industries--accounted for nearly 56 percent of the total imports. However, the distribution between intermediate demand and final demand sectors varied greatly among the individual commodity groups, ranging from 84 percent to intermediate demand for farm products to 11 percent to intermediate demand for retail trade margins.

Additional trade relationships among Minnesota industries and institutions and the rest of world are presented in Table 6.18 that provide alternative measures of the importance of foreign and domestic trade in the Minnesota economy. Import dependency, for example, which is the proportion of total industry purchases accounted for by imports, ranged from 31.1 percent for nondurable goods manufacturing to 3.9 percent for finance, insurance and real estate gross margins. Because of large differences between industry exports and industry imports, some industries contribute to a positive trade balance for Minnesota, while others contribute to a negative trade balance. The dominantly export-producing industries are also import purchasing but they are more likely to produce positive trade balances than the dominantly residentiary industries. This linkage between exports and imports is most clearly revealed in a detailed interindustry transactions table that is directly related to corresponding export and import matrices.

Table 6.18

Export and import parameters for individual industries are represented by market share, import dependency, regional purchase, and import propensity coefficients. In 1982, the export market shares of 13 Minnesota industry groups ranged from less than 0.05 percent of US retail industry output to 1.9 percent of US agriculture industry output. The import dependencies of the same industries ranged from no import purchases to import purchases equal to 32.4 percent of total industry purchases, while the net commodity supply ranged from none to 100 percent of gross commodity demand as represented by the regional purchase coefficient (RPC). The import propensity coefficient is then given by the form, 1-RPC, which shows import propensities ranging from no import propensity for farm comodities to 100 percent for noncomparable imports. Import market share, which is the ratio of total imports to gross regional commodity demand, ranged from 1.1 percent for wholesale trade to 81.7 percent for durable goods manufacturing.

Industry	Industry Output US	Industry Output Minnesota	Export Sales Total	Export Sales Market Share	Import Purchases Total	Import Purchases Import Dependency	Regional Supply Sufficiency Net Supply	Regional Supply Sufficiency Gross Demand	Regional Supply Sufficiency Regional Purchase	Import Propensity	Import Market Share
	(bil.$)	(mil.$)	(mil.$)	(pct.)	(mil.$)	(pct.)	(mil. $)	(mil.$)	(pct.)	(pct.)	(pct.)
Goods-producing:											
1. Agriculture	175.9	8320	3376	1.9	210.	25.3	7037	6658	100.0	0.0	30.7
2. Ag. serv.,for.,fish	20.2	185	136	0.7	29	15.7	265	526	50.4	49.6	36.5
3. Mining	196.8	835	788	0.4	233	27.9	759	2378	31.8	69.2	40.5
4. Construction	399.7	7586	904	0.2	2458	32.4	7586	7627	99.5	0.5	17.0
5. Mfg., nondurables	1011.0	18699	9918	1.0	5812	31.1	17654	19866	88.9	11.1	66.0
6. Mfg., durables	941.2	15115	10494	1.1	4523	29.9	13194	16534	79.8	20.2	81.7
Total goods-prod	2744.8	50740	25615	0.9	15156	29.9	46495	53589	86.8	13.2	59.8
Services producing:											
7. Tran. comm., util.	541.6	8715	1001	0.2	2021	23.2	8380	9075	92.3	7.7	18.0
8. Wholesale trade	299.2	6167	1204	0.4	416	6.7	5813	4992	100.0	0.0	1.1
9. Retail trade	427.1	7810	114	0.0	730	9.3	5029	5249	95.8	4.2	4.5
10. Fin., ins., real est.	719.7	15357	2517	0.4	599	3.9	15312	13787	100.0	0.0	6.4
11. Private services	815.2	14171	1992	0.2	1679	11.8	18259	18672	97.8	2.2	12.9
12. Government enterprise	58.5	918	74	0.1	71	7.7	564	551	100.0	0.0	10.7
13. Other sectors	367.4	7159	7008	1.9	0	0.0	6545	412	100.0	0.0	n.a.
Total services-prod.	3226.7	60298	12207	0.4	5518	9.2	59902	52738	100.0	0.0	11.8
Total	5971.5	111038	39607	0.7	20674	18.6	106397	106327	100.0	0.0	36.0

Total commodity exports from and total commodity imports to Minnesota industries thus are commonly expressed by two statistical measures--the export market share coefficient and the import dependency coefficient. The market share coefficient is expressed as a ratio of given regional industry exports to corresponding US exports or industry output. The import dependency coefficient is expressed as a ratio of total import purchases of a given regional industry to total industry purchases. Forecasts of changes in the market share and import dependency ratios are derived from the US IMPLAN system. Finally, each ratio is multiplied by its corresponding denominator when forecasting future exports from and imports to a given regional industry.

A third trade strategic concept is the propensity to import--the proportion of a region's total requirements of a given commodity that is imported from other regions, including foreign countries. For those commodities produced in excess supply in the region, all requirements are met without imports. Conversely, for noncompetitive imports, that is, imports of commodities not produced in the region, the import propensity is 1. In Minnesota, commodities originating in the mining industry have a high import propensity while service industry production has low import propensity. Manufacturing is characterized by generally low to moderate import propensities.

The import propensity coefficient is derived from the regional purchase coefficient--the ratio of net commodity supply to gross regional commodity demand. Net commodity supply is the total amount of a commodity available for consumption in the region, namely, gross commodity production, plus inventory and institutional (state, local and federal government) sales, less foreign exports. Gross regional commodity demand is the sum of gross intermediate demand plus final demand. The regional purchase coefficient is the proportion

of regional demand that is met by regional supply.

An alternative measure of import propensity is the import market share coefficient--the ratio of total commodity imports to gross regional commodity production. Unlike the import propensity coefficient, the import market share coefficient is derived directly as a ratio of two variables. In 1982, the Minnesota import market share coefficient ranged from 1.1 percent of gross Minnesota commodity production for wholesale trade to 81.7 percent for manufactured durables.

A combination of the export market-share approach and the use of a special two-region demand-supply balancing alogrithm--the Minnesota Two-region Input-output model--is available to provide a confirmation of the indirectly derived import propensity coefficient for each industry. It is also available for comparing estimates of commodity exports based on the industry surveys and for deriving alternate estimates of commodity-specific export and import flows.

An import substitution strategy addresses thus the implications of low or high import propensities for local market expansion. Import substitution, however, is closely linked to export expansion--the two strategies being a continuum for some new and expanding businesses. Import substitution may lead ultimatlely to an excess supply position for a regional industry. Conversely, export expansion, because of an increase it may trigger in the derived demand for imports, is facilitated by import substitution. This is precisely the situation now faced in the US economy. The economic well-being of both Minnesota and the US thus may depend on a judicious and timely deployment of both export expansion and import substitution strategies.