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MINNESOTA'S PLACE IN THE GLOBAL ECONOMY

by

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Summary

Minnesota's place in the global economy is established by its trade and communications with the rest of world and itself. This includes foreign trade and the intra-state trade between substate regions. Both foreign trade and intra-state inter-regional trade are affected by the competitive forces of a global market economy.

Foreign trade-induced competition and related restructuring of the Minnesota economy are one set of results from Minnesota's participation in a global economy. Another is the growing recognition of the critical role of state and local governments in improving productivity in public education and other state and local tax-supported activities.

While the perceived linkage between education, improved productivity and economic growth is widely discussed, its acceptance remains more a matter of personal faith than factual confirmation. It lacks verification and documentation. This report represents part of an effort to fill this information gap by starting with a re-assessment of Minnesota's ties to the new global economy.

In 1982--a baseline year for assessing Minnesota's economic prospects for this decade and the next--Minnesota's total foreign exports amounted to $5.4 billion, or 14 percent of the $39.5 billion in total exports. When exports are represented by their industry-specific labor input requirements, foreign exports accounted for 18 percent of total export-producing employment. The higher percentage figure for labor inputs as compared with product value results from the lower value of product per worker in agriculture and services-producing industry than in durable goods manufacturing--the dominant

exporting industry group in product value.

The exports of goods and services from the Metro Region to Greater Minnesota and from Greater Minnesota to the Metro Region had labor requirements in 1982 that were equivalent to 27 percent and 20 percent, respectively, of the labor requirements of Minnesota's total domestic and foreign exports. Implicit in these estimates of export-related employment is the differing regional specialization within the two Minnesota regions. The Metropolitan Region is specialized in services-producing industry while Greater Minnesota is specialized in goods-producing industry. Some metropolitan-based manufactured products are shipped from the Metropolitan Region to Greater Minnesota while some services, like recreation-related retail trade, health care and education, are produced in Greater Minnesota for visitors from the Metropolitan Region.

In addition, Greater Minnesota offers favorable location advantages, especially in periods of general economic expansion, for manufacturing and service establishments experiencing rapidly rising site and labor costs in the Metropolitan Region. Some of the metropolitan "overspill" has remained and will remain as permanent business residents of Greater Minnesota contributing to the growing diversity of the Greater Minnesota economic base. As the discussion on industry productivity demonstrates, Greater Minnesota's site cost and wage rate advantages over the Metro Region enhance the prospects for an expansion of Minnesota manufacturing in the 1987-90 period beyond the levels indicated by 1980-85 industry trends included in this report.

The transformation of the Metropolitan Region from a regional trade center with a concentration of agricultural and food products manufacturing into a modern, technology-intensive urban-industrial complex is implicit in a comparison of the Region's economic base in 1950 and its projected economic

base in 1990. Regional service center activities accounted for much of the Metropolitan Region economic base in 1950 with its concentration of residentiary (except for agriculture-related and food-related manufacturing) industries. All but the personal, professional, business and repair service industries in the 1950 industry listing have declined in relative importance while durable goods manufacturing has increased sharply along with the service industry group.

Comparison of the 1950 and the projected 1990 percentage distributions of basic employment for Greater Minnesota also reveal changes in industry mix accompanying the shift to its more diverse economic base. In 1950, an estimated 87.3 percent of persons employed in export-producing activity were in agriculture. In 1990, the agriculture share of the region's economic base is projected at 45.8 percent. The nonagricultural share of basic industry is roughly equal to the agricultural-related share--a regional average, with much variation within the region, but tilting strongly toward a more agriculture-dependent economic base with increasing distance from the Metropolitan Region.

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.

Gradually changing staffing patterns among Minnesota industries 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. The 50 largest occupational classes among a total 400 occupational classes with a total employment of more than 25 thousand in 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 contast to the 50 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.

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 and technical, administrative support, and sales and services. Although projected employment growth is concentrated in six white-collar occupational groups, a wide range and variety 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.

Occupational differences in annual earnings per worker show that in 1982, average earnings ranged from $6.6 thousand in service occupations to $27.0 thousand in managerial and management-related occupations. The lowest level of earnings was 59 percent below the overall average of $16.1 thousand while the highest 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, which occur largely in the goods-producing industries. The high employee compensation encourage replacement of old workers with new machinary and technology.

Increasing world-scale competition has forced goods-producing industries to move quickly to adopt cost-reducing measures, while residentiary services-producing industries are protected from much outside competition by high transportation costs and the advantages of close proximity to their customers. Minnesota industry remains competitive in large part because of the productivity of its work force that is sustained at high levels by early adoption of cost-reducing technology and business services.

Labor and capital productivity improvements in the export-producing industries ameleriate the adverse effects of increased production costs. Productivity improvements are virtually non-existant, however, in the two activity areas most heavily supported by state and local spending--education and health care. Labor productivity of public primary and secondary school instructional staff, for example, fell by 36 percent from 1940 to 1986. During the same period labor productivity of all civilian workers increased by 108 percent. Yet, education is viewed as a critical asset in improving the competitiveness of US and Minnesota businesses in a global economy.

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Globalization of regional economies is illustrated by recent changes in Minnesota agriculture and manufacturing. These two industry groups responded sharply to the foreign trade boom of the 1970s and its subsequent collapse, starting with the grain embargo of the late 1970s and continuing with the rising foreign exchange value of the US dollar and the decline in US manufacturing in the 1980s. During this period foreign imports increased their US market shares because of price advantage and superior quality. Intense price and quality competition also reduced the bargaining position of labor in unionized, but competitively vulnerable, industries. This competition forced many businesses to improve labor and capital productivity in the work place, thus reducing labor costs as well as bargaining power.

Global trends

World-scale price and quality competition has been confined largely to the commercially-traded products of mines, farms and factories. Most services-producing industries remained virtually untouched by the foreign competition except for the indirect demand-side and supply-side effects emanating from unprecedented levels of deficit-financing. Shifts in employment growth from the competitively vulnerable industries to the less competitively vulnerable industries were facilitated by increasing demand, fueled by deficit financing, for the products of the less competitively vulnerable industries.

Price inflation in the less vulnerable industries has continued at above-average rates while productivity improvements have lagged, except for

the deregulated services-producing industries--telecommunications and transportation--that at least momentarily lost their local monopoly positions. These two industries also were affected by and, in turn, affected the changing patterns of industry location and population redistribution that accompanied the globalization of regional economies.

The globalization of regional economies contributed to their destabilization, both cyclical and secular. Regions with a disproportionate share of trade-intensive and credit-sensitive industries experienced above-average fluctuations in industry employment in the 1980s. In Minnesota, for example, the percentage drop in nonagricultural wage and salary employment from its 1979 peak to its 1982 trough was more than five times the percentage drop for the US. Moreover, rural Minnesota, which suffered heavily from the collapse of domestic and foreign trade and the 1980-82 recessions, remained depressed until recently while the Minneapolis-St. Paul metropolitan area quickly regained its former employment losses.

Destabilization of regional economies also occurs as a result of long-term shifts in the location of industry and population. The decline of mining, farming and manufacturing in some regions and their above-average growth in others reveals the vulnerability of high-cost producers to sustained price competition. An entire industry rather than only a few individual businesses may experience this vulnerability.

Some regions are differentially endowed with a capacity for self-sustaining growth despite a disproportionate share of industries with vulnerability to world-scale price competition. Such regions typically have a unique mix of high-order services, including high finance, high technology and higher education. The Minneapolis-St. Paul metropolitan area has benefitted from the location and growth of these high-order services within the area.

The Boston metropolitan area and, indeed, much of the New England Region, have benefitted even more than the Minneapolis-St. Paul metropolitan area from the territorial concentration of innovation-supporting activities, including higher education and state government.

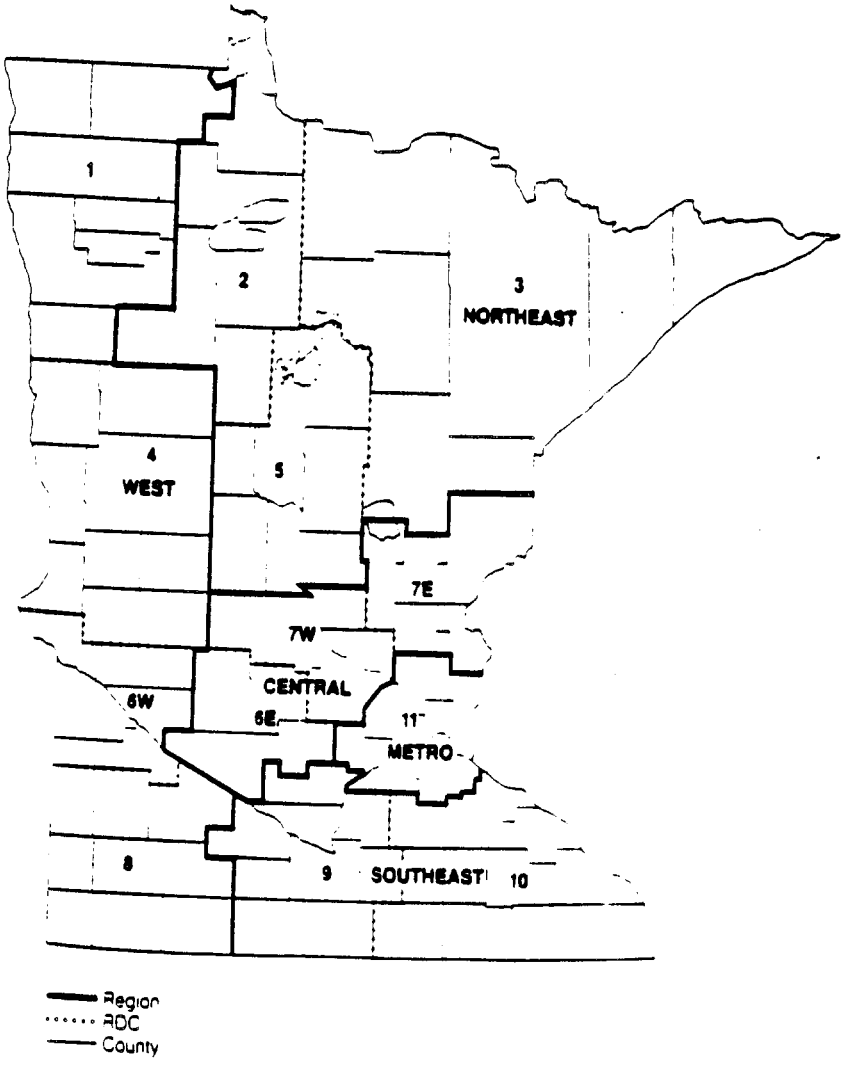
Services-producing industries, particularly high-order professional, business and related manufacturing services that compete, in varying degree, on a non-price basis, are concentrated in the seven-county Twin Cities Metropolitan Region and, to a lesser extent, in the four metropolitan centers (Fargo-Moorhead, Duluth-Superior, St. Cloud and Rochester) in four (3, 4, 7W and 10) of the substate regions. The four substate regions are part of the West, Northeast and Southeast Economic Regions, as shown in Figure 1.

Because services-producing activities of the metropolitan central areas are essential to the nuture and development of the emerging information society, the conventional economic wisdom that emphasizes a region's commodity exports has virtually been turned around. The new emphasis is on research and management in an increasingly service-oriented economy. The shift to services is a world-scale phenomenon with profound implications for Minnesota's educational institutions a well as the economic vitality of its rural and urban areas.

Despite the shift to services, the goods-producing industries nonetheless account for a critical part of the economy of Minnesota's rural regions. They also experience most severely the consequences of world-scale economic restructuring and of general business cycle fluctuations. In the 1975-79 recovery period, for example, goods-producing industry employment in Minnesota increased by 24 percent while employment in services-producing industries (transportation, communications, utilities, wholesale and retail trade, private services and government) increased by 19 percent. Minnesota outpaced

Figure 1

Minnesota's economic regions are each characterized by a unique pattern of industry dependence that is largely natural resource-based in three regions--the Northeast, the West and the Southeast--and dominantly metropolitan-based manufacturing and high-order services in two regions--Central and Metro.



US goods-producing employment growth by 50 percent. These patterns were reversed, however, in the 1982-87 period. In fact, total goods-producing employment declined from 1979 to 1983 in both Minnesota and the US, as shown in the upper half of Figure 2.

The growth relationship between the nonagricultural goods-producing employment, namely, mining, construction and manufacturing, and services-producing employment differed sharply in the two recovery periods--1975 to 1979 and 1982 to 1987 and they differ, also, to projected 1990. During the 1975-79 recovery period, Minnesota industries, even more so than US industries, benefitted from a foreign-trade boom. However, the sharp decline in US foreign trade in the post-1982 recovery period had an adverse impact on the export-oriented goods-producing industries, which resulted in a reversal of the two growth rates for both Minnesota and US industries. Services-producing industries grew more rapidly than goods-producing industries in both Minnesota and the US. Also, the growth in US services-producing industries exceeded the growth in Minnesota services-producing industries in the post-1982 period--again, a reversal of the 1975-79 industry growth patterns.

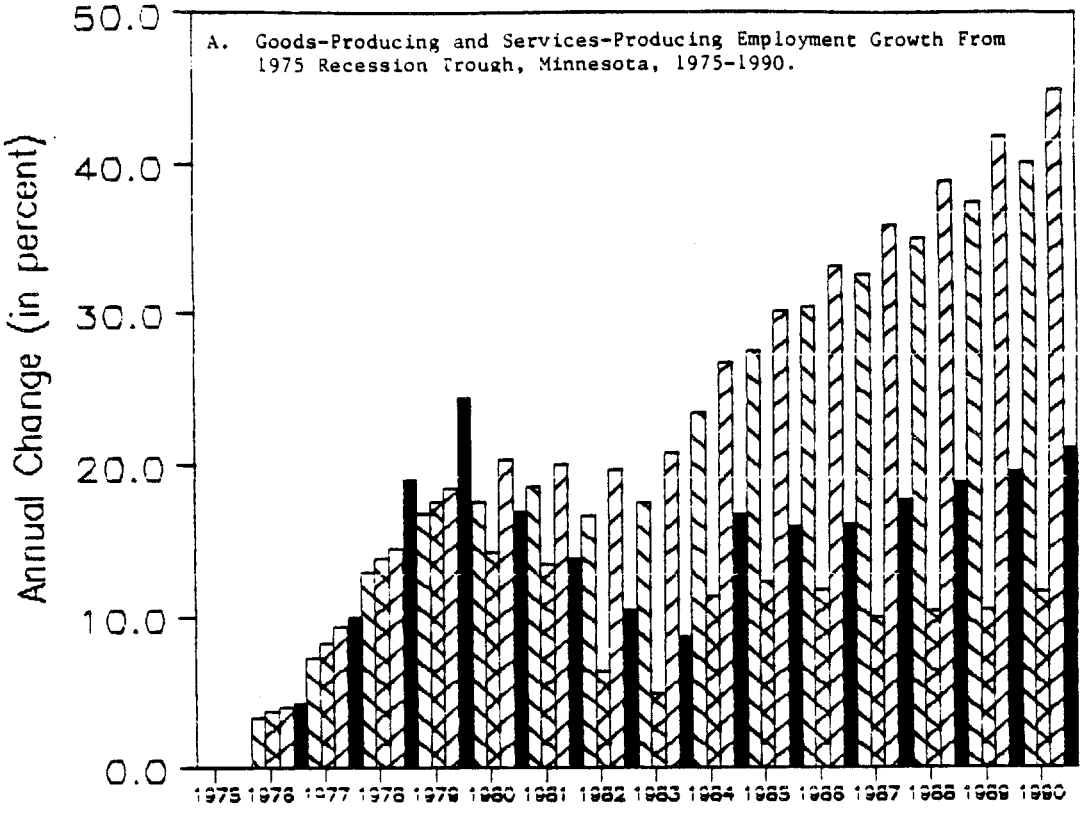
Competitive position

The overall effect of US services-producing employment outpacing Minnesota service-producing employment is shown in Part A, Figure 3 as a declining employment share, even though total Minnesota employment is increasing. The drop in the Minnesota share of US employment share was as large in the 1984-87 recovery period as it was in the 1980-82 recession period.

Sources of employment change in the restructuring of Minnesota industry are identified under four categories in the lower half of Figure 3 as a way of differentiating national and regional factors that link the Minnesota to the

Figure 2

Total nonagricultural goods-producing employment increased sharply during the 1975-79 recovery period in both Minnesota and the US but in the post-1982 recovery, services-producing employment increased more sharply--a consequence of declining Minnesota and US foreign trade opportunities and manufacturing employment.



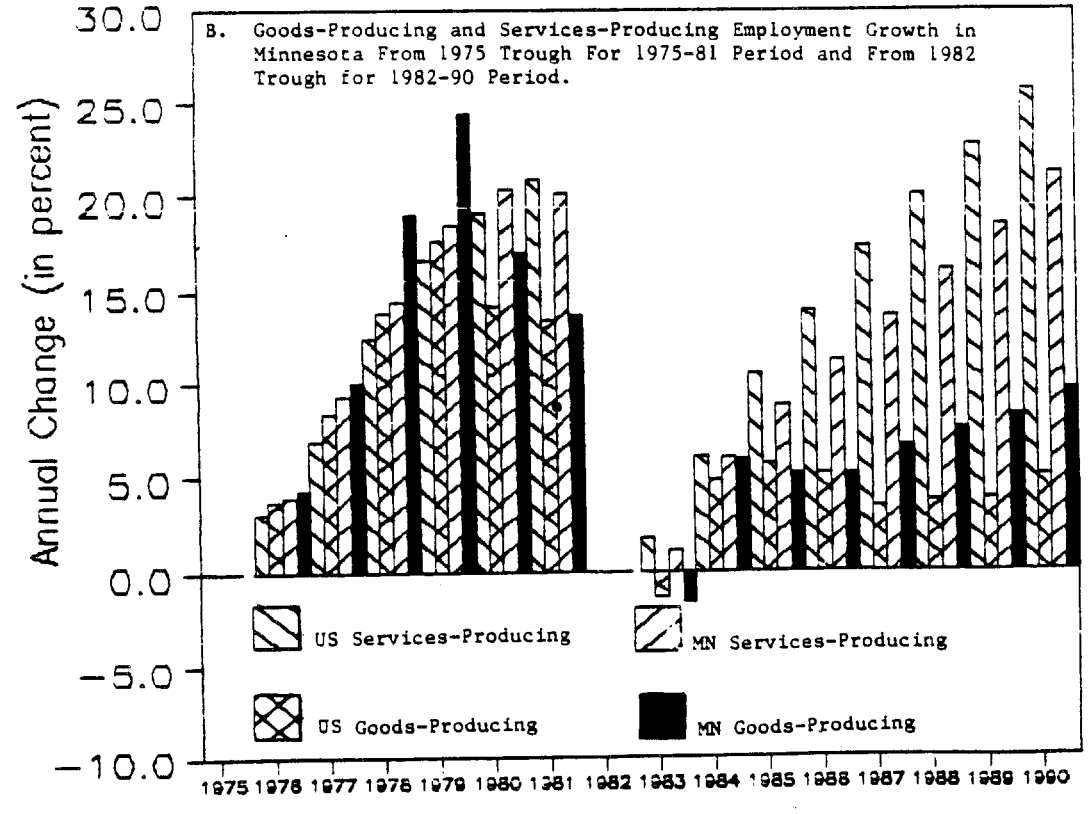
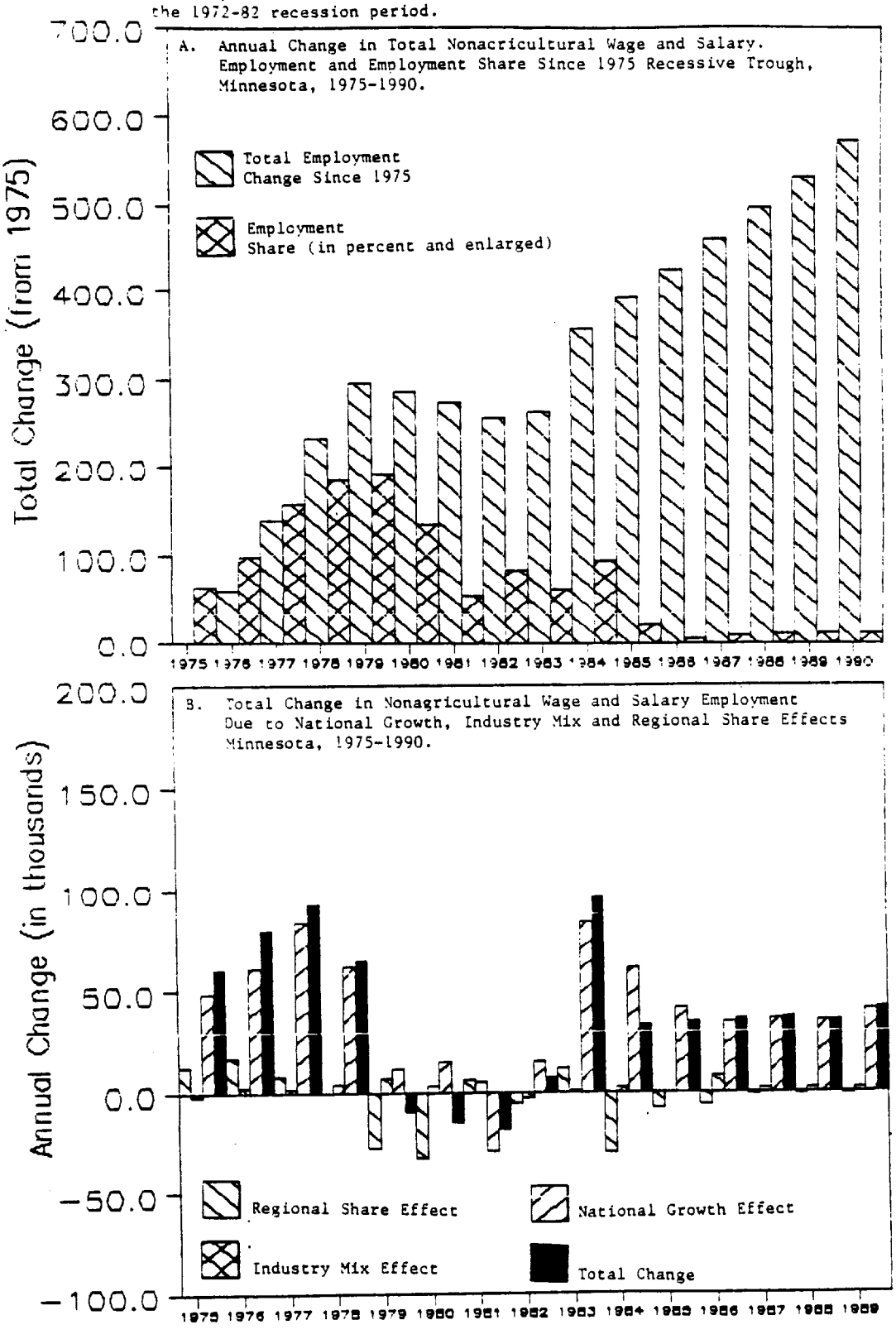


Figure 3

Total nonagricultural wage and salary employment grew by 460.3 thousand during the 1975-1987 period when the Minnesota employment share increased from 1.93 percent of US employment in 1975 to 1.98 percent in 1979 and then dropped to an even 1.9 percent by 1986. During the recovery period the national growth effect was the largest source of increases while the industry-mix effect accounted for much of the employment reductions in the 1972-82 recession period.



US economy over the business cycle. The national-growth effect refers to the Minnesota industry-specific employment growth attributed to overall US employment growth while the industry-mix effect refers to Minnesota industry-specific growth attributed to individual US industry growth relative to overall US employment growth. The regional-share effect refers to the individual MN industry employment growth relative to corresponding US industry employment growth. A forecast regional-share effect is based on past or expected difference in the growth between the Minnesota inudstry employment and the corresponding US industry employment. The relative-change effect is the sum of the industry-mix effect and the regional-share effect. The sum of the three effects--national growth, industry mix, and regional share--equals total employment change in a specific Minnesota industry. Thus, a positive relative-change effect denotes a Minneota industry-specific growth that is larger than if based solely on overall US employment growth.

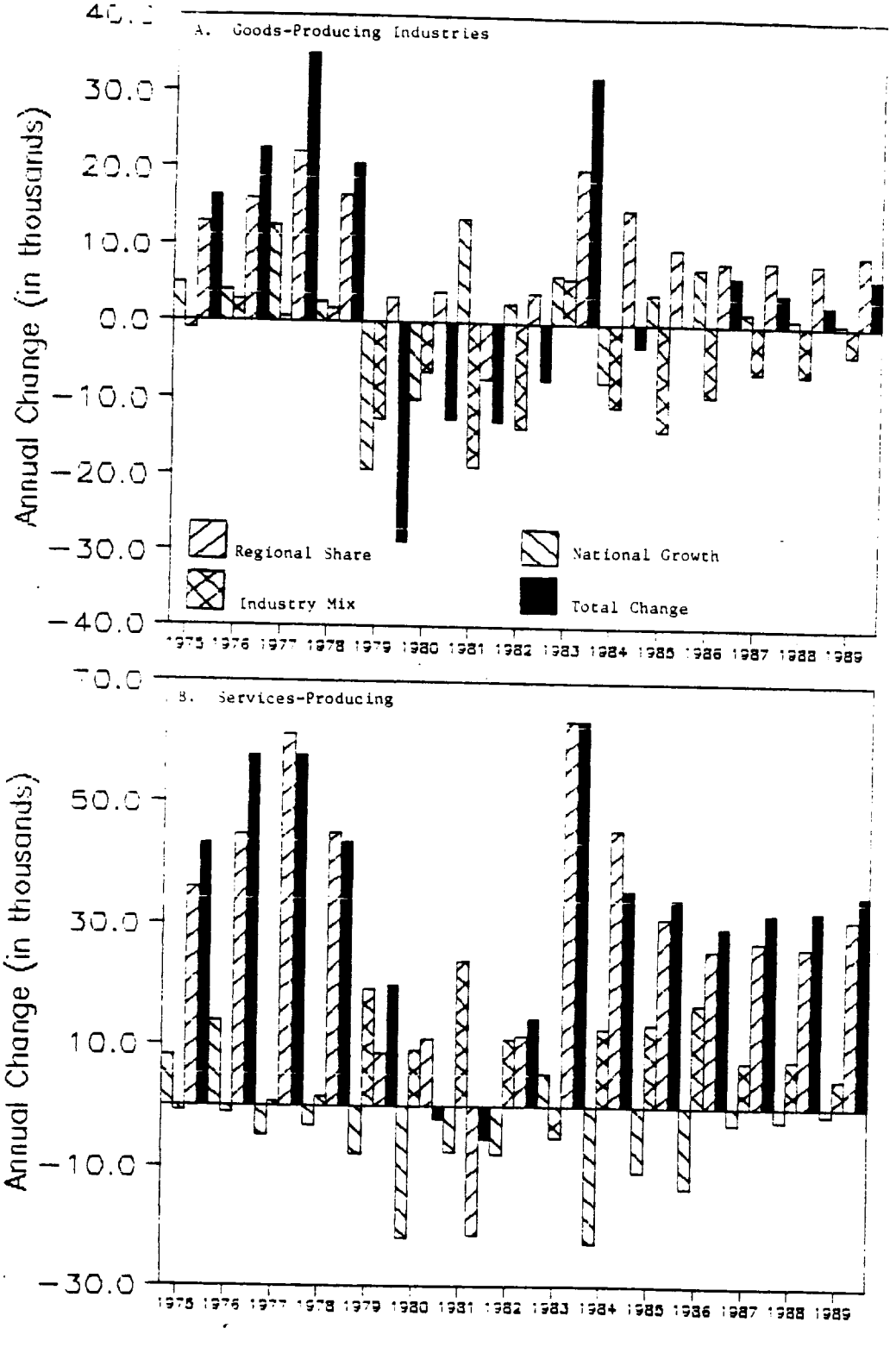
In four of the five periods, from 1975-76 to 1978-79, the relative change effect for Minnesota total nonagricultural employment was positive. It was negative during the three recession periods--1979-80 to 1981-82. It is negative for two of the six periods from 1983-84 to 1989-90.

The period-to-period effects of the three change sources are illustrated in Figure 4. In the 1983-84 period, for example, total employment in the goods-producing industries increased by 32.4 thousand, which was attributed to employment change sources as follows:

Change Source	Employment Change	
	Total (thousand)	Proportion of total (percent)
National growth effect	20.3	63
Industry mix effect	5.8	18
Regional share effect	6.3	19
Relative change	12.1	37
Total change	32.4	100

Figure 4

Most of Minnesota industry growth since the 1975 recession trough is attributed to overall U.S. economic growth as represented by national growth effect. Recession periods are marked by sharp reductions in total employment in goods-producing industry because of an adverse industry-mix effect, while above-average growth in individual industries is attributed to a regional-share effect. Goods-producing industries more so than services-producing industries in Minnesota have benefited from a positive regional-share effect.



The national-growth effect thus accounted for 20.3 thousand of the 32.4 thousand net goods-producing employment increase in the 1983-84 period, which was 63 percent of total employment change. Most of Minnesota's economic growth and well-being is similarily linked to the growth and well-being of the US economy.

In contrast to periods of economic recovery, recession periods are marked by an overriding negative influence on Minnesota industry employment due to the industry-mix effect on Minnesota goods-producing manufacturing industry. This results from a disproportionately high share of cyclically-sensitive and export trade-dependent industries in Minnesota. Services-producing industries, on the other hand, demonstrate above-average growth in recession periods. Since the 1975-76 recovery period, the industry-mix effect has been generally positive for Minnesota services-producing industries, while the regional-share effect has been generally negative.

The regional-share effect serves as a rough measure of the competitive position of individual regional industries in the US economy. The generally negative regional-share effect for Minnesota services-producing industries appears to imply that Minnesota services-producing industries have lagged US services-producing industries in economic growth. Complicating this picture is the additional fact that the regional-share effect has been generally positive for Minnesota goods-producing industries. Thus, conversely, the positive regional-share effect appears to imply that Minnesota's goods-producing are leading US goods-producing industries in employment growth.

One explanation of this apparant anamoly in Minnesota industry growth patterns in the post-1982 period is that growth in Minnesota services-producing industry overshot its sustainable long-term growth path in

the 1975-79 recovery period. Such an over-reaction may be attributed to above-average public (federal, state and/or local) support of employment in the services-producing industries--support that subsequently was reduced in the post-1982 period. Indeed, the Minnesota economy has not shared the recent federal spending emanating from the growing fiscal deficit of the post-1982 period proportionately with other states. The Reagan administration shift in federal spending priorities has not benefitted the Minnesota economy as it has the economies of other states, particularly those with a disproportionate share of military-related industry and installations that add to the economic base of a state or regional economy and its subsequent multiplier effects on local services-producing industries.

Industry Restructuring

Restructuring of Minnesota industries is demonstrated by employment share and excess employment trends. Employment share refers to the proportion of total US employment in a particular industry attributed to corresponding Minnesota industry employment. An above-average ratio (that is, above the overall industry employment share) denotes an industry with excess employment, that is, employment in excess of the US industry employment share of total industry employment. Excess employment is used, also, as a measure of basic employment, that is, employment in each industry that is engaged in producing goods and services for sale to nonresidents.

Manufacturing growth

Four durable goods manufacturing industries--fabricated metals, computing and office machines, nonelectrical machinery, and controlling and scientific instruments--account for much of Minnesota's economic growth since 1972, as well as much of its economic hardships of the mid 1980s. Employment shares in the four industries have increased in most years since 1972, as follows:s

Industry	1972	1980	1982	1984	1986
			(percent)		
Fabricated metals	2.0	2.3	2.3	2.4	2.3
Computing and office machines	9.5	8.6	8.6	9.1	8.7
Other nonelectrical machinery	2.1	2.4	2.4	2.6	2.5
Scientific & controlling instruments	2.5	3.1	3.0	3.1	3.5

Minnesota excess employment estimates, which also increased since 1972, are presented for comparison with the employment share percentages as follows:

Industry	1972	1980	1982	1984	1986
			(1000)		
Fabricated metals	2.6	5.7	6.0	6.3	5.9
Computing and office machines	19.9	28.7	31.5	37.7	32.1
Other nonelectrical machinery	5.0	9.7	7.8	11.2	9.6
Scientific & controlling instrruments	6.2	12.7	11.6	12.8	16.6
Subtotal	33.7	56.8	56.9	68.0	64.2
Other industry	126.4	127.9	127.9	123.9	123.1
All excess employment	160.1	184.7	184.8	191.9	187.3

Excess employment numbers (in thousands of jobs) increased as individual industry employment share percentages increased over the 1972-86 period. Moreover, the excess employment for the four durable goods manufacturing industries increased as a percentage of all industry excess employment for three of the four periods. Because of the above-average importance of the four cyclically-sensitive and trade-dependent industries, the foreign trade "bust" of the mid-1980s would impact more severely on the Minnesota economy than on the US economy as a whole and, indeed, it did.

Manufacturing growth in Minnesota from 1950 to 1980 and from 1980 to projected 1990 is documented in two employment series: One is the US Census of Population series showing the principal industry of employment of remuneratively employed persons; the other is the US Department of Commerce Regional Economic Information System (REIS) series showing the total number of jobs by industry of employment. Because the same person may hold more than one job--the case with many farmers and, also, part-time retail trade and service workers--the job count of industry employment yields a higher total

than the person count of industry employment, as shown for Minnesota in Table 1. The job count of industry employment for the 1980-90 period covers the nonagricultural wage and salary employment used in estimating the US market share of the four durable goods manufacturing industries and also all self-employed--farm and nonfarm--and farm wage and salary jobs. The total industry employment series is used next in calculating period-to-period changes in Minnesota's economic base.

Changing economic base

Domestic market expansion for the export-producing industries that lagged behind productivity increases in these industries has lead to reduced growth in industry labor requirements. Growth of foreign export markets counters this trend and enhances the growth-generating role of a region's exporting-producing industries because of their multiplier relationship with the total regional economy. A strictly goods-producing economic base for a region nonetheless contributes to the region's vulnerability to the consequences of unanticipated external shocks, as experienced, for example, by Minnesota manufacturing industries during the foreign trade "boom" of the 1970s and the subsequent foreign trade bust of the 1980s. Industry diversification serves to reduce this vulnerability by expanding the long-term market options available to a region's industries.

Comparison of the Minnesota's economic base of 1950 with its projected 1990 economic base shows the extreme importance of the manufacuring sector as a continuing source of new jobs to replace job losses in agriculture and mining. In 1980, for example, estimated exporting-producing, basic employment was 242.6 thousand for the person count and 280.3 thousand based for the job count. The employment totals, as well as their percentage distribution among industries, thus differ for the reasons cited earlier.

Table 1

Total persons remuneratively employed in Minnesota industries, according to the US Census of Population person count, increased from slightly more than 1.1 million in 1950 to nearly 1.9 million in 1980--an increase of 1.7 percent annually. Year-to-year changes, of course, depart sharply from the long-term growth trend, as shown by the fluctuations in total jobs (reported in the US Department of Commerce Regional Economic Information Systems) from nearly 2.189 million in 1980 to 2.151 million in 1982--a net loss of 38 thousand--and a projected 2.560 million in 1990--a net gain of 408 thousand.

Industry No.	Title	Employment (persons) 1950	1960	1970	1980	Employment (jobs) 1980	1982	1985	1990
		(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)
1	Agric. for. fish.	264.9	182.6	115.1	110.6	152.5	148.2	154.1	146.5
2	Mining	15.9	17.8	14.0	15.2	16.3	11.5	9.3	10.6
3	Construction	64.3	70.7	83.0	99.4	105.0	90.8	108.1	119.7
	Mfg. nondurable	94.3	116.9	125.3	131.7	148.4	142.2	154.4	165.4
4	Food products	46.7	59.5	47.6	46.0	48.9	46.6	44.6	45.1
5	Printing and publish	18.2	26.1	32.0	36.5	35.9	37.3	45.7	51.3
6	Other nondurables	29.3	31.3	45.7	49.2	63.6	58.3	64.1	69.0
	Mfg. durables	94.6	130.3	189.0	249.1	234.5	214.7	234.6	275.5
7	Lumber and furniture	12.9	10.9	11.2	15.9	19.0	16.3	19.9	22.3
8	Fabricated metals	10.6	19.2	28.4	33.4	38.1	34.1	36.5	44.0
9	Nonelectrical machin	24.2	31.4	65.7	91.5	88.6	82.6	91.1	105.8
10	Electrical machinery	9.5	14.1	22.5	40.7	27.1	26.2	28.0	32.0
11	Other durables	37.4	54.6	61.2	67.6	61.8	55.4	59.1	71.4
	Total goods producin	534.0	518.4	526.5	606.0	656.7	607.3	660.5	717.6
12	Tran. comm. util.	97.3	92.6	96.3	129.1	133.2	128.0	134.7	142.3
13	Wholesale trade	50.2	53.5	70.7	92.2	124.7	120.3	124.7	134.3
14	Retail trade	181.3	195.9	258.8	321.2	384.1	379.1	411.4	450.7
15	Fin. ins. real estat	37.7	51.8	68.2	107.7	147.1	151.2	177.1	188.9
	Services, total	243.3	321.3	468.5	629.3	743.2	751.7	845.2	911.8
16	Pers. bus. repair se	93.0	102.3	119.4	141.6	214.8	222.7	277.7	297.3
17	Professional service	110.3	170.9	293.5	418.2	460.3	464.5	499.4	538.5
18	Public administratio	40.0	48.0	55.6	69.6	68.1	64.5	68.2	76.0
	Total services produ	609.8	715.0	962.5	1279.5	1532.3	1530.3	1693.1	1828.1
	All industry	1143.9	1233.4	1488.9	1885.5	2189.1	2137.7	2353.6	2545.7

Large individual industry differences occur in agriculture, retail trade, and social services. Educational services are underestimated with the job count series because of greater industry aggregation in the one series than the other estimating basic employment.

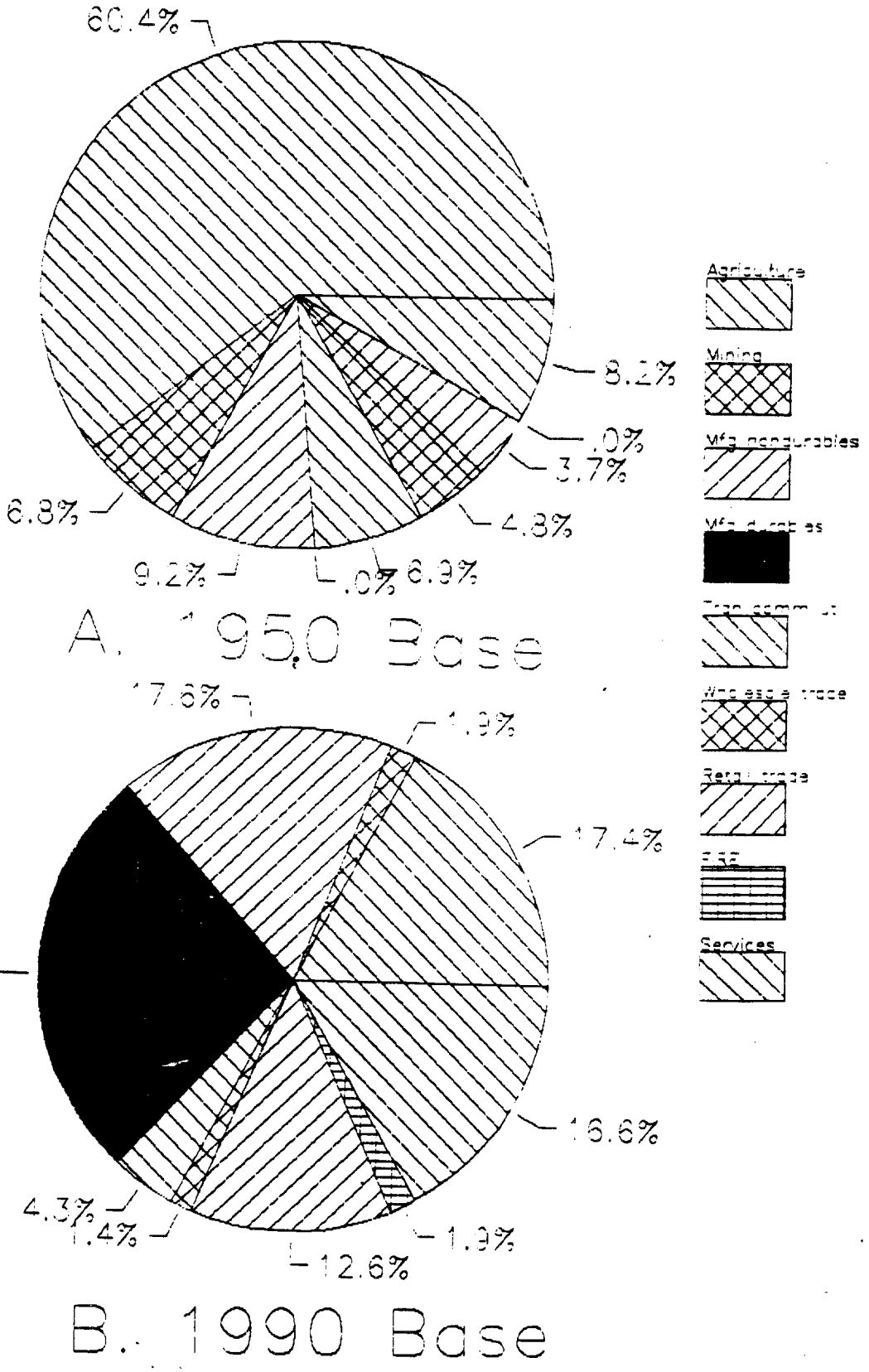
In 1980, agriculture accounted for 22.5 percent of total basic employment while the two manufacturing sectors accounted for 35.6 percent. Manufacturing and services together accounted for 51 percent of the total. In comparison agriculture and manufacturing accounted for only 7.0 percent and 17.5 percent, respectively of total employment (that is, basic and residentiary), while personal, business and professional service industries, together, with retail trade, accounted for 50.9 percent of the total. The goods-producing industries thus account for a major portion of basic employment, even when using the job count series.

The distribution of both basic and total employment is changing continuously as a result of the business cycle and, also, long-term structural changes in the US economy. In 1950, agricultural employment represented nearly two-thirds of total export-producing employment, as shown in Part A, Figure 5, while manufacturing and services, respectively, accounted for only 9.2 percent and 8.2 percent of the total. In 1990, as shown in Part B, Figure 5, agriculture is projected at 17.4 percent of the total while the services industry is projected at 16.6 percent and manufacturing is projected at 44 percent of the total--a near reversal of the 1950 economic base with manufacturing and services together accounting for more than 60 percent of basic industry in 1990.

The percentage distributions of basic and total employment for 1950 and 1990 show the changing industry structure--both the shift to services in total employment and the shift to manufacturing in basic employment, as follows:

Figure 5

The transformation of Minnesota's economic base from two-thirds agricultural to two-thirds manufacturing and service has occurred since 1950. Except for iron ore mining and tourism, agriculture and agriculture-related manufacturing, trade and service industries were Minnesota's highly specialized economic base in 1950 (Part A). By 1990, manufacturing and service industries, with no relation to agriculture, will have emerged as Minnesota's new and diversified economic base, reversing the role of nonagricultural industry and establishing new entrepreneurial opportunities in Minnesota's economic future.



Industry	Basic Jobs		1980 Comparisons	
	1950	1990	Basic	Total
			(percent)	
Agriculture	60.4	17.4	22.5	7.0
Mining	5.8	1.9	4.2	0.7
Mfg., nondurables	9.2	17.6	14.9	6.8
Mfg., durables	0	26.4	20.7	10.7
Tran., comm. utilities	6.9	4.3	4.7	6.1
Wholesale trade	4.8	1.4	3.8	5.7
Retail trade	3.7	12.6	12.5	17.5
Fin., ins., real estate	0	1.9	1.3	6.7
Services	8.2	16.6	15.4	34.0
Construction	0	0	0	4.8
Total	100.0	100.0	100.0	100.0

Only construction among the major industry groups is entirely a residentiary, or nonbasic, activity. In 1950, however, durable goods manufacturing and finance, insurance and real estate also were wholly residentiary industries. Basic jobs in these industries were virtually non-existent.

Another critical change in Minnesota's economic well-being is the remarkable diversity of its economic base. In 1950, agriculture, by accounting for two-thirds of its economic base, had no contenders as Minnesota's basic industry. Indeed, much of the basic manufacturing, trade and service industries was agriculture-related. Nondurable goods manufacturing was virtually non-existent in Minnesota as a basic industry. Yet, in less than three decades, the Minnesota economy was transformed into a post-industrial technology-intensive, manufacturing and service economy with remarkable capacity for self-sustaining economic growth.

Industry diversification has heightened rather than reduced cyclical fluctuations in the Minnesota economy. Minnesota export-producing industries quickly transmit changes in general economic conditions to local suppliers and work force. Industry diversification, on the other hand, has lessened the state's vulnerability to structural change by providing existing industries a

broad range of opportunities for entering new markets and acquiring new products and production techniques.

Minnesota's economic geography also changed during the 1950-80 period from place specialization to place diversity. The Minneapolis-St. Paul area expanded from a trade and service center for a goods-producing hinterland to manufacturing, and professional and business services center catering to national and world markets. At the same time, agriculture-dependent rural counties experienced the effects of industrial overspill from the metropolitan centers. As a result of manufacturing growth, less than two dozen Minnesota counties have more than two-thirds of their economic base in agriculture.

Two Economies or One?

Today, the Minneapolis-St. Paul core area--the seven-county Metropolitan Council Region--rather than Greater Minnesota as in years past, dominates the Minnesota economy in jobs, income and wealth. Surrounding it are the two transitional regional clusters--Central Minnesota, extending from the St. Croix River westward to Pine City, Hinckley, and Willmar in the west, and southeastern Minnesota, including Mankato and Rochester. Both regional clusters are now strongly influenced by the metropolitan core region. Together, they support the St. Cloud-to-Rochester axis that marks the extended Minneapolis-St. Paul metropolitan region.

Beyond the extended metropolitan core region are the two dominantly natural resource-based regional clusters--northern Minnesota and western Minnesota. One regional cluster depends on taconite, tourism, trade and government; the other on corn, cattle, and other cash grains. These two regional clusters are dominantly commodity-producing or commodity-serving. They are now experiencing the sharpest reductions in population, employment, earnings and general economic activity of all Minnesota regions as a result of

the post-1982 decline in rural goods-producing industries.

Regional comnparisons--Metro vs Greater Minnesota

Regional comparisons are confined in this section to employed persons (in each case reporting only one job that accounts for the principal source of remuneration) residing in the seven-county Metropolitan Region and the 80-county Greater Minnesota Region during the four census years--1950, 1960, 1970 and 1980. Total jobs in the two regions in 1980 and projected 1990 are compared, also.

Metropolitan Region Employed persons residing in the Metropolitan Region more than doubled over a 30-year period, growing from 486 thousand in 1950 to slightly more than one million in 1980, as shown in Table 2. The increase of 534 thousand employed persons is attributed mostly--70 percent--to three large industry groups, namely services, durable goods manufacturing, and finance, insurance, and real estate, with the three contributing, respectively, 60 percent, 26 percent and 14 percent of the total. Further transformation of the Metropolitan Region from a regional service center to a modern urban-industrial complex is implicit in the near-term projections from 1985 to 1990.

Industry employment growth in the Metropolitan Region is represented, again, by the three change sources--industry mix, regional share and national growth, with the differential (from US) industry growth being represented by relative change--the sum of the industry mix and regional share effects. Industry mix alone--the concentration of above-average growth industries--accounts for nearly two-thirds of the positive differential employment attributed to relative change over the 1950-80 period, which in turn accounts for 138.5 thousand more jobs than attributed to the national growth effect. Thus, the industry-mix effect increased job growth in the

Table 2

Total employed persons residing in the Metropolitan Region increased by 533.7 thousand--from slightly less than 0.5 million in 1950 to slightly more than one million in 1980. This is an annual increase of 2.5 percent and a doubling rate of 29 years. During the 1980-90 period, total jobs in the Metropoitan Region are projected to increase by 281.2 thousand—from slightly less than 1.25 million in 1980 to near 1.53 million in 1990, or an annual increase of 2.1 percent and a doubling rate of 35 years.

No.	Industry	Employment (persons) 1950	1960	1970	1980	Employment (jobs) 1980	1982	1985	1990
		(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)
1	Agric. for. fish	17.8	12.6	8.6	9.6	13.9	14.2	15.7	16.2
2	Mining	.4	.4	.7	.6	.9	1.2	1.3	1.6
3	Construction	28.6	35.5	43.1	48.2	55.8	47.0	58.9	70.4
	Mfg. nondurable	56.8	65.0	70.8	71.0	91.4	88.4	98.2	107.3
4	Food products	24.5	28.2	20.3	17.1	21.9	21.1	21.7	22.4
5	Printing and publish	12.7	18.4	21.8	24.2	23.9	24.8	30.7	34.7
6	Other nondurables	19.5	18.5	28.7	29.7	45.5	42.5	45.8	50.2
	Mfg. durable	65.8	93.5	126.6	163.0	158.4	148.2	159.5	188.0
7	Lumber and furniture	5.6	4.9	3.8	5.3	7.2	6.2	8.2	10.1
8	Fabricated metals	8.2	16.1	21.2	23.7	28.6	26.3	27.7	33.0
9	Nonelectrical machin	18.9	23.0	49.1	61.8	63.4	60.7	68.1	83.0
10	Electrical machinery	8.4	9.6	15.6	28.3	18.0	17.2	15.4	13.0
11	Other durables	24.6	39.9	37.0	43.7	41.2	37.8	40.1	48.9
	Total goods producin	169.4	207.0	249.8	292.4	320.4	299.0	333.6	383.5
12	Trans. comm. utiliti	52.9	53.3	58.1	76.1	83.5	80.8	86.7	92.5
13	Wholesale trade	28.9	34.1	49.0	57.9	83.0	81.1	85.9	94.6
14	Retail trade	88.0	96.1	134.6	171.8	214.6	211.2	236.5	266.8
15	Fin. ins. real estat	26.4	36.3	48.4	76.5	99.6	103.2	122.6	131.0
	Services, total	120.8	164.1	254.4	345.3	447.6	453.4	517.2	561.5
16	Pers., bus., repair	44.1	51.4	70.4	87.4	156.6	160.6	206.7	228.7
17	Professional service	54.1	85.5	152.2	217.7	251.3	255.6	274.1	295.1
18	Public administratio	22.6	27.2	31.8	40.2	39.7	37.2	36.4	37.7
	Total services produ	317.0	384.1	544.4	727.7	928.3	929.8	1049.0	1146.4
	All industry	486.4	591.1	794.2	1020.1	1248.7	1228.8	1382.6	1529.9

Metropolitan Region by 16 percent above the US growth rate. The regional-share effect added another 10 percent, thus making the Metropolitan Region job growth rate 26 percent above the US average for the 1950-80 period.

The strengths and weaknesses in the performance of individual industry groups during the 1980-90 period is revealed, in part, by the employment changes attributed to the three change sources. The goods-producing industries are adversely affected in the Metropolitan Region by their below-average growth in the US and, also, by lackluster competitive performance, as indicated by small regional-share effects. The individual services-producing industries show above-average growth in the Metropolitan Region because of their above-average employment growth in the US and above-average competitive position in the Metropolitan Region.

Overall industry-mix, regional-share and national-growth effects on employment growth in the major industry groups are summarized as follows:

Change Source	1950-60	1960-70	1970-80	Total	1980-90
		(in thousands)			
Industry mix	34.3	87.4	16.7	138.4	63.8
Regional share	-6.5	58.2	-.4	51.3	61.3
Relative change	27.8	145.6	16.3	189.7	125.1
National growth	76.9	57.5	209.6	344.0	156.1
Total change	104.7	203.1	225.9	533.7	281.2

Projected 1980 to 1990 employment change is attributed largely to the national-growth effect but with additional growth equivalent to 80 percent of national growth attributed to relative change, which is shared nearly equally by industry-mix and regional-share effects.

Concentration of above-average growth industries in the Metropolitan Region accounts for the generally positive industry-mix effects. Because of industry restructuring and relocation, the regional-share effects are negative for several industries in at least one of the four 10-year periods from 1950 to 1980. Consequently, individual industry growth trends depart sharply from

the overall Metropolitan Region growth trends, as illustrated by the following:

Change Source	1950-60	1960-70	1970-80	Total	1980-90
			(in thousands)		
Mfg., nondurables					
Nonindustry mix	6.1	-14.4	-14.9	-23.3	-12.3
Regional share	-6.1	7.5	-3.5	-2.1	12.3
Relative change	0	-6.9	-18.4	-25.4	0
National growth	8.2	12.7	18.6	39.6	15.9
Total change	8.2	5.8	0.2	14.2	15.9
Mfg., durables					
Industry mix	12.6	-1.2	-13.2	-1.9	-12.2
Regional share	5.6	16.0	16.3	37.9	15.5
Relative change	18.2	14.8	3.1	36.1	3.3
National growth	9.5	18.3	33.3	6.1	26.3
Total change	27.7	33.1	36.4	97.2	29.6
Services					
Industry mix	30.1	40.5	25.3	95.9	22.0
Regional share	-4.2	17.6	-1.2	12.2	9.3
Relative change	25.9	58.1	24.1	108.1	31.3
National growth	17.4	32.2	66.8	116.6	82.7
Total change	43.3	90.3	90.9	224.8	114.0

While the industry-mix effect in the 1950-80 period and the 1980-90 period is generally negative for manufacturing industries, the regional-share effect differs widely between nondurable goods manufacturing and durable goods manufacturing for both periods, the difference demonstrating the above-average competitive position of the durable goods manufacturing industries in the Metropolitan Region. For the services-producing industries, a strongly positive regional-share effect re-enforces the above-average industry-mix effect in both the 1950-80 and 1980-90 periods.

The transformation of the Metropolitan Region from a regional trade center with a concentration of agricultural and food products manufacturing into a modern, technology-intensive urban-industrial complex is implicit in a comparison of the Region's economic base in 1950 and its projected economic base in 1990. Regional service center industries accounted for much of the Metropolitan Region economic base in 1950 with its concentration of

residentiary (except for agriculture-related and food-related manufacturing) industries, including:

- o Nondurable goods manufacturing (17.5% in 1950 to 14.7% in 1990)
- o Durable goods manufacturing (17.0% to 31.6%)
- o Transportation, communications, and utilities (14.2% to 4.5%)
- o Wholesale trade (11.7% to 6.2%)
- o Retail trade (13.3% to 8.7%)
- o Finance, insurance, and real estate (9.8% to 8.8%)
- o Services (16.5% to 25.4%)

All but the personal, professional, business and repair service industries in the 1950 industry listing have declined in relative importance while durable goods manufacturing has increased sharply along with the service industry group.

Greater Minnesota The 80 counties outside the Metropolitan Region are largely rural. The several urban places of more than 50,000 population are designated as metropolitan areas, but even then the surrounding counties are essentially rural. A critical variable correlating the degree of rurality of these counties is their proximity to the Minneapolis-St. Paul Metropolitan Region.

Employment trends in Greater Minnesota generally followed employment trends in the Metropolitan Region in the 1950-80 period with the one clear distinction being the relative importance of agriculture and its impact on goods-producing employment, as shown in Table 3. Total persons employed principally in agriculture declined from about 247 thousand in 1950 to 101 thousand in 1980 while persons employed principally in construction and manufacturing increased by 16 thousand and 72 thousand, respectively. Because of the large decline in agricultural employment, total goods-producing employment declined by 51 thousand over the 1950-80 period. Overall employment increased at an annual rate of 0.9 percent and a doubling rate of

Table 3

Employed persons residing in Greater Minnesota increased by 208.1 thousand over the 1950-80 period--fropm 657.5 thousand in 1950 to 865.6 thousand in 1980, which is an annual growth rate of 0.9 percent and a doubling rate of 75 years. On a job count basis, employment is projected to increase by 75.2 thousand over the 1980-90 period--from 940.4 thousand in 1980 to slightly more than on million in 1990. This reduces to an annual growth rate of 0.8 percent and a doubling rate of 91 years. The job shortfall in the 1980-90 period, if based on the 1950-80 employed person growth rate, is projected at 16.6 thousand and, if based on the 1990-80 employed person growth rate of 2.2 pereent, is projected at 56 thousand.

No.	Industry	Employment (persons) 1950	1960	1970	1980	Employment (jobs) 1980	1982	1985	1990
		(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)
1	Agric. for. fish	247.2	170.1	106.5	101.0	138.6	134.0	138.4	130.2
2	Mining	15.5	17.4	13.4	14.7	15.4	10.4	8.0	9.0
3	Construction	35.6	35.2	39.9	51.2	49.2	43.7	49.2	49.3
	Mfg. nondurable	37.5	51.9	54.5	60.7	57.0	53.8	56.2	58.0
4	Food products	22.2	31.4	27.3	28.8	27.0	25.5	23.0	22.7
5	Printing and publish	5.5	7.8	10.2	12.3	12.0	12.5	15.0	16.6
6	Other nondurables	9.8	12.8	17.0	19.5	18.0	15.7	18.3	18.8
	Mfg. durable	28.8	36.8	62.5	86.1	76.2	66.5	75.1	87.5
7	Lumber and furniture	7.3	6.1	7.5	10.6	11.8	10.2	11.7	12.3
8	Fabricated metals	2.4	3.1	7.2	9.7	9.4	7.8	8.8	11.0
9	Nonelectrical machin	5.3	8.4	16.6	29.7	25.2	21.9	23.0	22.8
10	Electrical machinery	1.1	4.5	6.9	12.3	9.1	9.1	12.6	19.0
11	Other durables	12.8	14.7	24.2	23.9	20.6	17.6	19.0	22.4
	Total goods producin	364.6	311.4	276.8	313.7	336.4	308.4	326.9	334.0
12	Trans. comm. utiliti	44.5	39.3	38.2	53.0	49.7	47.2	48.0	49.8
13	Wholesale trade	21.3	19.3	21.8	34.4	41.7	39.2	38.8	39.7
14	Retail trade	93.2	99.8	124.2	149.4	169.5	167.9	174.9	184.0
15	Fin. ins. real estat	11.3	15.4	19.7	31.2	47.5	48.0	54.4	57.9
	Services, total	122.6	157.1	214.0	283.8	295.6	298.3	328.0	350.2
16	Pers., bus., repair	49.0	51.0	48.9	54.1	58.2	62.1	70.9	68.5
17	Professional service	56.2	85.4	141.3	200.4	209.0	208.9	225.3	243.4
18	Public administratio	17.4	20.7	23.8	29.3	28.4	27.3	31.8	38.3
	Total services produ	292.9	330.9	418.0	551.9	604.0	600.5	644.1	681.6
	All industry	657.5	642.3	694.8	865.6	940.4	908.9	971.0	1015.6

75 years.

Meanwhile, persons employed principally in the broadly defined services-producing industries increased from 293 thousand in 1950 to 552 thousand in 1980--an increase of 259 thousand. A major portion of this increase occurred in professional services employment, particularly health care and public education.

In 1980, total job-count employment in Greater Minnesota reached an all-time high of 940 thousand. This figure compares with the 866 thousand employed persons residing in Greater Minnesota. In the two recession years from 1980 to 1982, however, this total dropped by 33 thousand to 907 thousand, with wage and salary jobs declining by 42 thousand. The number of self-employed actually increased by more than five thousand. Overall employment growth was at an rate of 0.8 percent and a doubling rate of 91 years. Growth of the resident Greater Minnesota employed work force in the 1950-80 period thus exceeded the projected growth in resident net new jobs by one-tenth of one percent, which converts to a job gap of more than 16 thousand by 1990.

The largest Greater Minnesota job reductions in the 1980-82 period occurred in the manufacturing industries, with large reductions, also, in the services-producing industries. The decline in manufacturing employment was equivalent to 10 percent of its 1980 level, while the decline in services-producing employment was equivalent to slightly more than two percent of its 1980 level.

Sources of employment change among Greater Minnesota resident employed persons during the 1950-80 period. Negative industry-mix and regional-share effects account for the lagging employment growth at one-half the US growth rate. Agriculture accounts for the entire slowdown and more because of its

negative multiplier effect on residentiary services, which is confounded by a negative regional-share effect for every services-producing industry.

Employment change during the 1980-90 period continues earlier trends with large negative industry-mix and even larger negative regional-share effects. However, much of the negative industry-mix is due to the export trade bust of the 1982-85 period that adversely affected the region's large agricultural and manufacturing industry base. The negative multiplier effects of a declining economic base were even more prounced in the 1980s than in the preceding 30-year period.

Sources of employment change among Greater Minnesota industry for the major industry groups are concentrated in three industry groups--agriculture, services and, to a lesser extent, durable goods manufacturing. The large negative regional-share effects in the services-producing industries, including services, are directly related to the large negative industry-mix effect originating in agriculture. The positive regional-share effect in manufacturing is related to the superior competitive of the region's nonagriculture-related manufacturing in domestic and foreign export markets. However, the positive competitive position of the region's manufacturing is yet not large enough to overcome the adverse employment effects of agricultural restructuring that results in reduced labor requirements in agriculture and agriculture-related industries. Strong export market performance in the late 1980s would mean, of course, a smaller negative regional-share effect attributed to the services-producing sector and particularly the service industries--personal, business and professional.

Individual industry employment change in the manufacturing and service industry groups accentuates the contrasting performance of trade-related basic industry in Greater Minnesota. While food products manufacturing generally is

a below-average growth industry in the US, it is an above-average growth industry in Greater Minnesota, except for the 1980s when it is projected to lose employment share in the US. Nonelectrical machinery manufacturing and electrical machinery manufacturing, on the other hand, are dominantly above-average growth industries, while professional services, which show above-average growth in the US, have failed to maintain above-average growth in Greater Minnesota relative to their US counterparts. Again, if the region's basic industries achieve greater-than-expected recovery from the prolonged trade-induced recession of the early 1980s in Greater Minnesota, then the sharply negative regional-share effects now projected for the 1980s would not hold.

Comparison of the 1950 and the projected 1990 percentage distributions of basic employment highlights the changes in industry mix accompanying the shift to a more diverse economic base as follows:

- Agriculture, forestry, fisheries (87.3% to 45.8%)
- Mining (7.2% to 3.6%)
- Nondurable goods manufacturing (2.9% to 8.0%)
- Durable goods manufacturing (.0% to 3.6%)
- Transportation, communications, and utilities (1.7% to 2.6%)
- Retail trade (.0% to 10.9%)
- Finance, insurance, and real estate (.0% to 1.2%)
- Services (.8% to 24.2%)

Diversification of the economic base of Greater Minnesota is clearly indicated in the comparison of the region's basic industry employment in 1950 and projected 1990. In 1950, an estimated 87.3 percent of persons employed in export-producing activity were in agriculture, 7.2 percent in mining, 2.9 percent in nondurable goods manufacturing, largely agricultural processing and 1.7 percent in transportation, communication and utilities, again, largely agricultural-related transportation. By 1990, the agriculture share of the region's economic base is projected at 45.8 percent, followed by services,

largely professional, at 24.2 percent, retail trade at 10.9 percent, nondurable goods manufacturing at 8 percent, and both durable goods manufacturing and mining at 3.6 percent. The nonagricultural share of basic industry is thus roughly equal to the agricultural-related share. This parity is a regional average, with much variation within the region, but generally tilting strongly toward a more agriculture-dependent basic industry with increasing distance from the Metropolitan Region.

Much variation exists within Greater Minnesota in both the 1950-80 and the 1980-90 employment trends. Central Minnesota, with three substate planning districts bordering the Metro Region, shows much growth in employment and population, while Northeast Minnesota and West Minnesota show population decline and, for the first decade since the 1950s, employment decline as well. Separate regional summaries for Greater Minnesota are presented in the Staff Paper Series titled, "Regional Differentiation of the Minnesota Economy: Part 2. Greater Minnesota".

Regional specialization and trade

Regional specialization leads to interregional trade and interregional trade makes regional specialization possible. The Metropolitan Region, while achieving an increasingly diversified economic base, has also achieved an economic base that includes high-order services--communications and transportation, banking, insurance and finance, and business and professional services. At the same time, Greater Minnesota has become more diversified in its goods-producing industries, expanding from a one-industry to a multiple-industry economic base, particularly in counties close to the Minneapolis-St. Paul metropolitan area. Its low-cost sites and wage-rate advantage over the Metropolitan Region has provided a cost-advantage for the expansion of existing, and organization of new, conventional-type

goods-producing manufacturing businesses.

The above-average performance of the Greater Minnesota economy in the 1970s is revealed in the large positive regional-share effects associated with employment increases in export-dependent manufacturing industries. The Greater Minnesota economy continued its specialization in goods-producing industries, but with a significant diversification of its economic base.

For the entire 30-year period from 1950 to 1980, employment growth in Greater Minnesota lagged US employment growth because of the disproportionate importance of agriculture. However, as agriculture declined, manufacturing gained in importance as a basic industry.

Greater Minnesota experienced more rapid growth in manufacturing employment in the 1950-80 period than the Metropolitan Region--a 109 percent increase as compared with a 91 percent increase, with the largest increases being in durable goods manufacturing in both regions. Because of lower levels of employment in 1950 in Greater Minnesota than the Metro Region, the absolute increases were smaller in Greater Minnesota, as shown below:

Manufacturing Industry	Metro Region			Greater MN		
	1950	1980	Increase	1950	1980	Increase
	(thou.)	(thou.)	(pct.)	(thou.)	(thou.)	(pct.)
Nondurable goods	56.8	71.0	25	37.5	60.7	62
Durable goods	65.8	162.0	148	28.8	86.1	199
Total manufacturing	122.6	234.0	91	66.3	146.8	109
Other industry	263.8	786.1	116	591.2	718.8	22
All industry	486.4	1020.1	110	657.5	865.6	32

Projected growth manufacturing employment in the 1980-90 period is confined entirely to the Metropolitan Region simply because the large negative impact of the two recessions and the decline in export-producing industries was much less severe in the Metropolitan Region than in Greater Minnesota. The prolonged downturn in Minnesota exports continued until 1986. Manufacturing employment declined also because of industry efforts to improve

productivity by restructuring, which reduced employment requirements in production and distribution. The projected employment growth is summarized as follows:

Industry Group	Metro Region 1980 (thou.)	Metro Region 1990 (thou.)	Metro Region Increase (pct.)	Greater MN 1950 (thou.)	Greater MN 1980 (thou.)	Greater MN Increase (pct.)
Nondurable goods	91.4	107.3	17	57.0	58.0	2
Durable goods	158.4	188.0	19	76.2	75.1	-1
Total manufacturing	249.8	295.3	18	133.2	133.1	0
Other industry	998.9	1234.6	24	807.2	882.5	9
All industry	1248.7	1529.9	22	940.4	1015.6	8

Concentration of Minnesota industry growth of the 1980s in the Metropolitan Region further increases the proportion of the total work force that commutes to work in the Metropolitan Region. Using jobs per person ratios, initial estimates show that in 1980 approximately 94 thousand jobs in the Metropolitan Region were in excess of the jobs held by the resident work force. An additional 110 thousand "excess" jobs are projected for the 1980-90 period, which thus yields a total of 210 thousand "excess" jobs in 1990, as follows:

Industry Group	1980 Total	1980 Excess	Added Excess	Total Excess
		(thousands)		
Nondurable goods	91.4	11.4	4.6	16.0
Durable goods	158.4	5.0	12.9	17.9
Total manufacturing	249.8	16.4	17.5	33.9
Other industry	998.9	77.6	98.1	175.7
All industry	1248.7	94.0	115.6	209.6

By 1990, the projected "excess" employment would account for 13 percent of the Metropolitan Region jobs, assuming 1980-85 industry location trends were to continue. However, low manufacturing wage costs in Greater Minnesota--at least one-third below Metro Region wage rates--and proportionately even lower site costs are increasingly strong inducements for more rapid manufacturing industry expansion in Greater Minnesota than in the Metro Region in the

1987-90 period.

The differential growth of manufacturing employment is shown, finally, in comparisons of the projected 1980-90 employment increases and the excess or deficit employment based on projected US employment increases, as follows:

Industry Group	Total Increase			Excess or Deficit		
	Metro	Gr MN	MN	Metro	Gr MN	MN
	(thousands)					
Nondurable goods	15.9	1.0	16.9	14.0	.4	14.4
Durable goods	29.6	11.3	40.9	15.6	-6.8	8.8
Total manufacturing	45.5	12.3	57.8	29.6	-6.4	23.2
Other industry	235.7	62.9	298.6	23.4	-78.1	-54.7
All industry	281.2	75.2	356.4	53.3	-84.8	-31.5

Thus, the projected 1990 Minnesota employment, when based on US employment growth, is larger than the projected employment by 31.5 thousand jobs. However, the projected increase for the Metropolitan Region employment in the 1980s is 53.3 thousand larger than the US-based employment increase. For Greater Minnesota the projected increase is 84.8 thousand smaller. More than half of the above-average employment growth in the Metropolitan Region is attributed to manufacturing, based, again, on 1980-85 industry trends and not the more likely 1987-90 trends noted earlier.

The linkage between regional specialization and interregional trade is clearly evident in the estimates of Metro Region-Greater Minnesota trade in 1982 based on the 528-industry Minnesota IMPLAN model as shown in Table 4. Purchases of Metro Region sectors from Greater Minnesota are largely from goods-producing industries while purchases of Greater Minnesota sectors from the Metro region are largely from services-producing industries. In 1982, the interregional trade between the two regions was more important in total dollar volume to the two regions than their total foreign trade (valued at less than 14 percent of total outshipments).

Regional specialization and interregional trade have lead to regional

Table 4

Total basic jobs supported by Minnesota's export-producing industry in 1987 are estimated at 436.3 thousand, of which 138.6 thousand are supported by inter-regional trade within in Minnesota. Nearly a third of the export-producing agricultural employment in Greater Minnesota depends on the export of farm products to the Metropolitan Region while more than two-thirds of the export-producing personal, business and repair services employment in the Metropolitan Region depends on Greater Minnesota residents for their market. Nearly a third of all export-producing employment in the Metropolitan Region is supported by the interregional trade.

No.	Industry	Minne-sota	Metro-politan	Greater Minn.	Interregional		
					Total	Metro	Gr. MN.
		(thou.)	(thou.)	(thou.)	(thou.)	(thou.)	(thou.)
1	Agr., for., fish	62.1	.0	95.1	33.1	0	33.1
2	Mining	5.6	.0	6.7	1.1	0	1.1
3	Construction	.0	.0	.0	0	1.1	
	Manufacturing, t	125.8	110.1	24.7	9.0	6.3	2.6
	Mnfg, nondurable	51.6	36.4	15.5	.3	0.1	0.2
4	Food products	13.1	3.5	9.7	.0	0	0
5	Printing and	17.6	14.4	3.3	.0	0	0
6	Other nondura	38.5	33.0	5.9	.3	0.1	0.2
	Mnfg, durable	74.1	73.6	9.1	8.6	6.2	2.4
7	Lumber and fu	.1	.0	2.5	2.4	0	2.4
8	Fabricated me	8.3	11.0	.0	2.7	2.7	0
9	Nonelectrical	50.6	45.4	5.1	.0	0	0
10	Electrical ma	.0	.0	.0	.0	0	0
11	Other durable	15.1	17.2	1.5	3.5	2.1	0
	Total good prod	193.4	110.1	127.9	44.6	7.8	36.8
12	Tran., comm., ut	12.2	12.6	3.7	4.1	3.9	0
13	Wholesale trade	3.8	15.6	.0	11.8	11.8	0
14	Retail trade	32.3	20.9	16.8	5.5	14.6	1.9
15	Fin., ins., real	7.7	24.3	1.0	17.6	16.5	1.0
	Private services	47.9	60.4	39.5	52.0	32.1	19.9
16	Per., bus., r	11.4	39.9	.5	28.9	28.4	0.5
17	Prof. service	36.9	16.1	42.3	21.5	7.8	13.7
18	Public admini	.0	.0	5.6	5.6	0	5.6
	Total services p	104.3	133.9	64.4	93.9	71.1	22.8
	All industry	297.7	243.9	192.4	138.6	78.9	59.7

interdependence. Clearly, if Minnesota is part of a global economy, the Metro Region and Greater Minnesota are parts of one economy and not two. Proximity to one another makes the one economy designation even more meaningful and appropriate for Minnesota. Even more important, as the discussion on industry productivity demonstrates, Greater Minnesota's site cost and wage rate advantages over the Metro Region enhance the prospects for an expansion of Minnesota manufacturing in the 1987-90 period beyond the levels indicated by 1980-85 industry trends.

Thinking Strategically

Thinking strategically is take account of the constraints established by US policies and world conditions on the choices available for attaining certain preferred goals. Movement towards these goals will depend, in part, on the nature and severity of the threats faced by Minnesotans to their economic and social well-being. It will depend also on the understanding of past trends and the useful conslusions that can be drawn from these trends for the future. Two areas that call for large doses of strategic thinking are export markets and industry productivity as they relate to economic growth.

Minnesota's economic growth is directly linked to its economic base and the growth of trade, imports as well as exports. Much attention is focused on the role of exports--the sale of Minnesota-produced goods and services to out-of-state customers--the source of Minnesota's economic growth. Much less attention is placed on role of imports in accounting for this growth. Without imports, of course, much value added by Minnesota businesses would not be possible. Minnesota, in short, is a trading economy, highly dependent on both imports and exports and highly sensitive to the economic well-being of its trading partners.

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 understand the trading prospects in domestic regional markets 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.

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.

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 to both US and Minnesota 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 5 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 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.

Table 5

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

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.

An import substitution strategy addresses 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 may depend on a judicious and timely deployment of both export expansion and import substitution strategies.

Industry productivity

The bottom line of all effective and meaningful economic development is improved productivity of all employed resources rather than simply export expansion. Such results are best demonstrated in U.S. industry output and° employment trends.

Increasing world-scale competition has forced goods-producing industries to move quickly to adopt cost-reducing measures, while residentiary services-producing industries are protected from much outside competition by high transportation costs and the advantages of close proximity to their customers. Minnesota industry remains competitive in large part because of the productivity of its work force that is sustained at high levels by early adoption of cost-reducing technology and business services.

Over the 1967-80 period output per worker in U.S. industry grew at an

overall rate of one-percent annually in both goods-producing and services-producing industries. In the 1980-84 period, however, output per worker increased 3.0 percent and 1.2 percent, respectively, in the two industries. The all industry growth was 0.6 percent and 1.5 percent, respectively, for the two periods. Generally, individual manufacturing industries show high year-to-year variability in output per hour ratios. The variability in these ratios in the manufacturing industries is exceeded only in agriculture and construction. Both the manufacturing industries and the construction industry are cyclically-sensitive and, hence, the year-to-year variability coincides with the general business cycle.

Comparisons of the changing patterns of productivity in the U.S. economy in the four business cycles from 1958 to 1984 (with the last two cycles being counted as one) will differ from the 1967-80 and 1980-84 comparisons. Generally declining levels of real gross output in the goods-producing industries are reported over the four business cycles. During much of this period, the services-producing industries contributed an increasingly large share of an expanding total real output. In the 1979-84 period, however, the growth in total real output was generally less than in any one of the preceding three business cycles.

A larger share of GNP growth is attributed to growth in output per worker in the latest period than in the earlier periods. Limited export market expansion, coupled with newly emerging demographic constraints, made labor productivity growth an increasingly important determinant of the 2.8 percent real GNP growth in the latest period. Similarly, the Minnesota economy depends increasingly on above-average growth in worker productivity to achieve above-average growth in its industry gross product. Thus, the rapid shift to services, together with an increasingly severe demographic constraint on the

future growth of the Minnesota labor force, make doubly important a renewed focus on productivity in the work place, particularly in the services-producing industries.

Productivity per nonfarm worker in Greater Minnesota on the average is one-third to one-half below the corresponding statistic for the Metropolitan Region as measured by labor earnings. Productivity per worker is low because investment per worker is low, which is the result of limited access to essential information for developing business and market plans--laregly on the part of small businesses--that are strong enough to attract the needed productivity-increasing investment financing. Low wages, of course, makes low investment per worker an economically-viable option, but low wages will remain low as long as worker productivity remains low. It is important to acknowledge that Greater Minnesota businesses with good management and adequate financing are profitable as those in the Metrpolitan Region.

The output sales and input purchases of Minnesota industries helped support over 2.1 million jobs that produced a total industry output of more than $104 billion and total labor earnings of more than $35 billion in 1982, as shown in Table 6. 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

Table 6

Gross Minnesota industry output was valued at $104.6 billion (in 1982 dollars) in 1982. 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 2.1 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.

No.	Industry Title	1982 Gross Output	1982 Total Earning	1982 REIS Employ	1982 BLS Employ	1985 Gross Output	1985 Total Earning	1985 REIS Employ	1985 BLS Employ	2000 Gross Output	2000 Total Earning	2000 REIS Employ	2000 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	78.6	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	18546	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	50.0	34.7	3081	1389	60.5	42.0	4903	3082	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	330	123	16.6	16.6

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 distribution of jobs by occupational title in a given industry, as shown in Table 7. The industry staffing paterns projected for 1982-2000 period correspond to the US and Minnesota occupational projections prepared, respectively, 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, for example, administrative support and sales.

Corresponding US occupational employment estimates and projections are presented in Table 8. With the more detailed breakdown available from the 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.

Changing patterns of occupational employment have important implications for both the Minnesota economy and its educational institutions. Job

Table 7

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 8

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	Estimated 1986 Total	Proportio	Projected 2000 Total	Proportio	Change 1986-2000 Total	Proportio	Annual Growth
		(thou.)	(pct.)	(thou.)	(pct.)	(thou.)	(pct.)	(pct.)
TotTotal,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	758	.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	13606	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 & peripher	309	.3	457	.3	148	.7	3.8
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
WclTotal 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	4622	3.4	349	1.2	.4
BclTotal blue-collar		34597	31.0	36885	27.7	2288	10.7	.5

replacement still accounts for most job openings in this decade and the next, as shown in Table 9. 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 10. In contast to the 50 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. Secretaries, 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.

Occupational differences in annual earnings per worker based largely on 1970-80 levels are summarized in Table 11. In 1982, average earnings ranged from $6.6 thousand in service occupations to $27.0 thousand in managerial and

Table 9

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	45	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	365	.3	485	120	.6	33
Total, 50 largest		55457	49.7	70656	15199	71.0	27

Table 10

The 50 fastest-growing occupations in the US range from paralegal 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	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
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	31	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
Interviewing 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

Table 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

management-related occupations. The lowest level of earnings was 59 percent below the overall average of $16.1 thousand while the highest 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.

Labor and capital productivity improvements in the export-producing industries ameleriote the adverse effects of increased production costs in these industries. Productivity improvements are still virtually non-existant, however, in the two activity areas most heavily supported by state and local spending--education and health care. Labor productivity of public primary and secondary school instructional staff, for example, fell by 36 percent from 1940 to 1986. During the same period labor productivity of all civilian workers increased by 108 percent. Yet, education is viewed as a critical asset in improving the competitiveness of US and Mionnesota businesses in a global economy.

Professor Richard Vedder--a respected authority on the economics of public education--has noted that public schools educated 16.5 percent of the population at a cost of two percent of the nation's output in 1950. In 1986, it took 3.5 percent of the nation's output to educate the same proportion of the nation's population. Vedder relates the productivity decline in public schools to three factors: monopoly power, third party payments and "seeking something for nothing" by being a "rent-seeker", that is, attempting to increase one's income without a trade-off of any added, and demonstrably productive, work. For example, private schools spend 36 percent less per pupil than public schools. Private schools, of course, face competition for

students while public schools do not. Moreover, when consumers do not pay directly for the service, they have little incentive to demand efficiency and effectiveness of service delivery. Making payments to the consumers for these services rather than their providers would reduce at least two of the three deterrents to improved productivity in the schoolroom.

Similar concerns are expressed over post-secondary education and the lack of performance measures that reasonably well represent the values sought by the consumers and not simply the values put forth by the providers of educational services. While the social value of scientific education and research is widely recognized, it does not necessarily follow that the more advanced the post-secondary education the more it must remain the exclusive responsibility of a provider-driven service delivery system. The challenge of improving productivity in post-secondary education necessarily includes thorough examination of the processes for establishing and implementing performance goals as well as the goals themselves and the efficient use of incentives to reach these goals. As suggested by Tor Dahl--a distinguished management consultant for some of our largest private corporations as well as several of our public school districts, productivity in the work place is three dimensional in that it involves efficiency, effectiveness and occupancy. Of the three, effectiveness is most critical insofar as it establishes the societal or market value of the results achieved by this activity. Improving productivity means doing the right thing, doing it well and without waste of time and effort, that is, being efficient and fully occupied while being effective.

Regional centers of applied economic and business research that are linked to both the State University System and the University of Minnesota (or corresponding institutions in other states) would help organize the

intellectual and statistical resources supported by state and local financing for meeting the critical challenge of improving total resource productivity in the work place of each substate region. Target activities for such efforts would include education, health care and other tax-supported services-producing activities that are a growing burden on the taxpayer because of rapid cost inflation and lack of productivity improvements. Such centers would be complementary, rather than competitive, with existing research centers, provided they have an appropriate organizational form, environment and financial support for achieving their individual goals.

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