

# Staff Papers Series

P79-2

February 2, 1979

## EMPLOYMENT TRENDS AND PROJECTIONS FOR MINNESOTA AND ITS SUBSTATE DEVELOPMENT REGIONS

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

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## ACKNOWLEDGEMENT

This report is based on research completed under the Minnesota Agricultural Experiment Station project entitled, Service Delivery Alternatives in Rural Areas. The focus of this research has been job and skill development in Minnesota regions. Financial support by the Minnesota Agricultural Experiment Station has made possible the compilation and assessment of the statistical series needed in the study of industry employment prospects and potentials in Minnesota and each of its development regions.

## ABSTRACT

Changing patterns of employment in Minnesota and its 13 development regions are examined in this report. Industry employment change is discussed in terms of the industry distribution of employment, the sources of employment change, and the interrelationships between the economic base and total employment change. Economic base refers to export-producing industry, specifically, the employment engaged in producing goods and services which are bought by non-residents.

An indirect method of measurement is used in deriving the economic base of Minnesota and its 13 development regions. Employment in excess of the national average in each industry is derived as a surrogate for export-producing employment. This measurement of the economic base shows the declining importance of agriculture and agriculture-related industries in each substate region.

While agriculture and agriculture-related employment is declining, non-agricultural manufacturing and service industry employment is increasing. Five above-average growth industries are projected to increase from 47.4 percent of total excess employment in 1970 to 74.8 percent of the total in 2000.

Total industry employment is derived with a shift-and-share model. In this projection method, the total change in employment is partitioned into three sources -- the national-growth effect, the industry-mix effect, and the regional-share effect. The shifts in total employment from dependence on agriculture to dependence on manufacturing and services are forecast by the industry-mix and the regional-share effects in the shift-and-share forecasting approach.

## SUMMARY AND CONCLUSIONS

Important shifts have occurred in Minnesota industry employment since 1940. Growth in manufacturing, trade and service industries has more than offset the employment decline in agriculture, mining and timber-related industries in the 30 years from 1940 to 1970. Employment shifts in place of work have been accompanied by corresponding shifts in place of residence.

Today, only one in five employed persons is in the three primary resource-related industries. Only one of every eight residents lives on farms while three of every five residents lives in cities of 10,000 population or more. The remaining residents live in small towns and open-country settlements.

The shift to a service economy is projected to continue from 1970 to 2000. Employment in the primary and secondary industries -- agriculture, mining, and timber-related manufacturing and, also, other manufacturing and construction-- is projected to decline. Employment growth in trade and service industries is projected to more than off-set the projected employment decline in the primary and secondary industries.

From 1940 to 1970, the total civilian employed labor force in Minnesota increased by 60.5 percent, from 927,899 to 1,488,919. If the employed labor force had increased at the national rate of 69.2 percent, the 1970 employment would have been 642,235 larger than it was in 1940. It actually was 561,020 larger -- a difference of 81,215. The below-average growth was due to the adverse industry mix in the State -- a disproportionate number of employed persons in the below-average growth industries, such as agriculture.

In the 1970-2000 period, the adverse industry-mix effect will lessen, largely because of the declining importance of agricultural employment in the Minnesota economy. The projected increases in most industry employment in Minnesota are smaller than the increases for the corresponding industry employment in the Nation. If the 1940-1970 industry-mix were to exist in the 1970-2000 period, then the

total civilian employment in 2000 would be 1,926,094 rather than the projected 2,147,900. This is an increase of 29.4 percent from 1970 to 2000, rather than the projected increase of 44.3 percent. The shift in industry-mix thus becomes a key factor in accounting for the projected growth in total industry employment.

The projected increase of 44.3 percent in total employment is consistent with the projected increase of 22.3 percent in total population (from 3,805,000 in 1970 to 4,652,800 in 2000). The spread of 22 percent in the two rates of increase is explained by sharply increasing labor force participation rates which are combined with increasing proportions of total population in the working age groups. However, the rates of increase in population and employment, and the spread between the two, vary among the substate regions because of regional differences in both labor force participation rates and age distribution of each region's population.

Most of the employment increase is projected for the substate regions within a 100-mile radius of downtown Minneapolis-St. Paul. Employment will concentrate in this extended metropolitan economic community because of high labor force participation rates and population growth. Especially in the dominantly agricultural counties, multiple job-holding will occur more frequently than in the substate regions outside the 100-mile radius.

Population and employment changes since 1970 are concentrated within the 100-mile radius (of downtown Minneapolis-St. Paul). Above-average increases in labor force participation account for most of the employment increases in the five substate regions adjoining the Metropolitan Council Region. In two of the five regions, however, population growth has been large, also.

EMPLOYMENT TRENDS AND PROJECTIONS FOR MINNESOTA  
AND ITS SUBSTATE DEVELOPMENT REGIONS<sup>1/</sup>

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In 1940, most Minnesotans were employed in the commodity-producing industries -- agriculture, mining, construction and manufacturing. By 1970, only 1 person in 3 was employed in these industries. Non-commodity-producing industries, -- transportation, communications, utilities, trade, finance, real estate, personal and other services, and government -- accounted for the remaining employment.

The shift to a service economy was accompanied by a corresponding shift to urban and metropolitan residence. In 1940, 1 of every 3 people in Minnesota lived on farms, while another 1 of every 3 lived in cities of 10,000 population or more. By 1970, only 1 of every 8 residents lived on farms and 3 out of 5 residents of the State lived in cities of 10,000 population or more.

The shift to a service economy is projected to continue over the 30-year period from 1970 to 2000 as the non-commodity, or service, industries become even more important. Employment in farming, mining, manufacturing (including timber-related activities) and construction, as a proportion of total employment, is projected to decline from 30 percent to 24 percent over the 30-year period.

The location of population is changing. No longer are people moving in large numbers to the major metropolitan areas. Indeed, a "reverse" migration has occurred as fewer people move to large metropolitan areas and more remain in or move to smaller cities and towns, but largely within a 100-mile radius of the large metropolitan core area.

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<sup>1/</sup> The authors gratefully acknowledge the helpful comments and suggestions of Ronald Dorf, John Hoyt and Andrea Lubov in the preparation of this report.



Industry employment trends and projections reveal both a changing industry mix in Minnesota and a changing geographical pattern of industry location. Also revealed by the employment trends and projections are the changing relationships between "basic" and "service" industries and the sources of employment change in Minnesota industries.

### Study Objectives

The principal objective was to prepare a series of employment projections for Minnesota and its 13 development regions delineated in fig. 1. Procedures used to make these projections are discussed briefly, and the various projected series are compared with corresponding industry employment projections for the United States.

A secondary study objective was to explore the employment implications of the population projection series prepared by the Minnesota State Planning Agency. These projections are based on a demographic approach with the predicted population being the result of adding the natural increase in population (births minus deaths) and net migration. While the natural increase in population can be documented and validated with reasonable predictive accuracy, net migration is more difficult to forecast. Study of industry employment projections may point to emerging problems in meeting the employment levels implied by the population projections, especially in the basic industries which determine the level of the total employment in each region.

A third study objective was to examine the linkages between the Minnesota economy and the overall national economy -- industry by industry. What industry groups are above-average in employment growth in the United States? How does Minnesota compare with the U.S. in each of these industry groups? How important are the declining and below-average growth industries in the Minnesota economy? What factors account for the reported and projected changes in industry employment

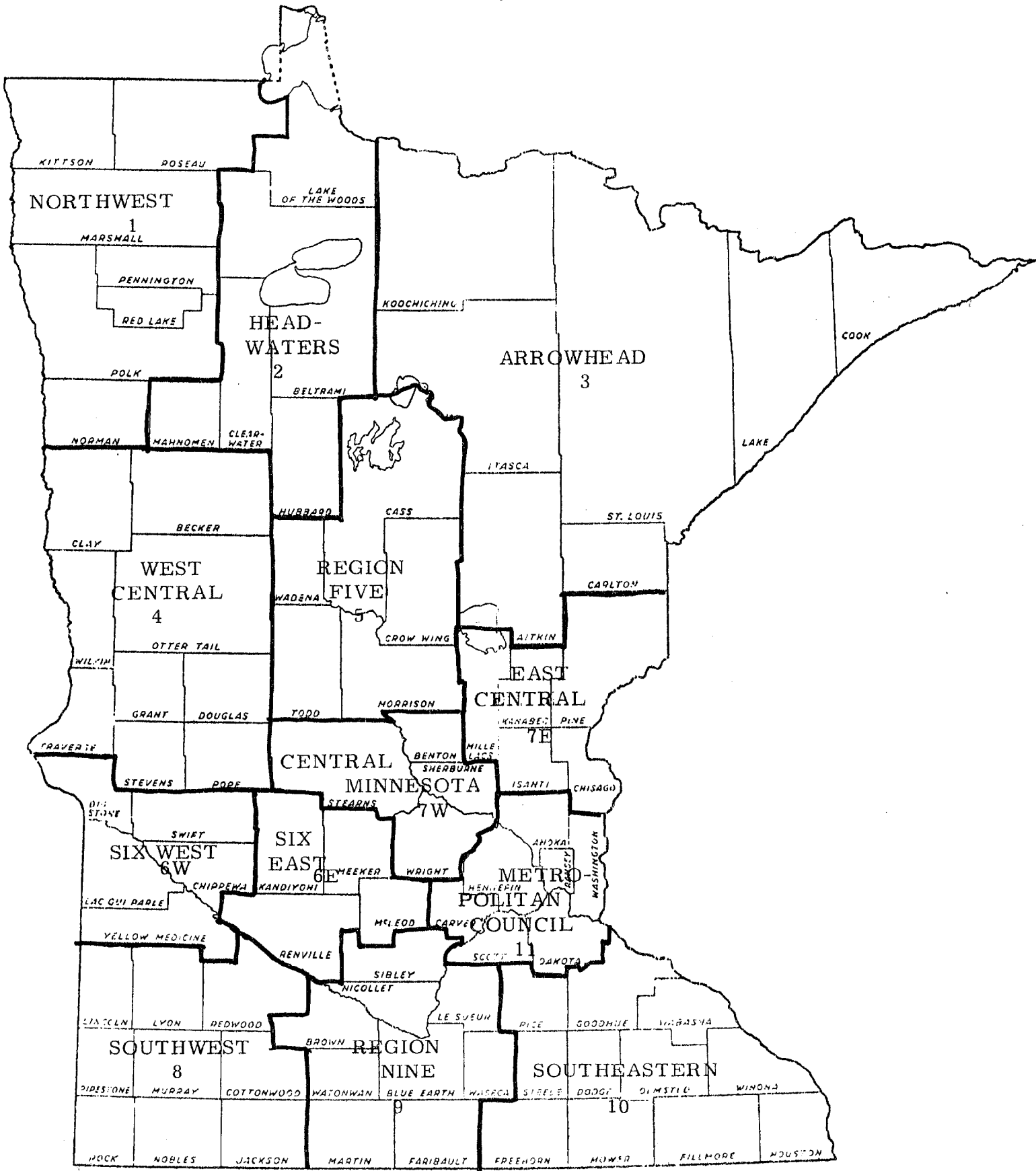


Fig. 1.1. Substate Planning and Development Districts, Minnesota, 1978.

in Minnesota? All industry employment projections are linked to the corresponding national projection series in this study and, hence, each of the questions is approached in the context of Minnesota industry employment levels relative to corresponding U.S. industry employment levels.

#### Method of Procedure

A "shift-and-share" forecasting technique is used to analyze and project historical trends in industry employment to the year 2000. This procedure makes use of U.S. industry employment trends and projections<sup>2/</sup> It is supplemented by an "excess" employment technique which identifies an "export-producing" and a "residential" component for each industry in terms of its total employment.

<sup>2/</sup> Total employment change is partitioned into the three effects for each of the 35 civilian industry groups in the form,

$$\text{emp}'_i = (1 + A + B_i + C_i)\text{emp}_i,$$

where,

$\text{emp}'_i$  = total employment in i-th industry in region, year (t+1).

$\text{emp}_i$  = total employment in i-th industry in region, year (t).

$A\text{emp}_i$  = national-growth effect of i-th industry in region, year (t) to year (t+1).

$B_i\text{emp}_i$  = industry-mix effect of i-th industry in region, year (t) to year (t+1).

$C_i\text{emp}_i$  = regional-share effect of i-th industry in region, year (t) to year (t+1).

The three coefficients are derived as follows:

$$A = \frac{\text{EMP}'_N - 1}{\text{EMP}_N}$$

$$B_i = \frac{\text{EMP}'_i}{\text{EMP}_i} - \frac{\text{EMP}'_N}{\text{EMP}_N}$$

$$C_i = \frac{\text{emp}'_i}{\text{emp}_i} - \frac{\text{EMP}'_i}{\text{EMP}_i}$$

where,

$\text{EMP}'_i$  = total employment in i-th industry in nation, year (t+1)

$\text{EMP}_i$  = total employment in i-th industry in nation, year (t)

$\text{EMP}'_N = \sum_i \text{EMP}'_i$ , or total employment of all industry in nation, year (t+1)

$\text{EMP}_N = \sum_i \text{EMP}_i$ , or total employment of all industry in nation, year (t)

All U.S. employment is given (i.e., either estimated and projected) and, hence, only the forecast industry employment,  $\text{emp}'_i$ , must be derived for each industry and region.

So-called "export-producing" employment is engaged in producing goods and services for sale to non-residents of a given region. In this study, "excess" employment is in excess of the national average for this industry. The ratio of total employment to excess employment is a measure of interindustry linkages within a region -- the larger the ratio, the greater the interindustry linkages and the greater the total employment supported by each "export-producing" worker.<sup>3/</sup>

Trends in both the level of industry employment and the ratio of total employment to excess employment are presented in this report. These trends are examined for their economic implications for resource development planning in Minnesota.

Results of this study are presented under four major headings. First, industry employment trends and projections are presented for the employed labor force. Second, the economic base of each region is identified for three years -- 1940, 1970 and 2000 -- in terms of the excess employment concept. Third, employment change sources are identified for 35 civilian industry groups in 13 Minnesota development regions. Fourth, the implications of the projected employment changes for projected population change in each of the 13 development regions are presented and assessed critically in view of the earlier findings on each region's economic base. In each topic, both the Minnesota and the regional employment trends and projections are compared with corresponding U.S. trends and projections.

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<sup>3/</sup> Excess employment is the positive differential employment in the region, i.e., the employment due to the difference in employment distribution between the Region and the Nation. This difference,  $demp_i$ , is represented by the form,

$$demp_i = emp_i - empr\left(\frac{EMP_i}{EMP_N}\right),$$

where the employment variables are defined as in footnote 2.

## INDUSTRY EMPLOYMENT

Industry employment is reported in terms of (1) persons and (2) jobs. An employed person may have more than one job. The U.S. Census of Population, however, reports employed persons by place of residence with the major source of earned income being shown by the industry of employment. The Minnesota Department of Employment Security, on the other hand, reports the number of jobs, by industry. Employment is reported by place of work. The number of employed persons is not reported in the monthly, quarterly and annual employment statistics published by this agency.

In this study, the employed labor force is identified by the industry of major source of remuneration. Self-employed persons and unpaid family workers are reported, also, by industry and place of residence.

## Data Sources

The employed labor force is reported, by county, for each decennial census of population. The 1940, 1950, 1960 and 1970 employment series have been collated in a 36-industry breakdown of total employment (table 1). The industry employment series are comparable for all counties and for all four census periods.

A 36-industry employment series is available from a recently published document of the U.S. Department of Commerce.<sup>3/</sup> This series expands the earlier industry employment series prepared by the U.S. Department of Commerce for the U.S. Water Resources Council.<sup>4/</sup> It also expands the 28-industry employment series prepared by the U.S. Office of Business Economics (now the Bureau of Economic Analysis)

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<sup>3/</sup> U.S. Department of Commerce, Social and Economics Statistics Administration, Bureau of Economic Analysis, Regional Employment by Industry, 1940-1970, U.S. Government Printing Office, Washington, D.C., 20402, 1975.

<sup>4/</sup> U.S. Water Resources Council, 1972 OBERS Projections, Regional Economic Activity in the U.S., Series E. Population, U.S. Government Printing Office, Washington, D.C., 20402, April 1974.

Table 1. Estimated and projected employment in specified industry, Minnesota, 1940-2000.

| No. | Title                           | Estimated <sup>1/</sup> |           | Projected <sup>2/</sup> |           |           |
|-----|---------------------------------|-------------------------|-----------|-------------------------|-----------|-----------|
|     |                                 | 1940                    | 1970      | 1980 <sup>3/</sup>      | 1990      | 2000      |
| 1.  | Agriculture                     | 285,779                 | 113,871   | 86,410                  | 66,062    | 52,747    |
| 2.  | Forestry & Fisheries            | 790                     | 1,213     | 723                     | 567       | 535       |
| 3.  | Mining                          | 7,986                   | 14,030    | 15,565                  | 12,414    | 11,563    |
| 4.  | Construction                    | 38,018                  | 83,033    | 93,208                  | 99,143    | 97,811    |
| 5.  | Food Products                   | 35,417                  | 47,605    | 49,245                  | 45,437    | 35,621    |
| 6.  | Textile Products                | 3,589                   | 2,571     | 2,696                   | 2,691     | 2,466     |
| 7.  | Apparel                         | 5,698                   | 8,302     | 10,202                  | 10,709    | 10,222    |
| 8.  | Lumber, Furniture               | 10,894                  | 11,214    | 13,031                  | 15,069    | 15,886    |
| 9.  | Printing and Publishing         | 13,629                  | 31,977    | 38,517                  | 37,381    | 42,715    |
| 10. | Chemicals and Allied Prod.      | 3,809                   | 8,348     | 8,847                   | 10,610    | 9,247     |
| 11. | Machinery, exc. Elec.           | 8,476 <sup>4/</sup>     | 65,685    | 93,213                  | 131,002   | 151,016   |
| 12. | Electrical Machinery            | 2,328 <sup>4/</sup>     | 22,509    | 31,465                  | 40,150    | 47,166    |
| 13. | Motor Vehicles                  | 2,323                   | 4,790     | 3,811                   | 3,605     | 3,508     |
| 14. | Transp. exc. Mot. Veh.          | 522                     | 8,059     | 10,339                  | 17,977    | 18,824    |
| 15. | Paper Products                  | 4,760 <sup>4/</sup>     | 24,417    | 29,485                  | 41,881    | 42,403    |
| 16. | Petroleum Refining              | 676 <sup>4/</sup>       | 2,060     | 1,772                   | 2,033     | 1,508     |
| 17. | Primary Metals                  | 4,169 <sup>4/</sup>     | 8,003     | 10,110                  | 10,834    | 9,900     |
| 18. | Fabricated Metals <sup>5/</sup> | 5,891 <sup>4/</sup>     | 28,417    | 35,909                  | 42,599    | 42,356    |
| 19. | Misc. Manufacturing             | 13,972 <sup>4/</sup>    | 40,348    | 42,755                  | 41,491    | 41,607    |
| 20. | Railroads                       | 31,337                  | 19,519    | 15,609                  | 12,070    | 8,648     |
| 21. | Trucking                        | 10,943                  | 23,291    | 28,196                  | 31,185    | 32,679    |
| 22. | Other Transportation            | 6,572                   | 19,346    | 25,025                  | 29,338    | 30,941    |
| 23. | Communications                  | 7,790                   | 17,186    | 20,284                  | 22,660    | 25,031    |
| 24. | Elec., Gas, San. Utilities      | 9,176                   | 16,950    | 20,897                  | 20,132    | 20,198    |
| 25. | Wholesale Trade                 | 35,462                  | 70,724    | 84,472                  | 90,857    | 90,755    |
| 26. | Food Stores                     | 27,853                  | 39,369    | 50,203                  | 54,510    | 55,009    |
| 27. | Eating & Drinking Places        | 27,890                  | 56,459    | 66,477                  | 75,584    | 74,894    |
| 28. | Other Retail                    | 83,697                  | 162,934   | 207,314                 | 222,036   | 225,950   |
| 29. | Fin., Ins., Real Estate         | 28,990                  | 68,174    | 86,810                  | 96,911    | 102,360   |
| 30. | Lodging, Personal               | 32,486                  | 38,956    | 45,930                  | 44,526    | 40,839    |
| 31. | Business & Repair               | 19,882                  | 48,522    | 77,585                  | 106,203   | 127,087   |
| 32. | Entertain. & Recs. Serv.        | 7,751                   | 11,162    | 13,374                  | 13,823    | 13,524    |
| 33. | Private Households              | 38,221                  | 20,739    | 11,556                  | 7,966     | 6,710     |
| 34. | Prof. Services                  | 80,734                  | 293,524   | 429,582                 | 512,111   | 584,359   |
| 35. | Public Administration           | 30,389                  | 55,602    | 65,284                  | 72,336    | 74,815    |
| 36. | Military                        | 2,600                   | 5,497     | 3,000                   | 3,000     | 3,000     |
|     | Total                           | 930,499                 | 1,494,416 | 1,828,900               | 2,046,800 | 2,150,900 |

<sup>1/</sup> U.S. Department of Commerce, Regional Employment, by Industry, 1940-1970; employed labor force 14 years and older.

<sup>2/</sup> Adjusted to labor force/population projections prepared by Minnesota State Planning Agency (Minnesota Labor Force Projections, 1970-1990 and Minnesota Population Projections, 1970-2000); employed labor force, 16 years and older.

<sup>3/</sup> Based on 1970-1980 projected change in specified industry employment, in Minnesota Employment 1970, 1980, prepared by Research and Planning Branch, MN Department of Employment Services.

<sup>4/</sup> Estimated from 1950-1970 trends.

<sup>5/</sup> Includes ordnance in projected series; ordnance is included in sector 19 for 1940, 1950, 1960 and 1970.

in a shift-and-share analysis of county employment trends for the 1940 to 1960 period.<sup>5/</sup>

The earlier U.S. Office of Business Economics projection series is based on the Series E population assumptions. The current Series II population projections of the U.S. Bureau of the Census compare closely with the earlier series for the projection period in this report. The 1972 U.S. projection series is viewed as adequate for use in this study.

Selected employment trends, based on the U.S. employment series, are compared with the Minnesota employment trends noted earlier. First, the primary resource-based industries, including agriculture, mining and timber-related manufacturing, declined 63.1 percent from 9,607,100 to 3,549,100 in total employment during the 30-year period from 1940 to 1970. Employment in these industries is projected to decline an additional 33.8 percent to 2,350,000 over the same period. Manufacturing employment in the U.S. increased by 87.2 percent from 10,739,600 in 1940 to 20,109,600 in 1970. This increase is projected to dampen as total manufacturing employment approaches 25 million by the year 2000.

Share differences occur in the estimated and projected growth patterns for individual industries.<sup>6/</sup> Food and timber-related manufacturing are characterized by

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<sup>5/</sup> U.S. Department of Commerce, Office of Business Economics, Growth Patterns in Employment by County, 1940-1950 and 1950-1960, U.S. Government Printing Office, Washington, D.C., 20402, 1965.

<sup>6/</sup> Estimated employment refers to reported employment estimates for a given historical period, such as the calendar years 1940, 1950, 1960 and 1970. Projected employment refers to post-1970 employment derived as a forecast, i.e., by use of a forecasting method. In this report, all 1980, 1990 and 2000 state and substate employment is projected using the shift-and-share method. All data in this report are identified as being estimated or projected, with the data source being identified, also.

below-average growth -- from 2,073,600 in 1940 to 2,519,800 in 1970, and 2,599,000 in 2000 -- an overall projected growth of only 25.3 percent in the 60-year period. Machinery manufacturing, on the other hand, expanded in total employment from 1,086,700 in 1940 to 4,214,500 in 1970 and is projected at 5,639,000 for 2000 -- a 420 percent projected increase over the 60-year period.

Employment in professional services is projected to increase 745 percent in 60 years -- from 3,378,100 in 1940 to 13,577,300 in 1970 and to 28,530,000 in 2000. This compares with a projected increase of 269 percent in total non-commodity producing employment -- from 22,613,200 in 1940 to 49,053,500 in 1970 and 83,219,000 in 2000.

The U.S. employment trends thus reveal a massive shift from primary resources-based industries to services as the major employers of the total labor force. This shift is expected to become even more pronounced by the year 2000. Exceptionally high rates of increase in output per worker kept employment from increasing as fast as output expansion. High labor earnings also occurred in these industries. Thus, high levels of demand supported the counter-balancing expansion of employment opportunities in the non-commodity-producing industries.

### Employment Forecasts

#### State-level trends

The 36-industry U.S. employment series is used to prepare the estimates and forecasts of employed persons in Minnesota (table 2). In addition, a recently published report on projected 1980 industry employment is used to prepare the 1980 Minnesota employment series.<sup>7/</sup> A modified shift-and-share

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<sup>7/</sup> Minnesota Department of Employment Service, Research and Planning Branch, Minnesota Employment 1970, 1980, St. Paul, Minnesota, 55101, July, 1975.



Table 2. Estimated and projected total civilian employed labor force in specified substate planning region, Minnesota, 1940-2000.

| Region<br>No. | Title          | Estimated <sup>1/</sup> |           |           |           | Projected <sup>2/</sup> |           |           |  |
|---------------|----------------|-------------------------|-----------|-----------|-----------|-------------------------|-----------|-----------|--|
|               |                | 1940                    | 1950      | 1960      | 1970      | 1980                    | 1990      | 2000      |  |
|               |                | (number)                |           |           |           |                         |           |           |  |
| 1.            | Northwest      | 34,228                  | 39,175    | 34,445    | 32,267    | 39,034                  | 41,482    | 41,501    |  |
| 2.            | Headwaters     | 16,915                  | 19,021    | 16,222    | 17,664    | 23,909                  | 29,585    | 33,269    |  |
| 3.            | Arrowhead      | 90,229                  | 114,182   | 109,901   | 112,095   | 129,950                 | 139,164   | 140,210   |  |
| 4.            | West Central   | 57,648                  | 65,544    | 61,883    | 66,444    | 81,518                  | 92,818    | 97,650    |  |
| 5.            | Region Five    | 32,780                  | 38,740    | 36,411    | 35,944    | 46,829                  | 54,687    | 58,584    |  |
| 6W.           | Six West       | 24,919                  | 26,528    | 23,939    | 21,836    | 24,921                  | 25,928    | 24,775    |  |
| 6E.           | Six East       | 30,428                  | 34,881    | 33,996    | 36,496    | 44,773                  | 50,860    | 54,058    |  |
| 7W.           | Central MN     | 35,409                  | 43,368    | 46,366    | 61,071    | 86,196                  | 112,303   | 131,239   |  |
| 7E.           | East Central   | 23,041                  | 24,463    | 22,608    | 26,881    | 38,779                  | 52,165    | 63,637    |  |
| 8.            | Southwest      | 50,404                  | 54,608    | 51,549    | 50,828    | 59,938                  | 64,520    | 62,406    |  |
| 9.            | Region Nine    | 63,413                  | 73,145    | 74,540    | 81,873    | 97,061                  | 106,773   | 109,344   |  |
| 10.           | Southeastern   | 103,490                 | 124,035   | 130,598   | 151,311   | 184,140                 | 203,430   | 211,022   |  |
| 11.           | Metro. Council | 359,995                 | 486,183   | 590,950   | 794,209   | 968,853                 | 1,070,086 | 1,123,206 |  |
|               | State          | 927,899                 | 1,143,872 | 1,233,408 | 1,488,919 | 1,825,900               | 2,043,800 | 2,150,900 |  |

<sup>1/</sup> U.S. Department of Commerce, Bureau of Economic Analysis, Regional Employment by Industry, 1940-1970, Washington, D.C., U.S. Government Printing Office.

<sup>2/</sup> Projections made using shift-share techniques.

technique (which is discussed in the next chapter) is used to prepare the post-1975 projection series. All projected employment levels are adjusted to available projections of Minnesota labor force<sup>8/</sup> and population.<sup>9/</sup>

Employment trends in the primary resource-based industries cited earlier (i.e., agriculture, mining and timber-related manufacturing) show first, a 56.2 percent decline in employment -- from 294,555 in 1940 to 129,114 in 1970. This decline is slightly smaller than in the U.S. as a whole. However, the relative importance of these industries is much larger in Minnesota than in the U.S. as a whole (8.7 percent vs. 4.6 percent, respectively, of total civilian employment in 1970).

The massive decline in employment opportunities in agriculture reduced the potential rate of growth in total employment in Minnesota during the 1940 to 1970 period. Despite the importance of agriculture in the Minnesota economy, the actual growth in total employment kept pace with the rest of Nation. Future employment, also, is projected to increase at the same and even slightly higher rates as projected for the Nation.

The projected 49.8 percent decline in total employment in the primary resource-based industries -- from 129,114 to 64,845 by 2000 -- is much smaller than for the 1940-1970 period. Much of the absolute decline in agricultural employment has already occurred, so the potential remaining for decline is small.

Rapid expansion of manufacturing and service industries in Minnesota accounts for much of the growth in total industry employment from 1940 to 1970. Manufacturing employment expanded more rapidly in Minnesota, from 12.5 percent to 21.2

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<sup>8/</sup> Minnesota State Planning Agency, Minnesota Labor Force Projections, 1970-1990, 101 Capitol Square Building, St. Paul, Minnesota, 55101, July, 1976.

<sup>9/</sup> Minnesota State Planning Agency, Minnesota Population Projections, 1970-2000, 101 Capitol Square Building, St. Paul, Minnesota, 55101, November, 1975.

percent of total employment, than in the U.S. as a whole (where it increased from 23.8 percent to 26.0 percent of total employment during the 30-year period). Employment in professional services increased from 80,734 in 1940 to 293,524 in 1970 while total noncommodity-producing employment increased from 479,173 to 962,457 -- a 100.9 percent increase -- over the 30-year period.

Future growth of manufacturing and services industries in Minnesota will slow down as a result of national conditions -- a decline in the growth of the labor force and a decline, also, in the rate of growth in per capita purchases of the goods and services produced in these industries. The projected growth in these industries is shown as being sufficient only to provide employment for new entrants into the labor force and experienced workers in search of new jobs to replace old ones.

#### Substate trends

Availability of the 36-industry employment series, by county, makes possible a substate breakdown of total industry employment for the entire 60-year period. The substate grouping of counties used in this study is based on the system of multi-county planning and development districts which make up the 13 substate planning regions. These regions are legislatively mandated and generally recognized planning entities in Minnesota.

Each of the development regions is a separate statistical unit for compiling and analyzing statewide employment trends and making projections (table 2). Official labor force projection series prepared in the Minnesota State Planning Agency are used as control totals for the industry and regional employment projection.<sup>10/</sup> A uniform 4-percent unemployment rate and projected labor force participation rates are used in converting the projected population into corresponding

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<sup>10/</sup> Minnesota State Planning Agency, Minnesota Labor Force Projections, 1970-1990. St. Paul, Minnesota. 1976.

employed labor force projections. Hence, the projected regional distribution of total employment in Minnesota approximates (except for labor force participation rates, which may differ among regions) the regional distribution of the official Minnesota population projections.

While total Minnesota employment is projected to increase by 44.5 percent in the 30-year period from 1970 to 2000 total population is projected to increase only by 22.3 percent. More than one-half of the population increase -- 56.8 percent-- is projected for Region 11 -- The Metropolitan Council Region, but only 49.7 percent of the growth in employment is projected for this region. Labor force participation rates, which already are high in Region 11 in 1970, are projected to increase more rapidly in outstate regions.

The tabular presentation of industry employment for 1940 shows a wide geographical distribution of agricultural employment but a concentration of manufacturing employment in the most urbanized areas. Total agricultural employment in the strongly agricultural regions (Regions 1, 4, 6E, 6W, 7W, 8, 9 and 10) reached 209,921, or 73.5 percent of total agricultural employment in Minnesota. Manufacturing employment in the eight agricultural regions totaled 21,667, or 18.7 percent of total manufacturing employment in Minnesota. In contrast, 64.7 percent of the total manufacturing employment, was concentrated in the most populous region.

Primary resource-based manufacturing, namely, food, wood, and paper products manufacturing, accounted for 51.3 percent of the total manufacturing employment in 1940. These industries were located, in part, close to the source of the principal raw materials, including its concentration at terminals in the Twin Cities Metropolitan Area. Market-oriented segments of these industries account for another part of the total employment in the heavily populated areas.

By 1970, the geographic distribution of manufacturing employment had become more dispersed than it was in 1940. Agricultural employment had become more concentrated in the dominantly agricultural areas. Employment in

the noncommodity-producing industries, especially professional services, was highly concentrated in the most urbanized areas.

The projected year 2000 statewide distribution of industry employment shows the outcome of recent trends in the spatial redistribution of some industries and the further growth of others in existing areas of concentration. The service industries, for example, are projected to grow rapidly in almost every region. High-technology manufacturing, on the other hand, has concentrated in the largest metropolitan regions.

## EMPLOYMENT CHANGE SOURCES

The forecasting method used in this study is derived from the work of Dunn and Ashby on sources of regional economic growth.<sup>11/</sup> This approach makes use of differential and proportional changes in industry employment. Industry employment change is attributed in part to proportional change, or the geographic diffusion of national economic growth, and differential change, or the more rapid change of total and given industry employment in one region than in the Nation as a whole.

In this study, the total change is partitioned into three effects. The first is the "national-growth" effect -- the proportional change in total employment in the Nation. The second is the "industry-mix" effect and the third is the "regional-share" effect. The last two effects denote the differential regional change in given industry employment. Total employment change is the sum of the three sources of employment change.<sup>12/</sup>

## Employment Change in Minnesota

A two-stage forecasting procedure is used in which, first, the Minnesota employment series is prepared. This series is then viewed as for the Nation in the preparation of the substate projection series.

The regional share coefficient is the only source of local variation in the regional projections. This coefficient shows large variations from year to year, with varying periods of oscillation in value. Especially for industries with low employment levels, small absolute changes convert to large relative changes. To

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<sup>11/</sup> E.S. Dunn, Jr., A Statistical and Analytical Technique for Regional Analysis, Regional Science Association Papers, 6: 97-122, 1960; L.D. Ashby, The Geographical Redistribution of Employment: An Examination of the Elements of Change, Survey of Current Business, 44: 13-20, 1964.

<sup>12/</sup> Description and evaluation of the forecasting method used in this study is available in numerous articles and books, including the following: James H. Brown, "Shift and Share Projections of Regional Economic Growth: An Empirical Test", Journal of Regional Science, 9(1):1-17, 1969; J.M. Estefan-Marquillas, "A Reinterpretation of Shift-Share Analysis," Regional and Urban Economics, 28: 249-255, 1972.

effectively use the forecasting method, therefore, limiting values must be imposed on this coefficient. Otherwise, the regional-share effect may become explosive towards the end of a given projected series.

The regional-share coefficient is viewed as a policy parameter in the preparation of the population and labor force-based employment projection series. Given the official population and labor force projections for the State and substate regions, the forecasting method requires industry employment projections which conform with the official projections. Each industry-share coefficient is adjusted, therefore, to the regional distribution of population and labor force, by place of residence. A negative regional-share coefficient denotes above-average local growth relative to its growth in the "Nation" (i.e., U.S. or Minnesota). A positive coefficient implies a concentration of the given industry in this region.

The 30-year national-growth effect for Minnesota industry is the accumulated national-growth effect for each 10-year period from 1970 to 2000 (table 3). The percent increase in overall industry employment in the Nation is applied to the Minnesota employment totals to derive a corresponding proportional national-growth effect for the State. Similarly, the 30-year industry-mix effect for Minnesota industry is the accumulated industry-mix effect for three 10-year periods. The differential percentage change in specified industry employment in the Nation is applied to the Minnesota industry employment totals to derive the corresponding differential, industry-mix effect for the State. Finally, the 30-year regional-share effect for Minnesota industry is the accumulated regional-share effect for the three 10-year periods. The differential percentage change in specified industry employment in the Minnesota relative to the Nation is applied to the Minnesota industry employment totals to derive the corresponding differential, regional-share effect for the State. Two of the three effects, namely, the national-growth effect and the industry-mix effect, are based on national, or external, data sources. Only the regional-share effect is derived solely from regional, or internal, data sources.

Table 3. Projected change in employed civilian labor force in specified industry, by source of change, Minnesota, 1970-2000.<sup>1/</sup>

| No. | Industry Title        | National growth | Relative Change |                |          | Total   |
|-----|-----------------------|-----------------|-----------------|----------------|----------|---------|
|     |                       |                 | Industry mix    | Regional share | Total    |         |
| 1.  | Agriculture           | 42,030          | -82,363         | -20,791        | -103,154 | -61,124 |
| 2.  | For. and Fish.        | 411             | -197            | -892           | -1,089   | -678    |
| 3.  | Mining                | 6,182           | -9,319          | 670            | -8,649   | -2,467  |
| 4.  | Construction          | 39,524          | -4,872          | -19,874        | -24,746  | 14,778  |
| 5.  | Food Prod.            | 20,957          | -14,050         | -18,891        | -32,941  | -11,984 |
| 6.  | Textile Prod.         | 1,161           | -1,668          | 402            | -1,266   | -105    |
| 7.  | Apparel               | 4,135           | -3,665          | 1,450          | -2,215   | 1,920   |
| 8.  | Lumber, Furn.         | 5,570           | 465             | -1,363         | -898     | 4,672   |
| 9.  | Printing & Pub.       | 15,418          | -25,653         | 20,973         | -4,680   | 10,738  |
| 10. | Chemicals             | 3,986           | 999             | -4,086         | -3,087   | 899     |
| 11. | Machinery, exc. Elec. | 39,152          | -27,161         | 73,340         | 46,179   | 85,331  |
| 12. | Electrical Mach.      | 12,845          | 3,040           | 8,772          | 11,812   | 24,657  |
| 13. | Motor Vehicles        | 1,878           | -1,788          | -1,372         | -3,160   | -1,282  |
| 14. | Trans. exc. Mot. Veh. | 4,894           | -6,278          | 12,149         | 5,871    | 10,765  |
| 15. | Paper Prod.           | 13,244          | -4,468          | 9,210          | 4,742    | 17,986  |
| 16. | Petroleum Refining    | 875             | -536            | -891           | -1,427   | -552    |
| 17. | Primary Metals        | 4,072           | -6,848          | 4,673          | -2,175   | 1,897   |
| 18. | Fabricated Metals     | 14,916          | -3,169          | 2,182          | -987     | 13,929  |
| 19. | Misc. Manuf.          | 18,196          | -320            | -16,617        | -16,937  | 1,259   |
| 20. | Railroads             | 7,373           | -19,915         | 1,671          | -18,244  | -10,871 |
| 21. | Trucking              | 11,679          | -1,442          | -849           | -2,291   | 9,388   |
| 22. | Other Transp.         | 10,253          | -2,918          | 4,261          | 1,343    | 11,595  |
| 23. | Communications        | 8,523           | 4,888           | -5,566         | -678     | 7,845   |
| 24. | Elec., gas, Sani.     | 8,259           | -290            | -4,721         | -5,011   | 3,248   |
| 25. | Wholesale Trade       | 34,920          | -6,697          | -8,192         | -14,889  | 20,031  |
| 26. | Food Stores           | 20,216          | -893            | -3,683         | -4,576   | 15,640  |
| 27. | Eating & Drinking     | 28,108          | -5,492          | -4,181         | -9,673   | 18,435  |
| 28. | Other Retail          | 83,226          | -8,056          | -12,154        | -20,210  | 63,016  |
| 29. | F. I. R. E.           | 35,270          | 20,929          | -22,013        | -1,084   | 34,186  |
| 30. | Lodging, Personal     | 18,564          | -17,458         | 777            | -16,681  | 1,883   |
| 31. | Business & Repair     | 30,906          | 49,146          | -1,487         | 47,659   | 78,565  |
| 32. | Entertain. & Rec.     | 5,459           | -1,086          | -2,011         | -3,097   | 2,362   |
| 33. | Private Households    | 6,754           | -14,877         | -5,906         | -20,783  | -14,029 |
| 34. | Prof. Services        | 168,332         | 156,919         | -34,416        | 122,503  | 290,835 |
| 35. | Public Admin.         | 27,419          | 9,769           | -17,975        | -8,206   | 19,213  |
| 36. | Military              |                 |                 |                |          |         |
|     | Total                 | 754,707         | -25,324         | -67,402        | -92,725  | 661,981 |

<sup>1/</sup> Derived from: U.S. Water Resources Council, 1972 OBERS Projections, Employed labor force 16 years and older, and U.S. Department of Commerce, Bureau of Economic Analysis, Regional Employment by Industry, 1940-1970, Washington, D.C., U.S. Government Printing Office, 1975.



The combined industry-mix and regional-share effects contribute to an overall relative change in specified industry employment. If the two effects were counter-balanced, then total industry employment change would be identical to the national-growth effect. Typically, a positive or negative relative change is derived for each industry.

An above-average growth industry is differentiated from a below-average growth industry at the national level. The industry-mix data are obtained solely from U.S. employment estimates and projections. Regionally, of course, the balance of above-average and below-average growth industries will vary. In Minnesota, the balance is changing from strongly negative (largely because of agriculture) to strongly positive.

Trends in the regional-share effect show the changing competitive position of a region for each industry group. A positive regional-share effect means that a given industry is growing faster in the region than in the Nation. A negative industry-mix effect may combine with a positive regional-share for a relative change that is small compared to the national-growth effect. Both components of relative change -- the external industry-mix effect and the internal regional-share effect -- must be obtained, therefore, to assess the employment status of each industry in a region.

#### Employment Change in Minnesota Regions

Total employment change for each substate region is partitioned into the three sources of employment change (table 4). The uneven distribution of above-average growth industries among Minnesota regions results in a wide range of total industry-mix effects. Metropolitan regions generally are favored, in terms of industry development potentials, by a disproportionate concentration of above-average growth industries.

Table 4. Estimated and projected change in total civilian employed labor force in specified region, by source of change, Minnesota, 1940-2000 <sup>1/</sup>

| No. | Region<br>Title      | Estimated change 1940-1970 |                 |                   |         | Estimated change 1970-2000 |                 |                   |         |         |
|-----|----------------------|----------------------------|-----------------|-------------------|---------|----------------------------|-----------------|-------------------|---------|---------|
|     |                      | National<br>Growth         | Industry<br>Mix | Regional<br>Share | Total   | National<br>Growth         | Industry<br>Mix | Regional<br>Share | Total   |         |
| 1.  | Northwest            | 19,347                     | -19,444         | -6,874            | -26,318 | -6,961                     | 14,135          | -4,326            | -4,901  | 9,234   |
| 2.  | Headwaters           | 8,796                      | -6,497          | -1,551            | -8,048  | 748                        | 8,401           | -1,137            | 7,204   | 15,605  |
| 3.  | Arrowhead            | 52,706                     | 11,905          | -42,744           | -30,839 | 21,867                     | 48,169          | -5,962            | -20,034 | 28,115  |
| 4.  | West Central         | 31,364                     | -26,463         | 3,892             | -22,571 | 8,793                      | 29,631          | -10,043           | 1,575   | 31,206  |
| 5.  | Region Five          | 18,233                     | -11,919         | -3,149            | -15,068 | 3,165                      | 16,589          | -4,412            | 6,051   | 22,640  |
| 6W. | Six West             | 12,916                     | -11,648         | -4,351            | -15,999 | -3,083                     | 9,280           | -5,073            | -6,341  | 2,939   |
| 6E. | Six East             | 16,859                     | -14,759         | 3,968             | -10,791 | 6,068                      | 16,268          | -6,268            | 1,294   | 17,562  |
| 7W. | Central Minnesota    | 21,253                     | -9,744          | 14,155            | 4,411   | 25,664                     | 29,994          | -4,751            | 44,925  | 70,168  |
| 7E. | East Central         | 11,966                     | -10,358         | 2,232             | -8,126  | 3,840                      | 13,445          | -1,672            | 23,311  | 36,756  |
| 8.  | Southwest            | 26,706                     | -24,307         | -1,974            | -26,281 | 425                        | 22,037          | -11,031           | -10,459 | 11,578  |
| 9.  | Region Nine          | 35,962                     | -21,984         | 4,481             | -17,503 | 18,459                     | 34,710          | -9,086            | -8,239  | 27,471  |
| 10. | Southeastern         | 60,865                     | -16,129         | 3,083             | -13,046 | 47,819                     | 66,881          | -8,864            | -7,170  | 59,711  |
| 11. | Metropolitan Council | 244,274                    | 161,344         | 28,598            | 189,942 | 434,216                    | 351,440         | 72,626            | -22,444 | 328,997 |

(number)

<sup>1/</sup> Based on use of shift-share technique with Minnesota viewed as Nation.

The total regional-share effects also vary greatly among regions. In the period, 1940-1970, rural regions experienced a predominance of negative regional-share effects, largely because of the rapid decline of agricultural employment. In the 1970 to 2000 period, these same regions are projected to show strong positive regional-share effects because of the projected dispersion of manufacturing and service industries into these regions.

The regional distribution of the total industry-mix effect depicts the redistribution of above-average and below-average growth industries in the State. For example, the movement of manufacturing and service industry into all regions of the State is represented by the changing industry-mix effect from strongly negative to positive and even strongly positive.

The regional distribution of the total regional-share effect shows the changing competitive position of each substate region. The changing economic status is attributed to the revitalization of the economic base of rural regions. The redistribution of manufacturing industry is represented by the change from negative to positive regional-share effects in non-metropolitan regions.

Interpretation of substate regional shifts in industry is conditioned by the underlying assumptions of the projection procedure. First, all employment projections are keyed to the Minnesota State Planning Agency population and labor force projections. The total employed labor force in each region is derived from the official labor force projections to 1990 which are extended to 2000 in this study. An assumed four-percent unemployment is subtracted from the projected total labor force to obtain the total employed labor force for each region.

Second, the projected industry employment is based on the shift-and-share model, which makes use of the U.S. industry employment projection in the preparation of the national-growth and industry-mix coefficients in the state-level projections for 1980, 1985, 1990 and 2000. Deviations from the national pattern of industry employment change are the result of using non-zero values for the regional-share coefficients in the state-level projections.

Third, all projected regional-share coefficients are constrained within the limits of  $\pm 0.5$  as they approach the year 2020, when all coefficients reach an equilibrium value of zero.<sup>13/</sup> Thus, industry employment change in each region approaches the national pattern, which is represented by the specific industry growth rate for the nation.

Fourth, the substate employment projections are derived from the state-level projections, with the State being viewed as the Nation. Again, the "national-growth" and "industry-mix" coefficients are derived, but, now from the projection series for Minnesota. The identical procedure is used to prepare the substate regional share coefficients.

Thus, the industry employment projections for the Nation assert a strong influence on the two levels of "regional" employment projections through the use of the shift-and-share projection procedures. The Minnesota State Planning Agency population and labor force projections also assert a strong influence on the substate employment projections. The substate employment projections are thus affected by (1) the U.S. industry employment projections and (2) the Minnesota population and labor force projections for the industry distribution of total projected state and substate employment in Minnesota. Within this context, therefore, the individual regional industry employment series are presented, next, in an assessment of the substate regional implications of the projected employment changes.

Four regional groupings are identified for a brief assessment of industry employment trends as follows:

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<sup>13/</sup> Numerous approaches have been tried in reducing the typically large forecast error for the regional-share coefficient. Use of the  $\pm 0.5$  limit, combined with a zero equilibrium value, means simply that by the year 2020, the industry distribution of total employment change is the same in the Region as in the Nation.

Dominantly agricultural base

Transitional agricultural-industrial base

Transitional primary resource-industrial base

Dominantly urban-industrial base

Of these four groups of regions, two -- the transitional agricultural-industrial and the dominantly urban-industrial -- account for the major part of the projected growth in employment and population. The remaining two regions are marked by above-average growth in total population and employment.

Dominantly agricultural base

Four substate regions -- Northwest, West Central, Six West and Southwest -- are characterized by a dominantly agricultural economic base. As agriculture declines in importance, basic manufacturing is projected to increase over the 1970 to 2000 period. Trade and service industries, although an increasingly important part of the economic base in the 1940 to 1970 period, are unlikely to sustain the growth momentum in the 1970 to 2000 period unless there is a continuation of the growth in per capita real income levels.

The dominantly agricultural economic base accounts for the large negative industry-mix effects in the projected total employment change in the four substate regions. The negative industry-mix effects, in turn, account for lagging economic growth which results, also, in a series of negative regional-share effects.

Total civilian employment growth from 1970 to 2000 in the dominantly agricultural regions is projected at 54,957, or 8.3 percent of the projected total Minnesota civilian employment growth. In 1970, total civilian employment in the four regions was 171,375, or 11.5 percent of Minnesota total civilian employment. Thus, the projected average annual employment growth of only 1.1 percent over the 30-year period -- the lowest of the four regional groupings -- is attributed to its dominantly agricultural economic base.

Transitional agricultural-industrial base

Four substate regions -- Six East, Central Minnesota, Region Nine and Southeastern -- are characterized by a transitional agricultural-industrial economic base. Basic agricultural employment is a smaller proportion and basic manufacturing employment is a larger proportion of total basic employment in these four regions than in the four dominantly agricultural regions. In addition, the professional services industry (e.g., the Mayo Clinic in Rochester) is an increasingly important part of the economic base in the Southeastern Region.

The economic heritage of a formerly dominant agricultural economic base has left the four transitional regions with slightly negative industry-mix effects projected for the period from 1970 to 2000. However, the projected regional-share effects are uniformly positive. Thus, for two of the four regions -- Six East and Central Minnesota -- the projected relative change also is positive.

Total civilian employment growth in the four transitional regions is projected at 174,912, or 26.4 percent of the projected growth in total civilian employment in Minnesota for the 1970-2000 period. In 1970, total civilian employment in the four regions was 330,751, or 22.2 percent of the Minnesota total civilian employment. Thus, the projected average annual employment growth of 1.4 percent is slightly above the projected average growth rate for the State.

Transitional primary resource-industrial base

Four substate regions -- Headwaters, Arrowhead, Region Five and East Central -- are in transitional economic status. The four regions are heavily dependent on a primary resource base for their important forest, mining and recreation industries. The dependence on forest and mining industries accounts for the large negative industry-mix effects projected for the four regions.

The projected regional-share effects for each decade in 1970 to 2000 period are strongly positive in the Headwaters Region, Region Five and the East Central Region, and strongly negative in the Arrowhead Region. The contrasting projections

are difficult to explain in terms of the existing and projected economic base of the four regions. In this case, the employment implications of the Minnesota Planning Agency population and labor force projections require further assessment in the light of the region's industry-mix and its basic economic development potentials.

Total civilian employment growth for 1970 to 2000 in the four regions is projected at 103,116, or 15.6 percent of the projected Minnesota civilian employment growth. In 1970, total civilian employment in the four regions was 192,584, or 12.9 percent of the State total. Thus, the projected average rate of growth is 1.4 percent per year, which also is slightly above the State average.

#### Dominantly urban-industrial base

The dominantly urban-industrial region -- Metropolitan Council -- is marked by a wide range of manufacturing and service industries in the regional economic base. While the projected industry-mix effects are positive, the projected regional-share effects are strongly negative. Additional work is necessary to reconcile the several sets of projections for this substate region.

Total civilian employment growth from 1970 to 2000 in the Metropolitan Council Region is projected at 328,997, or 49.7 percent of the projected growth in total civilian employment in the State. In 1970, total civilian employment in this region was 794,209, or 53.3 percent of the State total. The projected annual growth rate of 1.2 percent is the second lowest of the four groups of regions. This rate is much lower than the historical 30-year growth rate of 2.6 percent. The two rates for the urban-industrial regions compare with the projected 1.2 percent rate and historical 1.6 percent rate for the entire State.

## REGIONAL ECONOMIC BASE

In this chapter, the state and substate employment trends and projections are viewed from the perspective of regional economic theory. This theory holds that the total employment in a region depends upon the level of employment in the economic base of the region. The economic base is defined as the export-producing activity in the region and the employment engaged in supporting this activity. In manufacturing, for example, the workers employed in Minnesota who help produce the manufactured products purchased by industry and residents located outside Minnesota are part of the economic base of this State.

The economic base of a region may be identified by direct methods, which makes use of industry survey, and indirect methods, which make use of existing data sources. In this study, the indirect method of estimating and projecting the economic base is used.<sup>13/</sup> This method is used for two purposes: to provide a surrogate measure of export-producing activity and to provide a basis for evaluation of the individual regional employment projections.

## Excess Employment

Excess employment is defined as the employment in a given industry in a region which is in excess of the employment based on its distribution in a "normal" region. In deriving excess Minnesota employment, the employment norm is given by the industry distribution of the total employed labor force in the United States. In 1940, employment in agriculture accounted for 19 percent of the total employment in the United States and 30.8 percent of the total employment in Minnesota. The excess employment in agriculture is obtained by multiplying the positive difference in the two series and the total employment in the State. Thus, the positive differential, or excess, agriculture is 109,373, or 66.2 percent of the total excess employment in Minnesota in 1940 (table 5).

<sup>13/</sup> Andrew M. Isserman, The Location Quotient Approach to Estimating Regional Impacts, AIP Journal, 43(2): 33-41, January 1977.



Table 5. Estimated and projected excess employed labor force in specified industry, Minnesota, 1940-2000.

| Industry<br>No. Title     | Estimated <sup>1/</sup> |                             |         |                             | Projected |                             |
|---------------------------|-------------------------|-----------------------------|---------|-----------------------------|-----------|-----------------------------|
|                           | 1940                    |                             | 1970    |                             | 2000      |                             |
|                           | Total                   | Pro-<br>portion<br>of total | Total   | Pro-<br>portion<br>of total | Total     | Pro-<br>portion<br>of total |
|                           | (no.)                   | (pct.)                      | (no.)   | (pct.)                      | (no.)     | (pct.)                      |
| 1. Agriculture            | 109,373                 | 66.2                        | 59,666  | 30.1                        | 20,925    | 7.0                         |
| 2. For. & Fish.           | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 3. Mining                 | 0                       | 0                           | 1,860   | .9                          | 2,299     | .8                          |
| 4. Construction           | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 5. Food Prod.             | 12,313                  | 7.5                         | 19,009  | 9.6                         | 4,908     | 1.7                         |
| 6. Textile Prod.          | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 7. Apparel                | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 8. Lumber, Furn.          | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 9. Printing & Pub.        | 404                     | .2                          | 4,852   | 2.4                         | 24,446    | 8.2                         |
| 10. Chemicals             | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 11. Machinery, exc. Elec. | 0                       | 0                           | 25,113  | 12.6                        | 106,897   | 35.9                        |
| 12. Electrical Mach.      | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 13. Motor Vehicles        | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 14. Trans. exc. Mot. Veh. | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 15. Paper Prod.           | 0                       | 0                           | 11,147  | 5.6                         | 25,466    | 8.5                         |
| 16. Petroleum Refining    | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 17. Primary Metals        | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 18. Fabricated Metals     | 0                       | 0                           | 0       | 0                           | 2,102     | .7                          |
| 19. Misc. Manuf.          | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 20. Railroads             | 7,658                   | 4.6                         | 6,581   | 3.3                         | 3,674     | 1.2                         |
| 21. Trucking              | 388                     | .2                          | 1,203   | .6                          | 2,373     | .8                          |
| 22. Other Transp.         | 0                       | 0                           | 0       | 0                           | 1,855     | .6                          |
| 23. Communications        | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 24. Elec., gas, Sani.     | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 25. Wholesale Trade       | 10,272                  | 6.2                         | 10,157  | 5.1                         | 9,267     | 3.2                         |
| 26. Food Stores           | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 27. Eating & Drinking     | 3,800                   | 2.3                         | 7,341   | 3.7                         | 8,809     | 3.0                         |
| 28. Other Retail          | 5,468                   | 3.3                         | 12,290  | 6.2                         | 14,750    | 4.9                         |
| 29. F. I. R. E.           | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 30. Lodging, Personal     | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 31. Business & Repair     | 1,744                   | 1.1                         | 2,068   | 1.0                         | 10,485    | 3.5                         |
| 32. Entertain. & Rec.     | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 33. Private Households    | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 34. Prof. Services        | 11,186                  | 6.8                         | 32,033  | 16.1                        | 56,822    | 19.1                        |
| 35. Public Admin.         | 0                       | 0                           | 0       | 0                           | 0         | 0                           |
| 36. Military              | 2,600                   | 1.6                         | 5,497   | 2.8                         | 3,000     | 1.1                         |
| Total                     | 165,206                 | 100.0                       | 198,819 | 100.0                       | 298,078   | 100.0                       |

<sup>1/</sup> Derived from: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Employment by Industry, 1940-1970. Washington, D.C., U.S. Government Printing Office. 1975.

<sup>2/</sup> All military employment is entered as excess employment; it is not included in deriving non-military excess employment.

Minnesota excess employment

In 1940, the economic base of Minnesota was largely agriculture. Since 1940, however, manufacturing and service industries have contributed an increasing share of total excess employment in the State. By 1970, manufacturing accounted for 30.2 percent of the economic base while the service industries accounted for 35.4 percent of the economic base -- a total of 65.6 percent.

Shifts in the economic base of the State are projected for the 1970 to 2000 period. While basic agricultural employment is projected to decline from nearly 60,000 in 1970 to near 20,000 in 2000, basic employment in machinery (except electrical) manufacturing and professional services is projected to increase from approximately 25,000 and 32,000, in 1970 to approximately 107,000 and 57,000, respectively, in 2000. Thus, the two industry groups would account for 55 percent of the Minnesota excess employment in 2000 -- up 28 percent from the 1970 percentage levels. Whether or not the projected basic employment growth will actually occur depends, of course, on the continuation of the conditions contributing to the comparative advantage of these industries in Minnesota. Comparative advantage is affected by the cost of doing business in the State relative to other states where these industries can locate. Thus, future employment growth in Minnesota is predicated upon shifts in the economic base of the State from agriculture to manufacturing and service industries.

The excess employment statistic also shows that the ratio of total employment to excess employment is increasing. More and more employment in the residential (i.e., non-export-producing or non-basic) industries is being supported by a given level of basic employment.

The declining importance of agricultural employment in the economic base and the declining importance of basic employment in total employment in the State means that the Minnesota economy is less and less dependent on agriculture. It does not mean, however, a decreasing dependence on basic employment. Rather, each

basic worker is now more important than ever before, and this importance will increase because of the increasing number of additional residentiary workers supported by one basic worker.

#### Substate excess employment

Substate excess employment may be derived with either the U.S. or the State employment distributions as norms. In this report, the 1970 U.S. employment distribution is used, first, in deriving the 1970 levels of excess industry employment in the 13 development regions. These results show above-average levels of employment per 1,000 total employment in 29 of the 35 civilian industries. Individual regions differed widely in industry diversity, from only six industries with excess employment in Region Nine to 15 industries with excess employment in the Metropolitan Council Region.

Use of the 1970 Minnesota industry employment distribution as the norm results in levels of excess employment which differ from the levels derived from the U.S. norm. In all but one region, use of the State norm reduced total excess employment from the levels presented earlier. The excess employment here is an indication of the geographic dispersion or concentration of industry employment in the State. Thus, for Region Nine, the number of industries with excess employment is increased from six to 11 by use of the U.S. rather than the Minnesota norm. This indicates a greater diversity of industry employment within the State than between the State as a whole and the Nation.

The projected levels of excess employment indicate shifts in the regional distribution of industry which are implied by the projected changes in total population and total labor force. An even greater sharing of the State's basic industries among the 13 regions is projected for 2000 than existed in 1970. In the Headwaters Region, for example, total excess employment is projected to increase from 4,679 in 1970 to 7,268 in 2000. Most of the projected increase in

total excess employment is due to the projected increase in professional services.

Comparison of the two sets of excess employment for 1970 show differences in the geographic concentration of industry in each development region with reference to (a) the U.S. and (b) the State of Minnesota. Further comparison of the excess employment projections based on the Minnesota norm indicate changes in the regional distribution of export-producing industry in the State. These comparisons are summarized, next, for the three regional groupings and the Metropolitan Council Region which were cited earlier.

Dominantly agricultural base. The four regions with a dominantly agricultural base in 1970 varied in agricultural excess employment from 61 percent to an 88 percent of the total as follows:<sup>14/</sup>

| <u>Industry Group</u> | <u>Region 1</u> | <u>Region 4</u> | <u>Region 6W</u> | <u>Region 8</u> |
|-----------------------|-----------------|-----------------|------------------|-----------------|
|                       |                 | (percent)       |                  |                 |
| Agr., for., fish.     | 61              | 65              | 88               | 81              |
| Mining                | 0               | 0               | 0                | 0               |
| Construction          | 0               | 1               | 0                | 0               |
| Manufacturing         | 17              | 3               | 3                | 10              |
| Trans., com., util.   | 4               | 3               | 2                | 0               |
| Trade                 | 9               | 12              | 7                | 9               |
| Fin., ins., real est. | 0               | 0               | 0                | 0               |
| Services              | 9               | 16              | 0                | 0               |
| Total                 | 100             | 100             | 100              | 100             |

Part of the excess employment in the manufacturing, transportation and trade industries also was related to agriculture in these four regions.

Use of the Minnesota industry employment distribution results in lower levels of excess employment in agriculture, food products manufacturing, railroads, trucking, eating and drinking places, other retail trade, professional services and all other industries with above-average employment per 1,000 total employment (see, table 8). Because of the importance of agriculture-related industry in Minnesota, total excess employment in the agriculturally-dominant regions is low relative

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<sup>14/</sup> The percentage distributions refer only to civilian excess employment. Military employment is excluded.

to other Minnesota regions.

Total excess employment based on the Minnesota norm is projected to increase in Regions a and 4 and decrease in Regions 6W and 8. The projected increases in non-agricultural excess employment, despite the increasing diversity of the economic base in each region, are not enough to counter-balance the large projected reductions in total agricultural employment.

Transitional agricultural-industrial base. The four transitional agricultural-industrial regions were more dependent on non-agricultural manufacturing and services than the dominantly agricultural regions in 1970. Excess employment in agriculture ranged from 41 percent to 72 percent of total employment while excess employment in non-agricultural manufacturing and services varied from 20 percent to 32 percent of total employment, as follows:

| <u>Industry Group</u> | <u>Region 6E</u> | <u>Region 7W</u> | <u>Region 9</u> | <u>Region 10</u> |
|-----------------------|------------------|------------------|-----------------|------------------|
|                       |                  | (percent)        |                 |                  |
| Agr., for., fish.     | 72               | 47               | 61              | 41               |
| Mining                | 0                | 0                | 0               | 0                |
| Construction          | 1                | 3                | 0               | 0                |
| Manufacturing         | 21               | 19               | 20              | 32               |
| Trans., com., util.   | 2                | 3                | 0               | 0                |
| Trade                 | 4                | 13               | 12              | 4                |
| Fin., ins., real est. | 0                | 0                | 0               | 0                |
| Services              | 0                | 15               | 7               | 23               |
| Total                 | 100              | 100              | 100             | 100              |

Excess employment in professional services was large, also, because of educational and medical institutions located in the principal city in three of the four regions.

Use of the Minnesota rather than the U.S. norm in computing 1970 excess employment results in sharp reductions in total excess employment but increases in the number of industries adding to these totals. The two employment distributions thus show that these four regions participate even more than the four dominantly agricultural regions in sharing the diversity of the State's economic base.

Excess employment is projected to increase in each of the four regions. These increases vary, however, with the smallest for Region 6E and the largest for Region 7W and next largest for Region 10. They depict the geographic dispersion of the State's economic base to the two rapidly growing transitional regions which also have the two largest population agglomerations (i.e., Rochester and St. Cloud).

Transitional primary resource-industrial base. The four transitional primary resource-industrial regions depend on several industries for their economic base. In two of the regions, excess employment in the agriculture, forestry and fishery industries accounted for less than one-half of total excess employment, while in the remaining two regions excess employment in these primary resource industries was more important than it was in two of the four transitional agricultural-urban regions. The diversity of industry in each region's economic base in these four transitional regions is indicated by the 1970 industry employment distributions, as follows:

| <u>Industry Group</u> | <u>Region 2</u> | <u>Region 3</u> | <u>Region 5</u> | <u>Region 7E</u> |
|-----------------------|-----------------|-----------------|-----------------|------------------|
|                       |                 | (percent)       |                 |                  |
| Agri., for., fish.    | 41              | 1               | 57              | 57               |
| Mining                | 0               | 47              | 0               | 0                |
| Construction          | 2               | 0               | 2               | 10               |
| Manufacturing         | 11              | 24              | 12              | 15               |
| Trans., com., util.   | 2               | 10              | 7               | 2                |
| Trade                 | 13              | 4               | 11              | 4                |
| Fin., ins., real est. | 0               | 0               | 0               | 0                |
| Services              | 31              | 14              | 11              | 12               |
| Total                 | 100             | 100             | 100             | 100              |

In Region 5, the major dependence on agriculture is supplemented by dependence on the wood products industries (i.e., lumber, furniture and paper). In Region 7E, above-average employment in new construction and light manufacturing supplements the dependence on agriculture. It signals, also, the transition from a primary resource-based to an urban-industrial economy.

Rapid diversification of the economic base in the four regions is indicated

by the trends in the industry distribution of total excess employment. The non-commodity producing industries account for an increasingly larger share of total excess employment in these regions.

Dominantly urban-industrial base. The Metropolitan Council Region has a diversified economic base. This does not include, however, agriculture, mining and construction. In 1970, five of the 15 manufacturing industries contributed to a total excess employment of 53,353, which was 45 percent of the Region's total excess employment. The relative standing of each major industry group in the Region's economic base is summarized as follows:

| <u>Industry Group</u> | <u>Region 11</u><br>(percent) |
|-----------------------|-------------------------------|
| Agr., for., fish.     | 0                             |
| Mining                | 0                             |
| Construction          | 0                             |
| Manufacturing         | 45                            |
| Trans., com., util.   | 7                             |
| Trade                 | 20                            |
| Fin., ins., real est. | 8                             |
| Services              | 20                            |
| Total                 | 100                           |

Comparison of the 1970 industry distributions of total excess employment reveals a high degree of industry diversification in the Metropolitan Council Region. Above-average levels of industry employment occurred in 15 of the 35 civilian industries with reference to U.S. industry employment and 18 of the 35 civilian industries with reference to Minnesota industry employment (see, tables 9 and 10). Geographic dispersion of the projected 2000 industry employment is indicated by the decline in excess employment in 11 of the 18 industries with excess employment indicated for 1970.

Much greater dispersion of non-manufacturing than manufacturing employment is projected for the State as a whole. For example, excess employment in professional services is projected for 11 of the 13 regions because of the proportionately lower levels of professional services employment in Region 11 than in the State as a whole.

In Region 2, the projected excess employment in professional services accounts for 41 percent of its economic base. A similar dispersion of retail trade and other services employment is projected.

Total substate excess employment summed over the 13 substate regions differs from the statewide excess employment totals. This difference is due to the use of two different employment distributions as the base for deriving the excess employment. The total substate excess employment thus serves as measure of region-to-region differences in patterns of industry specialization -- present and projected-- and how these patterns are changing among the substate regions.

#### Employment Multipliers

A basic employment multiplier is the ratio of total employment to basic employment. It can be derived from historical data and it can be projected from these data for the future. Similarly, basic employment can be projected. The two statistics can be used to project total employment, given basic employment. They can be used, also, to evaluate the industry employment projections based on the shift-and-share technique.

Two types of multipliers are derived (table 6). One is based on excess employment, the other on commodity-producing employment. The latter can be viewed as a basic multiplier where employment in commodity-producing industries, namely, agriculture, forestry, mining, construction and manufacturing, is equivalent to employment in export-producing industries. The two measure basic employment differently so that the two sets of multipliers differ in absolute values. However, both increase in numerical value over the 60-year period.

The excess employment multiplier, which is based on the Minnesota employment distribution as a norm, is projected to increase over the 1970 to 2000 period in every region of the State. Large differences occur in this multiplier among the regions because of the size of the region, its degree of urbanization and the differential growth in residentiary industries relative to the State.



Table 6. Estimated and projected total employment per 1,000 of excess and commodity-producing employment in specified regions, Minnesota, 1940-2000. <sup>1/</sup>

| Region<br>No. Title      | Excess Employment |       |       |       |        | Commodity-Producing Employment |        |       |       |       |       |       |       |       |
|--------------------------|-------------------|-------|-------|-------|--------|--------------------------------|--------|-------|-------|-------|-------|-------|-------|-------|
|                          | 1940              | 1950  | 1960  | 1970  | 1980   | 1940                           | 1950   | 1960  | 1970  | 1980  | 1990  | 2000  |       |       |
| 1. Northwest             | 3,302             | 3,360 | 3,748 | 4,798 | 5,222  | 5,191                          | 5,285  | 1,509 | 1,641 | 1,962 | 2,548 | 3,142 | 3,362 | 3,684 |
| 2. Headwaters            | 3,847             | 3,884 | 4,227 | 4,022 | 4,139  | 4,071                          | 4,102  | 1,591 | 1,719 | 2,138 | 3,129 | 4,004 | 4,565 | 5,082 |
| 3. Arrowhead             | 4,678             | 4,122 | 3,843 | 4,604 | 4,935  | 5,134                          | 5,286  | 2,360 | 2,166 | 2,376 | 2,753 | 2,958 | 3,114 | 3,286 |
| 4. West Central          | 3,312             | 4,116 | 4,484 | 5,298 | 5,582  | 5,431                          | 5,411  | 1,569 | 1,742 | 2,102 | 2,900 | 3,771 | 4,412 | 5,061 |
| 5. Region Five           | 4,437             | 4,304 | 4,615 | 5,287 | 5,407  | 5,205                          | 5,114  | 1,652 | 1,796 | 2,010 | 2,599 | 3,122 | 3,311 | 3,570 |
| 6W. Six West             | 3,744             | 3,740 | 3,423 | 4,123 | 5,302  | 6,094                          | 6,348  | 1,599 | 1,728 | 1,972 | 2,298 | 2,947 | 3,450 | 3,881 |
| 6E. Six East             | 3,789             | 3,916 | 4,264 | 5,217 | 6,049  | 6,375                          | 6,758  | 1,548 | 1,660 | 1,849 | 2,093 | 2,462 | 2,624 | 2,649 |
| 7W. Central Minnesota    | 5,069             | 5,749 | 6,424 | 7,296 | 7,694  | 7,724                          | 7,832  | 1,679 | 1,802 | 2,005 | 2,524 | 2,913 | 3,090 | 3,264 |
| 7E. East Central         | 3,075             | 3,118 | 4,942 | 6,703 | 7,456  | 8,008                          | 8,496  | 1,421 | 1,487 | 1,880 | 2,254 | 2,595 | 2,705 | 2,854 |
| 8. Southwest             | 3,708             | 3,683 | 3,803 | 4,283 | 5,388  | 5,792                          | 6,083  | 1,552 | 1,679 | 1,880 | 2,269 | 2,963 | 3,469 | 3,928 |
| 9. Region Nine           | 4,966             | 5,002 | 5,285 | 6,543 | 7,411  | 7,411                          | 7,600  | 1,633 | 1,741 | 1,985 | 2,352 | 2,785 | 3,021 | 3,235 |
| 10. Southeastern         | 6,513             | 6,436 | 6,431 | 6,857 | 7,512  | 7,686                          | 7,877  | 1,750 | 1,870 | 2,114 | 2,477 | 2,870 | 3,025 | 3,218 |
| 11. Metropolitan Council | 3,895             | 4,797 | 6,670 | 9,770 | 10,472 | 10,524                         | 10,675 | 3,150 | 2,871 | 2,856 | 3,180 | 3,365 | 3,274 | 3,330 |
| Average                  | 4,182             | 4,645 | 5,442 | 7,185 | 7,850  | 7,954                          | 8,129  | 2,068 | 2,142 | 2,828 | 2,828 | 3,163 | 3,236 | 3,370 |

<sup>1/</sup> Derived from: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Employment by Industry, 1940-1970. Washington, D.C., U.S. Government Printing Office, 1975.

The commodity-producing multiplier also increased sharply in the 1940 to 1970 period and is projected to increase, but at a slower rate, from 1970 to 2000. This trend is attributed to the large decline in agricultural employment and the much larger increases in non-commodity-producing industry employment. These trends manifest the shift to a service economy and its salient characteristics -- increasing output and income per worker and corresponding shifts in the production of income-elastic consumer services. For the Headwaters Region, for example, the commodity-producing employment multiplier is projected to exceed the excess employment multiplier by the year 2000 because of the projected rapid growth of trade and service industries which account for an increasingly larger share of the region's economic base.

For each of the two base multipliers, the corresponding measure of basic employment is required. As long as the percentage decline in basic employment is less than the percentage increase in the base multiplier, total employment will increase. In some regions, as in the Twin Cities Metropolitan Area, basic employment has been increasing. Total employment will increase at above-average rates.

The findings thus show the regional employment distributions which are consistent with the previously projected labor force levels. For some regions, such as the Headwaters Region, a large shift to export-producing service employment is projected. Without this shift in basic employment, lower levels of total employment would be obtained, which would require, in turn, a re-evaluation of the levels of population and labor force projected for the Region.

## IMPLICATIONS FOR POPULATION CHANGE

Population is related to employment through labor force participation rates. Each age and sex class in the population 16 years old and over is identified with a particular labor force participation rate -- a statistic representing the proportion of a given population which is employed or is actively seeking employment. Age-sex specific labor force participation rates and the corresponding population classes are multiplied to obtain the number of persons in the labor force. Finally, the unemployed labor force is deducted from the derived total labor force to obtain the derived employed labor force.

## Employment-Related Population Change in Minnesota

An employment-based approach to the study of population change in Minnesota starts with the relationships between total population, particularly the population 16 years and older, and total labor force (table 7). The unemployed labor force -- approximately four percent of the total labor force in Minnesota -- is added to the employed labor force to give a measure of the total labor force.

In Minnesota, the total labor force increased 14.7 percent from 1,562,200 in 1970 to 1,792,000 in 1975 -- an increase of 229,800 persons. Total population increased by only 2.9 percent from 3,805,000 to 3,916,000. Because of an increase in unemployed persons from 1970 to 1975, the employed labor force increased 13.2 percent.

Work force statistics of employment are compiled monthly, quarterly and annually and, hence, they provide a more up-to-date measure of state and substate employment change than the labor force statistics. The work force series is based on the employer reports of business payroll covered by the Unemployment Insurance Program. Self-employed persons and those not covered by the Unemployment Insurance Program also are included in this statistical series. The employed work force series is a job-based measure of employment by place of work compiled

Table 7 . Estimated and projected population and labor force, Minnesota, 1970-2000.

| Item             | Estimated |         | Projected |         |         |         |  |
|------------------|-----------|---------|-----------|---------|---------|---------|--|
|                  | 1970      | 1975    | 1980      | 1985    | 1990    | 2000    |  |
| (thousand)       |           |         |           |         |         |         |  |
| Population:      |           |         |           |         |         |         |  |
| Total            | 3,805.0   | 3,916.1 | 4,076.8   | 4,252.2 | 4,421.5 | 4,652.8 |  |
| 16 years & older | 2,574.4   | 2,812.0 | 3,061.6   | 3,223.6 | 3,331.0 | 3,433.4 |  |
| Labor Force:     |           |         |           |         |         |         |  |
| Total            | 1,562.2   | 1,792.0 | 1,905.1   | 2,041.7 | 2,132.1 | 2,243.6 |  |
| Employed         | 1,494.4   | 1,691.0 | 1,828.9   | 1,960.0 | 2,046.8 | 2,153.9 |  |
| Unemployed       | 67.8      | 107.0   | 76.2      | 81.8    | 85.3    | 89.7    |  |
| Work Force:      |           |         |           |         |         |         |  |
| Total            | 1,685.7   | 1,900.7 | 2,026.0   | 2,171.4 | 2,267.4 | 2,386.4 |  |
| Employed         | 1,612.3   | 1,767.2 | 1,919.3   | 2,054.0 | 2,147.9 | 2,260.7 |  |
| Unemployed       | 73.4      | 133.5   | 106.2     | 114.4   | 119.5   | 125.7   |  |

by the Regional Economic Information System (REIS) of the U.S. Department of Commerce.<sup>15/</sup>

The employed work force series show higher levels of total employment than the employed labor force series because of multiple job holding. One person may hold two or more jobs. For small areas, however, the total jobs in the area may be less than the total resident labor force because of commuting from place of residence to place of work. In 1970, the total employed work force in Minnesota was 1,612,400, or 7.9 percent larger than the total employed labor force of 1,494,400.

The employed work force series relates, finally, to the employment projections reported by the U.S. Bureau of Labor Statistics (BLS).<sup>16/</sup> This series shows a total U.S. employed work force of 85,646,000 in 1970 and a projected employed work force of 109,609,000 in 1985 (which compare with a total employed labor force of 79,307,900 in 1970 and 101,121,100 in 1985).

Relationships among the three demographic series -- population, labor force and work -- are summarized as follows:

|   | <u>1970</u> | <u>1975</u> | <u>1980</u> | <u>1985</u> | <u>1990</u> | <u>2000</u> |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| Persons 16 years and older<br>per 100 total population              | 677         | 718         | 751         | 758         | 749         | 738         |
| Labor force per 1000<br>persons 16 years and older                  | 606         | 639         | 662         | 633         | 640         | 654         |
| Employed labor force<br>per 1000 total population                   | 393         | 432         | 449         | 461         | 463         | 463         |
| Total employed work force<br>per 1000 total employed<br>labor force | 1,079       | 1,050       | 1,050       | 1,050       | 1,050       | 1,050       |

<sup>15/</sup> U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 1975.

<sup>16/</sup> U.S. Department of Labor, The U.S. Economy in 1985: A Summary of BLS Projections, Bul. 1809, Bureau of Labor Statistics, U.S. Government Printing Office, Washington, D.C., 1974.

The ratio of the 16-year-old-and-older to total population increased rapidly in the 1960's and the early 1970's when those born in the pre-1960 "baby boom" were ready to enter the labor force. The overall labor force participation rate increased in this period because of the expansion of the female labor force. Hence, the employment-population ratio is projected to increase as a result in more persons per household and more households. The formation of new households parallels the expansion of the total labor force. Finally, unemployment rates increased in the 1970's because of the slowdown in economic activity and decline in new job opportunities.

Additional study is needed of the labor force implications of shifts in the age distribution of the total population in Minnesota. The declining birth rate has led to a reduction in the number of persons entering the labor force. On the other hand, retirements from the labor force are increasing.

Population-related employment change include changes in (1) age-sex specific labor force participation rates, (2) age-sex distribution of total population, and (3) total population. The combined effects of labor force participation and the age-sex distribution of the total population are represented by the ratio of total employed force to total population.

The effects of each of the three population-related sources of employment change are projected, by decades, as follows:

|                           | <u>1970-80</u> | <u>1980-90</u> | <u>1990-2000</u> |
|---------------------------|----------------|----------------|------------------|
| Labor force participation | 212.5          | 58.3           | 0                |
| Population                | 106.8          | 154.7          | 107.1            |
| Combined effect           | 15.2           | 4.9            | 0                |
| Total                     | 334.5          | 217.9          | 107.1            |

The projected change in employed labor force per 1,000 total population due to changes in labor force participation accounts for 215,500 or 63.5 percent of the projected change in employed labor force from 1970 to 1980. In the 1990 to 2000

period, projected employment change is due entirely to population change.

#### Substate Distribution of Population Change

The overall population impacts of historical and projected employment changes in the Minnesota economy are summarized for each of the 13 substate regions (table 8). The population changes correspond with the employment changes. Indeed, the population changes projected for each region provide the statistical frame for the projected employment changes.

Major components of population change -- natural increase and migration-- are identified as the principal sources of total population change (table 9). Natural increase in population, of course, follows national social and economic trends. Migration, however, responds to certain local economic conditions, especially the existence of favorable employment opportunities.

Comparison of the natural increase component of total population change reveals a rather uniform population response in the 13 regions to primarily external conditions. A sharp drop in the national increase component occurred for all regions, especially in the 1960-1970 period. By the 1970-1980 period, this pattern will have stabilized to nearly a "zero growth" level.

Regional migration patterns show a vastly different mix of in-migration and out-migration for the two 25-year periods from 1950 to 1975 and 1975 to 2000. A sharp reversal in the direction of migration is indicated between the two 25-year periods for five of the 13 regions. In the Metropolitan Council Region a reversal in migration is indicated for the 1970 to 1975 period and, again, for the 1975 to 1980 period. Net out-migration is projected for the remaining five regions. The latter are more agriculture-dependent than other regions in the State.

Low rates of population growth projected for the dominantly agricultural regions are indicated by the reported changes in population for the 1970 to 1975

Table 8. Estimated and projected population in specified region, Minnesota, 1950-2000.

| Region                   | Estimated           |                     |                     |                     | Projected <sup>2/</sup> |           |           |           |  |
|--------------------------|---------------------|---------------------|---------------------|---------------------|-------------------------|-----------|-----------|-----------|--|
|                          | 1950- <sup>1/</sup> | 1960- <sup>1/</sup> | 1970- <sup>2/</sup> | 1975- <sup>2/</sup> | 1980                    | 1985      | 1990      | 2000      |  |
|                          | (number)            |                     |                     |                     |                         |           |           |           |  |
| 1. Northwest             | 108,850             | 100,402             | 94,579              | 97,307              | 96,500                  | 98,200    | 99,000    | 97,800    |  |
| 2. Headwaters            | 58,265              | 52,896              | 54,594              | 60,417              | 60,800                  | 64,200    | 66,000    | 72,800    |  |
| 3. Arrowhead             | 305,885             | 344,957             | 329,603             | 331,097             | 330,300                 | 332,600   | 332,400   | 325,400   |  |
| 4. West Central          | 179,953             | 183,511             | 185,417             | 192,106             | 195,600                 | 202,300   | 206,800   | 212,900   |  |
| 5. Region Five           | 114,401             | 110,813             | 113,624             | 123,436             | 122,500                 | 127,600   | 131,800   | 139,500   |  |
| 6W. Six West             | 73,007              | 69,063              | 61,914              | 62,240              | 60,300                  | 60,400    | 59,900    | 56,700    |  |
| 6E. Six East             | 93,762              | 96,524              | 97,736              | 112,644             | 104,000                 | 108,900   | 113,000   | 118,900   |  |
| 7W. Central Minnesota    | 124,969             | 140,428             | 173,518             | 198,925             | 206,500                 | 226,800   | 248,400   | 288,000   |  |
| 7E. East Central         | 67,372              | 67,520              | 76,351              | 90,182              | 93,500                  | 108,800   | 116,900   | 142,400   |  |
| 8. Southwest             | 149,116             | 140,268             | 141,532             | 141,423             | 141,000                 | 143,200   | 143,600   | 139,000   |  |
| 9. Region Nine           | 198,427             | 212,563             | 218,081             | 219,353             | 227,900                 | 234,400   | 238,900   | 243,400   |  |
| 10. Southeastern         | 322,773             | 360,532             | 384,546             | 394,957             | 410,200                 | 427,300   | 441,500   | 460,300   |  |
| 11. Metropolitan Council | 1,185,694           | 1,525,297           | 1,874,612           | 1,902,059           | 2,027,700               | 2,121,500 | 2,222,500 | 2,355,700 |  |
| Total                    | 2,982,483           | 3,413,864           | 3,806,103           | 3,916,105           | 4,076,800               | 4,252,200 | 4,421,500 | 4,652,800 |  |

<sup>1/</sup> U.S. Bureau of the Census, Census of Population: 1950, Minnesota, U.S. Government Printing Office, Washington, D.C., 1952; Census of Population: 1960, Minnesota, U.S. Government Printing Office, 1962.

<sup>2/</sup> U.S. Bureau of the Census, Population Estimates and Projections, Current Population Reports, Series P-25, No. 671, U.S. Government Printing Office, Washington, D.C., May 1977.

<sup>3/</sup> Minnesota State Planning Agency, Minnesota Population Projections, 1970-2000, St. Paul, MN, 1975.



Table B. Estimated and projected change in total population in specified region, by source of change, Minnesota, 1950-2000.<sup>1/</sup>

| No. | Region<br>Title      | Estimated Change, 1950-1975 |           |         | Projected Change, 1975-2000. |           |         |
|-----|----------------------|-----------------------------|-----------|---------|------------------------------|-----------|---------|
|     |                      | Natural Increase            | Migration | Total   | Natural Increase             | Migration | Total   |
|     |                      | (number)                    |           |         |                              |           |         |
| 1.  | Northwest            | 25,545                      | -37,097   | -11,552 | 14,166                       | -13,673   | 493     |
| 2.  | Headwaters           | 14,886                      | -12,734   | 2,152   | 9,443                        | 2,940     | 12,383  |
| 3.  | Arrowhead            | 83,570                      | -58,358   | 25,212  | 48,825                       | -54,522   | -5,697  |
| 4.  | West Central         | 46,523                      | -34,370   | 12,153  | 27,951                       | -7,157    | 20,794  |
| 5.  | Region Five          | 28,023                      | -18,988   | 9,035   | 16,925                       | -861      | 16,064  |
| 6W. | Six West             | 15,498                      | -26,295   | -10,797 | 8,647                        | -14,157   | -5,510  |
| 6E. | Six East             | 24,106                      | -15,224   | 8,882   | 15,416                       | 840       | 16,256  |
| 7W. | Central Minnesota    | 59,679                      | 14,277    | 73,956  | 39,217                       | 49,858    | 89,075  |
| 7E. | East Central         | 11,503                      | 11,307    | 22,810  | 14,290                       | 37,928    | 52,218  |
| 8.  | Southwest            | 43,304                      | -50,997   | -7,693  | 21,022                       | -23,445   | -2,423  |
| 9.  | Region Nine          | 38,257                      | -37,329   | 20,928  | 35,497                       | -11,452   | 24,045  |
| 10. | Southeastern         | 105,761                     | -33,577   | 72,184  | 67,410                       | -2,-67    | 65,343  |
| 11. | Metropolitan Council | 552,000                     | 164,354   | 716,354 | 324,690                      | 128,962   | 453,652 |
|     | Total                | 1,068,655                   | -135,031  | 933,624 | 643,499                      | 93,194    | 736,693 |

<sup>1/</sup> Economic Research Service, U.S. Dept. of Agriculture, Net Migration of the Population 1950-1960, by Age, Sex and Color, Part 2 -- North Central States, Washington, D.C. U.S. Government Printing Office, 1965; Economic Research Service, U.S. Dept. of Agriculture, Net Migration of the Population 1960-1970, by Age, Sex and Color: Part 2 -- North Central States, Athens, Georgia, University of Georgia Printing Department, 1975; U.S. Dept. of Commerce, Bureau of the Census, Estimates of the Population of Counties and Metropolitan Areas: July 1, 1974 and 1975, Current Population Reports, Series P-25, No. 709, Sept. 1977; Minnesota State Planning Agency, Population Estimates for Minnesota Counties, 1974, July 1975; Minnesota State Planning Agency, Minnesota Population Projections, 1970-2000, St. Paul, MN 1975.

period.<sup>17/</sup> From 1970 to 1975, total population declined in 21 counties, of which 10 are in the four dominantly agricultural regions, while an additional seven counties are in Regions 9 and 10 which, aslo, are strongly agricultural. The largest population decline in the State was reported for Hennepin County with Ramsey County having the second largest decline.

The geography of population change from 1970 to 1975 shows a concentration of rapidly growing counties within 100 miles of downtown Minneapolis-St. Paul (fig. 2). Above average population growth was reported for 15 counties from Olmstead County in the southeast to Stearns County in the northwest and Mille Lacs County in the north. All remaining seven counties in the highest quartile of population change also are northwest and north of the downtown Minneapolis-St. Paul area.

The population increases in the 15 most rapidly growing counties (i.e., highest quartile) in and near the Metropolitan Council Region accounts for 54 percent of the total population increase in the growing counties, while the total population increase in the 29 growing counties (i.e., first, second and third quartiles) in the 100-mile commuting zone adds up to more than 85 percent of the total population increase. Thus, the population redistribution in Minnesota is largely from the most highly populated to the less populated counties in the extended Metropolitan Council Region.

The geography of employment change in Minnesota is closely related to the geography of population change. Employment change, however, is more widely dispersed and it is shared more widely by the dominantly agricultural counties than the State's population increase (fig. 3). Of the 22 most-rapidly growing counties

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<sup>17/</sup> U.S. Bureau of the Census, Current Population Reports, Series p-25, No. 671, U.S. Government Printing Office, Washington, D.C., May 1977.

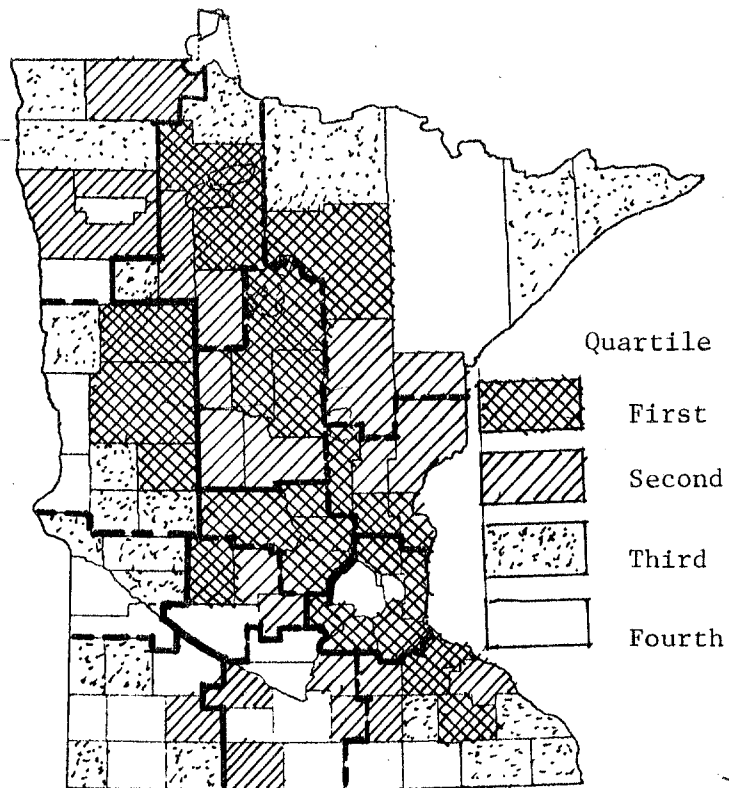


Fig. 2. County ranking in total population changes, Minnesota, 1970-75.

Source: U.S. Bureau of the Census, Population Estimates and Projections, Current Population Reports, Series P-25, No. 671, U.S. Government Printing Office, Washington, D.C., May 1977.

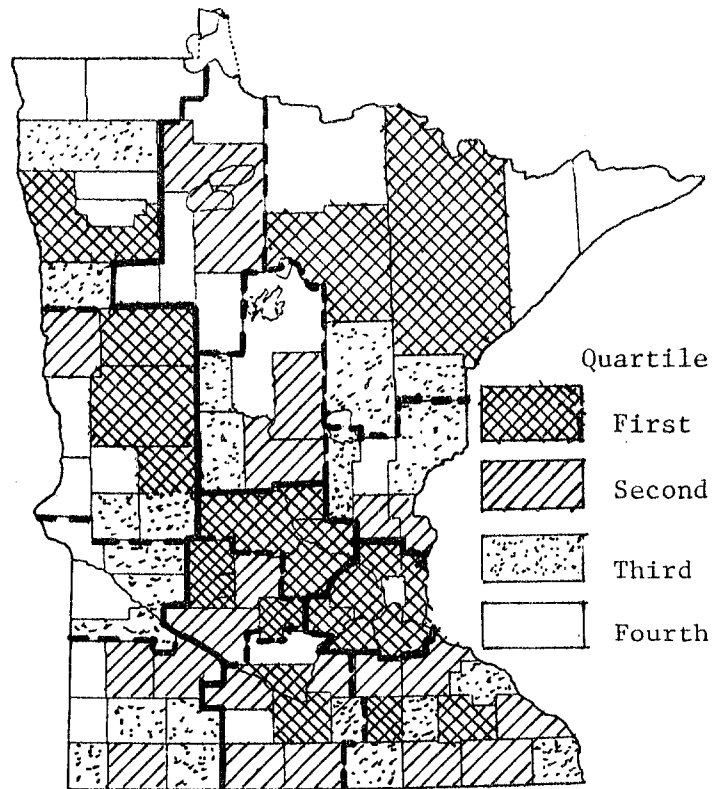


Fig. 3. County ranking in total employment change, Minnesota, 1970-75.

Source: U.S. Department of Commerce, Bureau of Economics, Regional Economic Information System, 1977.

in total employed work force are located within 100 miles of downtown Minneapolis-St. Paul. Slightly less of the employment change occurred in this area. Moreover, the employment increases were shared in large measure by more counties than were the population increases. County-to-county differences in labor force participation largely accounts for the differences in geographic distribution of population and employment change.

#### Relation of Population Change to Employment Change Minnesota Development Regions

In this report, projected total population in each region has served as a limit on total regional employment, given projected labor force participation rates and projected unemployment rates. The industry distribution of total regional employment is derived by use of the shift-and-share projection method, but total regional employment is determined by the projected labor force. Changes in total employment due to industry-mix and regional-share effects are closely correlated with changes in total population due to migration. An above-average industry-mix effect, when coupled with an above-average regional-share effect, invariably forecasts an above-average increase in employment, which correlates with an above-average increase in population.

#### Relative employment change and migration

Of the two components of relative change, the regional-share effect represents the outcome of local factors affecting the level of local industry employment. The individual industry regional-share effect is a surrogate for the competitive position of each industry. A positive regional-share effect denotes an increasing local concentration of employment in this industry while a negative regional-share effect denotes a reduction in given industry employment relative to the Nation.

Decade-to-decade changes in total employment due to the regional-share effect reveal an increasing concentration of Minnesota employment in 21 industries

in the 1960 to 1970 period. For eight of the 21 industries, the regional-share effects were positive for both the 1950 to 1960 and 1960 to 1970 periods, while for an additional 13 industries the regional-share effects shifted from negative in the 1950 to 1960 period to positive in the 1960 to 1970 period. For seven of the eight industries with positive regional-share effects in both the 1950-60 and 1960-70 periods, the projected 1970-80 effects were positive, also. The projected regional-share effects were positive each decade for only three industries.

Positive industry regional-share effects identify the more rapidly growing regions in total employment. The accumulative projected regional-share effect is positive each 10-year period for six of the 13 substate regions, as follows:

|                       | <u>Accumulative<br/>regional-share<br/>effect</u> | <u>Accumulative<br/>net migration<br/>effect</u> |
|-----------------------|---|--|
| 2. Headwaters         | 8,341   | 7,140  |
| 4. West Central       | 11,618  | -3,757   |
| 5. Region Five        | 10,463  | 7,539  |
| 6E. Six East          | 7,533   | 3,140  |
| 7W. Central Minnesota | 44,925  | 64,058   |
| 7E. East Central      | 24,983  | 50,025   |
|                       | <u>107,883</u>                                    | <u>128,145</u>                                   |

The accumulative regional-share effect in five of six substate regions correlates with the accumulative net migration effect. In the West Central Region, a large negative industry-mix effect results in a negative relative change, which, in turn, correlates with a negative migration effect.

Conversely, a large positive industry-mix effect for the Metropolitan Council Region results in a positive relative change which correlates with a negative migration effect. A large proportion of above-average growth industry is concentrated in this region. Widespread industry dispersion to substate regions, especially those identified with positive migration effects, is associated with a negative regional-share effect for the Metropolitan Council Region. This effect is large enough to overcome the positive industry-mix effect. In-migration

is projected nonetheless because of already high labor force participation rates in this region.

#### Population related employment change

The relation of employment change to population is demonstrated in a partitioning of the projected change in the total employed labor force in each substate region into three change sources: labor force participation (i.e., change in employed labor force per 1,000 total population), total population, and a combination of the two changes (table 10). Because the labor force participation rate varies among regions, the effect of population change on employment also will vary among substate regions.

Labor force participation is projected to increase more than the State average (of 7.1 percent) in 11 of the 13 regions. An increase of 10 percent or more is projected for four regions -- Headwaters, West Central, Region Five and Central Minnesota. Above-average rates of population growth also are projected for these regions, which, together with high labor participation, yield large percentage increases in employment. A small population increase, coupled with a large change in labor force participation, results in a large labor force participation effect but a small change in total employment (e.g., Regions 1, 3, 6W and 8). While the projected employment changes due to an increase in labor force participation are large in the 1970's, they become less important in later decades in all regions in the 1970 to 2000 employment projections.

Comparison of the projected 1970 to 2000 employment change with the 1970 to 1975 change in the total labor force in each region show several differences in the three sources of employment change (table 11). First, the 1970 to 1975 change in total labor force is converted into an employed labor force (by subtracting a total unemployed labor force equivalent to 5.6 percent of the total labor force) of 168,700. Thus, the estimated employed labor force change from 1970 to 1985 is

Table 10. Projected change in total employed labor force in specified region, by populated-related employment change source, Minnesota, 1970-2000. 1/

| No.   | Region<br>Title            | Employed Labor Force Per<br>1,000 Total Population |      | Employed Work Force Change Due to:     |                               |                               | Total |
|-------|----------------------------|--|------|--|-------------------------------|-------------------------------|-------|
|       |                            | 1970   | 2000 | Labor Force<br>Participation <u>2/</u> | Total<br>Population <u>3/</u> | Combined<br>Effects <u>4/</u> |       |
|       |                            |  |      | (number)                               |                               |                               |       |
| 1.    | Northwest                  | 34.1   | 42.4 | 7.9                                    | 1.1                           | 0.2                           | 9.2   |
| 2.    | Headwaters                 | 32.4   | 45.7 | 7.3                                    | 5.9                           | 2.4                           | 15.6  |
| 3.    | Arrowhead                  | 34.0   | 43.1 | 29.9                                   | -1.4                          | -0.4                          | 28.1  |
| 4.    | West Central               | 35.8   | 45.8 | 28.6                                   | 9.8                           | 2.8                           | 31.2  |
| 5.    | Region Five                | 31.6   | 42.0 | 11.8                                   | 8.2                           | 2.7                           | 22.7  |
| 6W.   | Six West                   | 35.2   | 43.7 | 5.2                                    | -1.8                          | -0.4                          | 3.0   |
| 6E.   | Six East                   | 37.4   | 45.5 | 8.0                                    | 7.9                           | 1.7                           | 17.6  |
| 7W.   | Central Minnesota          | 35.2   | 45.6 | 18.0                                   | 40.2                          | 11.9                          | 70.1  |
| 7E.   | East Central               | 35.2   | 44.7 | 7.2                                    | 23.2                          | 6.3                           | 36.7  |
| 8.    | Southwest                  | 35.9   | 44.9 | 12.7                                   | -0.9                          | -0.2                          | 11.6  |
| 9.    | Region Nine                | 37.6   | 44.9 | 16.1                                   | 9.5                           | 1.8                           | 27.4  |
| 9/10. | Southeastern               | 39.3   | 45.8 | 25.0                                   | 29.8                          | 4.9                           | 59.7  |
| 11.   | Metropolitan Council       | 42.4   | 47.7 | 99.4                                   | 204.1                         | 25.5                          | 329.0 |
|       | Average or Total <u>5/</u> | 39.1   | 46.2 | 267.1                                  | 335.6                         | 59.2                          | 661.9 |

1/ Based on estimated and projected population and employment (in tables 2 and 13).

2/ Change in employed labor force per 1,000 population, 1970 to 2000, times 1970 total population, i.e.,  
 $emp_1 = \text{elfpr} \times \text{pop}_{70}$

3/ Change in total population, 1970 to 2000, times 1970 employed labor force per 1,000 population, i.e.,  
 $emp_2 = \text{elfpr}_{70} \times \text{pop}$

4/ Change in employed labor force per 1,000 population, 1970 to 2000, times change in total population, i.e.,  
 $emp_3 = \text{elfpr} \times \text{pop}$

5/ Population-related employment change for State is sum of regional effects and, hence, differs from totals based on state-level data because of regional differences in employment participation rates.



Table 11. Estimated change in total employed work force and total labor force in specified region, Minnesota, 1970-1975.

| No.      | Region<br>Title                | Employed<br>Work Force<br>Change <sup>1/</sup> | Labor force change due to:                 |                               |                                   |                     | Employed Work Force Per<br>1,000 Labor Force |       |
|----------|--------------------------------|--|--|-------------------------------|-----------------------------------|---------------------|--|-------|
|          |                                |  | Labor Force<br>Participation <sup>2/</sup> | Popu-<br>lation <sup>3/</sup> | Combined<br>Effects <sup>4/</sup> | Total <sup>5/</sup> |  |       |
| (number) |                                |  |  |                               |                                   |                     |  |       |
|          |                                |  |  |                               |                                   | 1970                | 1975   |       |
| 1.       | Northwest                      | 7,523  | 2,609                                      | 996                           | 75                                | 3,680               | 1,150  | 1,236 |
| 2.       | Headwaters                     | 3,736  | 1,052                                      | 2,031                         | 112                               | 3,195               | 910  | 948   |
| 3.       | Arrowhead                      | 13,814   | 10,756                                     | 553                           | 49                                | 11,358              | 1,001  | 1,019 |
| 4.       | West Central                   | 13,505   | 4,990                                      | 2,480                         | 180                               | 7,650               | 978  | 1,057 |
| 5.       | Region Five                    | 6,130  | 2,204                                      | 3,295                         | 190                               | 6,589               | 1,026  | 1,019 |
| 6W.      | Six West                       | 4,334  | 1,430                                      | 129                           | 8                                 | 1,567               | 1,077  | 1,187 |
| 6E.      | Six East                       | 9,890  | -1,529                                     | 5,738                         | -234                              | 3,975               | 1,052  | 1,192 |
| 7W.      | Central Minnesota              | 15,990   | 2,815                                      | 9,160                         | 412                               | 12,387              | 918  | 980   |
| 7E.      | East Central                   | 5,876  | 423  | 5,098                         | 76                                | 5,597               | 892  | 918   |
| 8.       | Southwest                      | 10,581   | 4,593                                      | -40                           | -4                                | 4,549               | 1,019  | 1,135 |
| 9.       | Region Nine                    | 16,705   | 7,661                                      | 494                           | 45                                | 8,200               | 1,025  | 1,114 |
| 10.      | Southeastern                   | 26,015   | 13,110                                     | 4,185                         | 355                               | 17,650              | 1,010  | 1,058 |
| 11.      | Metropolitan Council           | 77,123   | 80,143                                     | 11,888                        | 1,173                             | 93,204              | 1,083  | 1,057 |
|          | Average or Total <sup>6/</sup> | 200,978  | 130,257                                    | 46,007                        | 2,437                             | 178,701             | 1,053  | 1,060 |

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1/ U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 1977.

2/ Change in labor force, per 1,000 population, 1970 to 1975, times 1970 total population, i.e.,  $\Delta \text{labfor} = \text{lfpr} \times \text{pop}_{70}$

3/ Change in total population, 1970 to 1975, times 1970 labor force per 1,000 population, i.e.,  $\Delta \text{labfor}_2 = \text{lfpr}_{70} \times \Delta \text{pop}$ .

4/ Change in labor force per 1,000 population, 1970 to 1975, times change in total population, 1970 to 1975, i.e.,  $\Delta \text{labfor}_3 = \Delta \text{lfpr} \times \Delta \text{pop}$ .

5/ Minnesota State Planning Agency, Minnesota Labor Force Projections, 1970-1990, July 1976, p. 36.

6/ Population-related labor force change for State is sum of regional effects and, hence, differs from totals based on State-level data because of regional differences in employment participation rates.

more than one-half of the projected 1970 to 2000 change. The increase in labor force participation accounts for 73 percent of the total 1970 to 1975 employment change as compared with 30 percent of the projected 1970 to 2000 employment change.

Changes in labor force participation and total population are ranked from highest to lowest for the 13 substate regions as follows:

| Region | Ranking of Change Source  |           |            |           |
|--------|---------------------------|-----------|------------|-----------|
|        | Labor Force Participation |           | Population |           |
|        | 1970-75                   | 1970-2000 | 1970-75    | 1970-2000 |
| 1      | 6                         | 9         | 9          | 10        |
| 2      | 10                        | 1         | 8          | 9         |
| 3      | 5                         | 6         | 10         | 12        |
| 4      | 7                         | 4         | 7          | 5         |
| 5      | 9                         | 2         | 6          | 6         |
| 6W     | 8                         | 8         | 12         | 13        |
| 6E     | 13                        | 10        | 3          | 8         |
| 7W     | 11                        | 3         | 2          | 2         |
| 7E     | 12                        | 5         | 4          | 4         |
| 8      | 4                         | 7         | 13         | 11        |
| 9      | 2                         | 11        | 11         | 7         |
| 10     | 3                         | 12        | 5          | 3         |
| 11     | 1                         | 13        | 1          | 1         |

Rankings for labor force participation rates generally are reversed from the 1970 to 1975 period to the 1970 to 2000 period. However, the rankings for total population change show only small changes between the two periods. The estimated 1970 to 1975 changes are consistent, therefore, with the projected 1970 to 2000 changes.

The derived labor force effects of the two change sources show the labor force participation effect as larger than the population effect in eight of the 13 regions (i.e., Regions 1, 3, 4, 6W, 8, 9, 10 and 11). These regions were characterized earlier as dominantly or strongly agricultural, with one exception, namely, Region 3.

Each of the eight regions with larger labor force participation effect than population effect is characterized also by a larger total employed work force than total labor force (see, table 12). The employed work force to labor force ratio is larger than one for two added regions, namely, Region Five and Six East. The

change in labor force participation was small, but the population change was large in both regions. A ratio of more than one indicates an excess of jobs over labor force and, hence, a likelihood of some in-commuting of residents outside the region to jobs in the region.

The small decline in the labor force participation rate in Six East Region indicates the possibility of in-migration, or lack of out-migration, of above-average size households. Also, the estimation procedures used in deriving the two data series were applied independently of one another and, hence, the differences may be due to estimation errors.

For three of the 11 regions -- Headwaters, Central Minnesota and East Central-- some out-commuting of the resident labor force is indicated by the small employed work force-to-labor force ratio. The three regions experienced large population increases from 1970 to 1975. The increases in labor force participation rates were among the lowest for these regions. Thus commuting to jobs outside the region and other external sources of income are likely to be essential to the resident population.

The projected increases in labor force participation rates for the three regions, which are among the highest in the State, are based on the projected 1970 to 2000 increases in total labor force. At least for two of the three regions -- Central Minnesota and East Central, the geographic dispersion of industry is likely to provide for new employment opportunities in each region. Location of this industry in the Headwaters Region is less likely, given current trends. Nonetheless, the underlying demographic assumptions imply a redistribution of export-producing industry to the Headwaters Region to support the projected levels of population and labor force.

With one significant exception, therefore, the 1970 to 1975 trends in population, labor force and employment support the underlying assumptions of the sub-state employed labor force projections for the year 2000. These projections show

a regional redistribution of employment from the core metropolitan region (i.e., Region 11) largely to surrounding regions (i.e., Regions 6E, 7W, 7E, 9 and 10) which are approximately a 100 miles from downtown Minneapolis-St. Paul. A massive redistribution of the employed labor force to remote rural regions is not indicated by these projections. Rather, the process is one of expansion of the Minneapolis-St. Paul urbanized area to an extended metropolitan economic community stretching from Rochester and Olmstead County in the southwest to St. Cloud and Stearns County in the northwest. Most of Minnesota's employment growth to the year 2000 is likely to occur in this extended economic region. And much of the employment growth is the result of an increase in labor force participation-- a process well underway in the 1970 to 1975 period for most regions of the State.