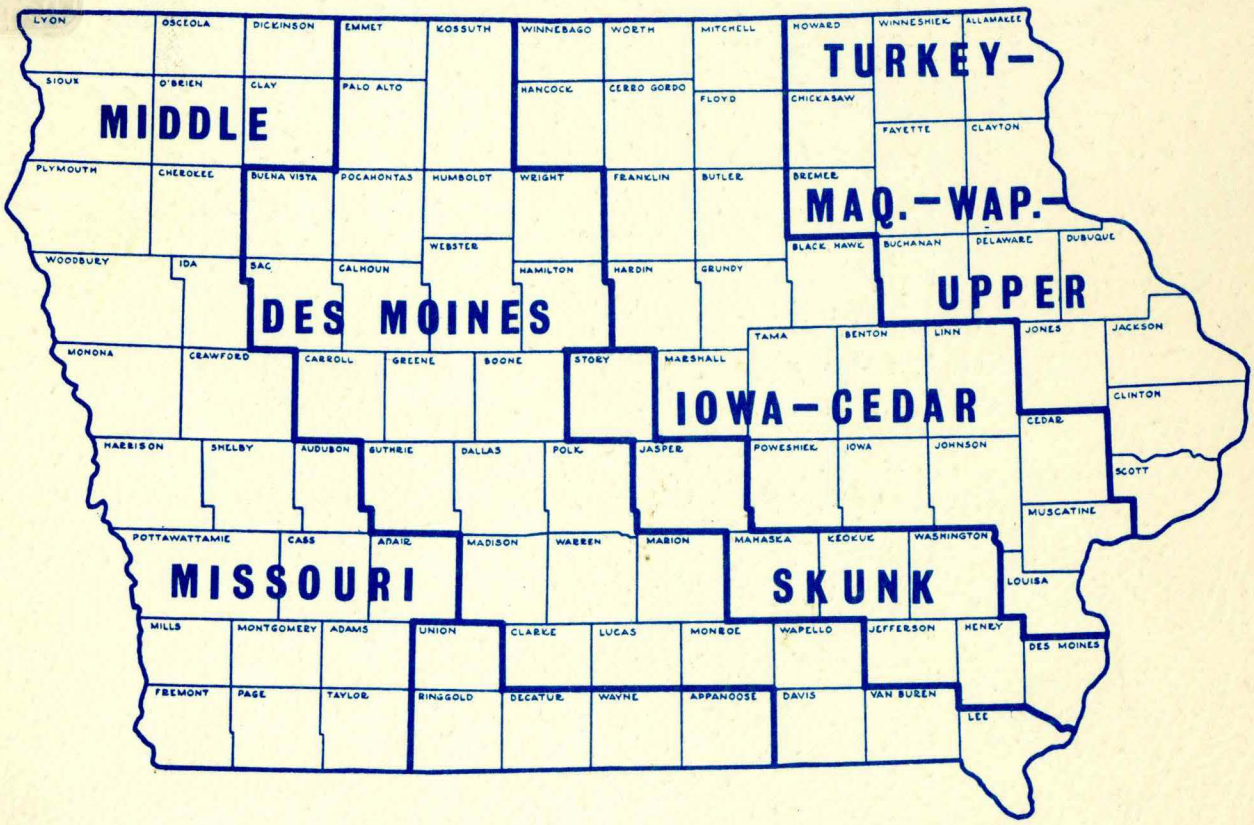
IOWA'S RIVER BASINS



PRELIMINARY ECONOMIC PROJECTIONS FOR IOWA PORTIONS OF MISSOURI AND UPPER MISSISSIPPI BASINS

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June 1967

PRELIMINARY PROJECTIONS

OF

INCOME, EMPLOYMENT AND POPULATION

IN IOWA PORTIONS OF

MISSOURI AND UPPER MISSISSIPPI BASINS

1980, 2000 & 2020

For use by the Iowa Natural Resources Council

June 1967

FOREWORD

Iowa's six river basins have been studied in the context of national trends and projections, particularly those prepared as part of the comprehensive framework studies of the Missouri and Upper Mississippi basins. Because of the dependence of the Iowa projections upon those prepared for the major river basins, they must be up-dated when the Missouri and Upper Mississippi Basin projections are revised. Presently, however, these projections represent the most up-to-date summary of Iowa's economic prospects over the next five to six decades.

Summarized in this report are projections of total population, total employment and total income for each of the six hydrologic subareas for three target years -- 1980, 2000 and 2020. Because of the stipulation that 50-year projections must be prepared as a basis for comprehensive federal-state river basin planning, the projection series extend far beyond our best forecasting capabilities. Yet, today's decisions to build dams and to undertake large-scale water resource projects are conditioned by notions about the future and the way in which we expect today's decisions to affect future prospects. We recognize, for example, that even though a major water facility built now may not last a full 50 years, its influence nonetheless has multiplier effects over time because of the impetus it provides for self-sustaining regional or state economic growth.

As part of the study, but not included as part of this report, are two series of individual county projections of population, employment and income that can serve as "building blocks" in multi-county data systems for water resource planning purposes. Only minor changes are required in the computer programs to accomodate revisions in the basin-wide projection series. Once the control totals for the six Iowa subbasins are revised, new series of county "building block" projections can be prepared; these projections also can be regrouped to provide revised series for alternative subarea delineations. The preparation of economic projections for river basin planning is, therefore, a continuing task that anticipates inevitable modification of existing projection series as underlying assumptions change and as our understanding and expectations of the future unfold.

CONTENTS

SUMMARY

Two series of economic projections are presented -- a baseline series and a program series. The two series in effect provide a range of reasonable alternatives with reference to Iowa's economic growth and development. Each of the projection series has been prepared for the six hydrologic subareas in the Iowa portions of the Missouri and Upper Mississippi basins (fig. 1).

Baseline projections are essentially demographic; they are developed from historic relationships exemplified by the level of state and subarea population and its increase through births and in-migration and its decrease through deaths and out-migration. The baseline series correspond approximately with the Series II B state-level projections of the U.S. Bureau of the Census.

The so-called program projections are comparable with the National Planning Association projections for the Upper Mississippi Basin, which includes four of the six Iowa hydrologic subareas. However, slight differences exist between the two sets of projections because of the exclusion of five Minnesota counties from Subareas 11 and 13 and the use of U.S. Census of Population population and employment definitions in the program series.

According to the baseline projections, Iowa population would increase from its 1960 level of 2,758,000 to a 2020 level of 3,761,000 -- an increase of one-half of one percent per annum over the 60-year period. In comparison, the program series show a population growth rate of 1.4 percent per year -- from 2,758,000 to 6.3 million over the 60-year period. The employment and income projections show comparable differences because of their underlying assumptions.

For water resource planning, the program series presented in this report are more useful than the baseline series. First, the program series are comparable with the projections used in Upper Mississippi Basin planning for 70 of the 99 Iowa counties; second, they are based essentially on detailed analyses of the industrialization process and its spatial diffusion in eastern Iowa -- a phenomenon that is not fully incorporated into the baseline series; third, although substantially more optimistic than the baseline series with reference to growth prospects for the Iowa economy, they are based on assumptions supported by recent studies regarding the spatial impacts of national economic growth and the range of favorable location alternatives available in Iowa to businesses and households seeking new industrial, commercial and residential sites. The program series represent, therefore, the preferred series of projections for water resources planning in Iowa. However, the program projections are useful only to the extent that they are kept up to date by appropriate revisions based on changes in the current preliminary projections for the Missouri and Upper Mississippi basins.

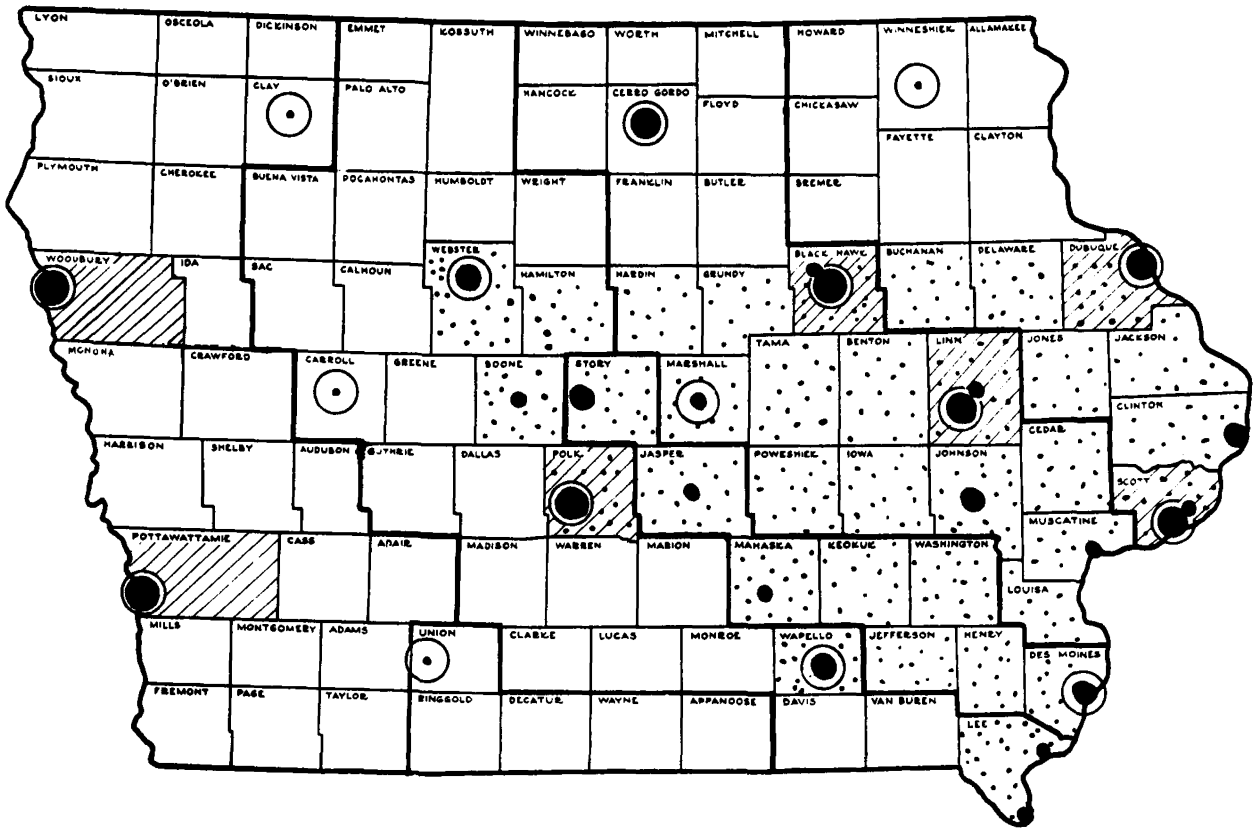

FIG. 1. Hydrologic subareas and principal population centers of Iowa.

IOWA'S RIVER BASINS -- PRELIMINARY ECONOMIC PROJECTIONS

FOR IOWA PORTIONS OF MISSOURI AND UPPER MISSISSIPPI BASINS *

The economic projections prepared for the Iowa Natural Resources Council are confined to the major indicators of economic growth and development in Iowa. In this report the major series include total population, total employment and total personal income; these series are presented for each of six subareas in the Iowa portions of the Missouri and Upper Mississippi Basins.

We accept the demographic approach as one of two approaches in the preparation of state population projections; in this report it provides the lower limit for the two Iowa series and, hence, it is viewed as the baseline series (representing, essentially, an extrapolation of 1950-60 demographic and economic structures).

Because of the high rate of outmigration associated with a rapidly declining agricultural employment, and sluggish growth in manufacturing and service employment during the 1950-60 period, the historic base for the baseline series is unduly restrictive. Since 1960 accelerated industrial development and proliferation of service industries has resulted in employment levels that already exceed those projected for 1970 on the basis of the demographic model. This experience supports the less restrictive assumptions involved in the approach used by the National Planning Association, particularly with reference to the projected growth in manufacturing and service employment in the emerging industrial complexes of the western periphery of the Manufacturing Belt.

The two series of economic projections are summarized in table 1 to illustrate the major differences resulting from their analytic approaches. For example, the baseline series show a 20-year increase of 293,000 in total population and an increase of 89,000 in total employment, which amounts to an average population increase of slightly more than three persons per additional worker. In comparison, the 1960-80 program projections show a population increase of 835,000, which is associated with an increase in employment of 276,000 -- in total, slightly less than three additional persons supported per one additional worker. Meanwhile, personal income is projected to increase by nearly 100 percent in the baseline series and by 130 percent in the program series.

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* Prepared for the Iowa Natural Resources Council by Wilbur R. Maki, Department of Economics, Iowa State University.

Table 1. Baseline and program projections of population, employment and income, Iowa, 1960-2020 [a/]

Item	Units	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population	thou.	2,757.5	3,050.6	3,389.5	3,760.7	3,592.6	4,689.9	6,300.2
Employment:								
Agriculture	thou.	215.9	129.2	84.9	65.9	176.8	137.3	107.4
Mining & construction	"	56.8	80.0	86.2	94.1	79.9	103.8	135.8
Manufacturing	"	194.5	276.9	307.1	338.1	213.1	240.4	275.5
Non-commodity producing	"	551.8	622.1	787.8	910.3	825.5	1,207.4	1,783.7
Total	"	1,019.0	1,108.2	1,265.9	1,408.4	1,295.4	1,688.9	2,302.4
Personal income [b/]	mil. dol.	5,475.0	10,675.4	19,720.2	34,979.5	12,573.6	27,276.5	58,575.2

a/ Totals may not equal sum of parts because of rounding.

b/ Constant 1960 dollars.

Comparisons between the baseline and program subarea projections on the one hand, and on the other, the U.S. Office of Business Economics (OBE) and the National Planning Association (NPA) national and basin projections, generally show below-average growth rates for the principal economic indicators (tables 2 and 3). A major difference between the baseline and program series is the employment growth rate, which, for the higher series is three times the lower series. In contrast, the overall Iowa program projections compare closely with both the OBE and the NPA national and regional growth rates. Clearly, the program series are not unrealistic in the context of national and regional projections, expecially in light of the assumptions concerning future patterns of industrial location. *

The economic projections are presented in three major parts. First, the underlying assumptions of the two projection series are discussed and critically evaluated. Second, the projection series are presented with specific reference to subarea population, employment and income trends; the employment projections are disaggregated further by industry group. Third, the projection series are summarized and presented in an Appendix table for each hydrologic subarea and major river basin in Iowa.

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* It is recognized, however, that a general purpose projection series roughly midway between the baseline and the program series might represent the preferred series for state economic planning. Such a series is being prepared for the Office of Planning and Programming, but it will be confined only to the 15-year period from 1965-1980 and not to the 50- to 60-year projection periods required in water resources planning.

Table 2. Annual change in baseline and program series of population, employment and income projections, by sub-area, Iowa, 1960-1980.

Subarea	Baseline series			Program series		
	Population	Employment	Personal income	Population	Employment	Personal income
	(percent)					
Missouri Basin:						
Subarea 6	- 0.3	- 0.4	2.6	0.5	0.6	3.4
Subarea 8	- 2.3	- 2.6	0.4	- 1.5	- 1.6	1.3
Average	- 0.5	- 0.6	2.4	0.4	0.4	3.2
Upper Mississippi Basin:						
Subarea 11	0.3	0.3	3.1	1.5	1.5	4.3
Subarea 12	0.2	0.2	3.3	1.5	1.5	4.6
Subarea 13	1.3	1.2	4.1	1.8	1.4	4.6
Subarea 14	0.8	0.7	3.9	1.3	1.4	4.4
Average	0.7	0.7	3.6	1.6	1.4	4.4
Iowa	0.5	0.4	3.4	1.3	1.2	4.2

Table 3. Comparison of two series of projected income, employment and population for selected areas, 1960-80. [a/]

Item	Population			Employment			Income [b/]		
	Estimated 1960	Projected 1980	Annual change 1960-80	Estimated 1960	Projected 1980	Annual change 1960-80	Estimated 1960	Projected 1980	Annual change 1960-80
	(mil.)	(mil.)	(pct.)	(mil.)	(mil.)	(pct.)	(bil. dol.)	(bil. dol.)	(pct.)
Office of Business Economics (OBE):									
United States	176.3	243.9	1.6	66.4	94.8	1.8	351.6	785.0	4.1
Missouri Basin	7.9	10.4	1.4	3.0	4.1	1.6	14.4	32.4	4.2
National Planning Association (NPA):									
United States	180.0	241.3	1.5	66.7	94.7	1.8	399.0	989.5	4.6
Upper Miss. Basin	21.0	28.7	1.6	8.3	11.0	1.4	51.2	117.5	4.2

a/ Preliminary.

b/ Projected OBE and NPA series in 1954 and 1960 dollars, respectively.

POPULATION AND LABOR FORCE

The goods and services produced by Iowa industry provide employment for more than a million self-employed and wage and salary workers. An additional 20 to 30 thousand are seeking work but at the moment are not employed; they, too, belong to the Iowa labor force. Finally, a small military component is included in the labor force estimates. The labor force of a million supports a population approaching three million.

Population

The two series of population projections are related to the projected labor force by their labor force participation rates. Generally the percentages are gradually decreasing for the male population and increasing for the female population in Iowa. In the baseline projections, the participation rates were applied to the population projections to obtain the corresponding labor force projections. For the program series, the projected labor force were derived first and the projected population was obtained subsequently.

Despite the differences in the procedures used to derive the two series of population projections, they show essentially the same patterns of increases. In both series, the older age groups increase less rapidly than the younger age groups, which corresponds with historic patterns of population growth in the United States. For Iowa, however, the age groups between 20 and 34 are increasing less rapidly than for the Nation because of the substantial outmigration of young people seeking employment opportunities, while the older age groups are increasing more rapidly than for the Nation because of the relative fixity of older people. Percentage-wise, the aged become a larger and larger proportion of the total population as a result of high rates of population outmigration.

A summary table of area population projections is presented to show the geographic distribution of Iowa's population in the six hydrologic subareas (table 4). These projections serve as control totals for individual counties, which, in turn are "building blocks" in the data system for water resource planning and development.

Iowa's three million people are now split about equally between three residential categories -- the seven Standard Metropolitan Statistical Areas (SMSA's), urban places of less than 50,000 population outside SMSA's, and rural areas -- farm and nonfarm (see fig. 1). The other residential classifications are useful in identifying shifts in the spatial distribution of people -- the so-called "growth centers" and Iowa's "golden triangle". The growth centers are the major cities of the 16 economic areas into which Iowa has been divided for analytical

Table 4. Baseline and program projections of population, by subarea, Iowa, 1960-2020. [a/]

Subarea	Estimated 1960	Projected					
		Baseline series			Program series		
		1980	2000	2020	1980	2000	2020
		(1,000)					
Missouri Basin :							
Subarea 6	526.8	497.1	504.9	534.0	585.4	698.7	894.6
Subarea 8	58.0	36.2	26.3	21.8	42.6	36.3	36.6
Total	584.7	533.3	531.2	555.9	628.0	735.0	931.2
Upper Mississippi Basin:							
Subarea 11	791.5	847.9	927.2	1,020.7	1,071.6	1,449.2	1,944.5
Subarea 12	221.7	233.0	247.9	267.7	297.8	413.8	572.1
Subarea 13	686.1	883.1	1,053.9	1,210.7	983.7	1,252.5	1,689.9
Subarea 14	473.4	553.4	629.3	705.7	611.5	839.5	1,162.4
Total	2,172.8	2,517.4	2,858.3	3,204.8	2,964.6	3,955.0	5,369.0
Iowa	2,757.5	3,050.6	3,389.5	3,760.7	3,592.6	4,689.9	6,300.2

a/ Totals may not equal sum of parts because of rounding.

and planning purposes. Iowa's "golden triangle" is delineated in fig. 1. and includes 34 counties, five SMSA's, nine growth centers and a total of 21 urban places of more than 10,000 population.

Altogether, in 1960 42.5 percent of Iowa's population resided in the 16 growth center counties while more than 55.9 percent lived in the 34 counties identified by the shaded area in fig. 1. The baseline population in the 16 counties in which growth centers are located is projected to increase from 1,171,700 in 1960 to 1,550,000 in 1980 while for the 34 "golden triangle" counties the projected population increase is from 1,540,800 to 1,941,800. Clearly, most of Iowa's population growth is concentrated in (a) the seven SMSA's and (b) the nine additional growth centers that are not yet SMSA's. However, SMSA's and growth centers in Iowa's "golden triangle" are projected to experience the largest population increases over the 1960-80 period.

Labor Force

To obtain the subarea employment projections, the population projections were transformed, first, into a corresponding series of labor force projections, using projected labor force participation rates. The labor force projections were transformed, finally, into projections of total employment.

In the baseline series, projections of labor force participation rates were prepared and applied to the baseline population projections. In the program series, however, the labor force projections are based on a corresponding series of Iowa projections prepared by the National Planning Association. The National Planning Association projections were adjusted to the total employment projections summarized in proceeding tables.

The two labor force projections show a similar pattern of increase by age class, with the larger increases occurring under the program assumptions. In addition, the program projections show a somewhat larger increase for the male labor force as compared with the female labor force, although both series show an absolute decline in the male labor force 65 years and over on the first 20-year period.

When the agricultural labor force is differentiated by occupation and place of work and of residence, the projections show an increasing proportion of the wage and salary component of the farm labor force in non-farm residence. In addition, an increasing proportion of the projected rural-farm labor force is engaged in non-farm employment. Thus, a shift between place of work and place of residence is projected that can be associated with emerging patterns of commercialization and specialization in the Iowa economy.

EMPLOYMENT AND PRODUCTIVITY

A range of employment prospects are projected that correspond with a range of probabilities concerning events to which Iowa institutions and policies must adapt. However, potential adjustment of these institutions and policies to events outside their control can be facilitated, not merely by achieving a concensus on numbers, but also through better understanding of the relationships between social and economic changes outside Iowa and corresponding social and economic changes within Iowa.

To facilitate more effective use of economic projections in coordinated water resource planning and programming, Iowa's industrial structure and changes in this structure have been studied in the context of the national economy. Changes in national employment, productivity and income have meant corresponding changes in the requirements for goods and services produced in Iowa. As national and regional markets have expanded, so has the output of Iowa industry. Moreover, as out-of-state shipments of Iowa products increase, so do job opportunities, capital requirements, and other resource needs, including water. Thus, projections of water requirements ultimately are tied to projections of job opportunities and out-of-state markets for those products that are produced in Iowa and that compete successfully in regional and national markets.

Both the baseline and program employment projection series can be translated into corresponding assumptions regarding (a) future growth in Iowa industrial outputs, particularly out-of-state shipments, and (b) future growth in the demand for Iowa-produced goods and services. For the baseline series the population projections are derived, first, but for the program series projected job opportunities in the Iowa economy are the basis for the population projections. By starting with the relation between job opportunities and population growth, we focus on a basic issue in water resource development -- the contribution of water resources to economic growth, or, alternatively the water resource requirements of projected economic growth. Alternative projections of economic growth in Iowa thus provide a basis for asking questions about the implications for water resource development programs in Iowa of different levels of economic growth. To provide only one projected level of employment for a given year would deny public decision makers essential information on the subarea consequences of different state and federal policies, measured in terms of projected differences in levels of job opportunities and earnings per worker.

Agricultural Economy

Because Iowa's economic base is primarily agricultural (i.e., a major proportion of out-of-state shipments are agricultural or agriculturally-related products) logically the agricultural projections are first in an Iowa employment series. Employment in Iowa agriculture, is, of course, declining, but total output is increasing. When total agricultural demand (and, thus, physical output) is increasing at a two percent per year rate and productivity per worker is increasing five percent per year, the simple arithmetic shows that a three percent per year reduction of the agricultural labor force is necessary to maintain the man-resource balance. The man-resource arithmetic underlies both series of agricultural employment projections (table 5).

For agriculture, the essential difference between the baseline and the program series is the closer adherence of the baseline series to recent historic experience in the rate of farm consolidation and outmigration of farm people. The program series assume a significant decline in the rate of farm outmigration. *

Manufacturing

Manufacturing in Iowa can be grouped into two categories -- primarily export or primarily local. The export-based manufacturing is agriculturally related, for example, meat products and farm machinery. The locally-based manufacturing, for example, bakery and dairy establishments, are oriented to local markets; hence, they are projected to expand as these markets expand. Recent growth in Iowa manufacturing has been dominated, not by the locally-based manufacturing, but by the tremendous expansion in durable goods production, particularly the agriculturally-oriented capital-producing industries. Indeed, durable goods manufacturing generally is expanding in Iowa as a result of the westward shift of the Manufacturing Belt.

A major difference between the baseline and the program projections for manufacturing is the much higher employment levels in the baseline series resulting from the implicit assumption that primarily 1950-60 historic patterns (i.e., growth rates for GNP and output per worker)

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* Additional analyses of the Iowa agricultural economy were made, but these results, which include output projections, are not presented in this report. Rather, the companion report on future water requirements incorporates the auxiliary production data.

Table 5. Baseline and program projections of agricultural employment, by subarea, Iowa, 1960-2020. [a/]

Subarea	Estimated	Projected					
		Baseline series			Program series		
	1960	1980	2000	2020	1980	2000	2020
	(1,000)						
Missouri Basin:							
Subarea 6	51.9	29.8	18.7	14.2	40.8	30.3	23.1
Subarea 8	7.0	3.3	1.8	1.2	4.5	2.9	1.9
Total	58.9	33.2	20.5	15.3	45.4	33.1	25.0
Upper Mississippi Basin:							
Subarea 11	52.0	29.2	18.2	13.6	43.7	34.6	27.5
Subarea 12	16.6	9.2	15.6	4.0	13.9	11.1	8.8
Subarea 13	49.4	32.3	22.3	17.8	41.3	32.7	25.9
Subarea 14	39.0	25.3	18.3	15.1	32.5	25.7	20.3
Total	157.0	96.0	64.4	50.5	131.5	104.2	82.5
Iowa	215.9	129.2	84.9	65.9	176.8	137.3	107.4

a/ Totals may not equal sum of parts because of rounding.

will persist over the projection period. The explicit assumptions for the program series, when compared with the implicit assumptions of the baseline series, show higher growth rates for both GNP and productivity per worker, and, consequently, lower employment requirements in manufacturing (table 6).

Mining and Construction

Seasonal employment patterns are similar in mining and contract construction. The two industries are functionally related in Iowa inasmuch as most of the employment in mining is engaged in the primary production of construction materials. Both industries are local, rather than export, oriented. Moreover, growth in productivity in these industries lags behind agriculture and manufacturing. Hence, the projected growth in employment is tied primarily to the projected expansion of local demand (table 7).

Trade and Services

Except for the insurance industry, the trade and service industries are locally oriented. Productivity increases in the trade and service sector are substantially smaller than in the commodity-producing sector. Thus, the projected increases in non-commodity-producing employment correlate with the projected increases in total consumption expenditures in Iowa (table 8).

Baseline and program projections of non-commodity-producing employment projections differ greatly, again, because of significant difference in the underlying assumptions regarding growth in GNP and personal income. Higher incomes per capita lead to further proliferation of services and an expansion of the entire trade and service sector.

Table 6. Baseline and program projections of manufacturing employment, by subarea, Iowa, 1960-2020. [a/]

Subarea	Estimated	Projected					
		Baseline series			Program series		
	1960	1980	2000	2020	1980	2000	2020
	(1,000)						
Missouri Basin:							
Subarea 6	22.2	28.7	31.0	33.7	21.8	23.7	26.3
Subarea 8	1.2	1.4	1.3	1.3	1.1	1.0	1.0
Total	23.4	30.1	32.4	35.0	22.8	24.7	27.4
Upper Mississippi Basin:							
Subarea 11	53.4	71.2	76.6	83.2	56.3	61.7	68.0
Subarea 12	16.4	20.4	20.2	20.7	19.3	23.7	29.5
Subarea 13	61.2	97.0	111.9	124.8	68.3	77.5	88.9
Subarea 14	40.1	58.1	66.1	74.3	43.1	46.6	50.6
Total	171.1	246.8	274.7	303.1	187.0	209.5	237.0
Iowa	194.5	276.9	307.1	338.1	209.8	234.2	264.4

a/ Totals may not equal sum of parts because of rounding.

Table 7. Baseline and program projections of other commodity producing employment, by subarea, Iowa, 1960-2020. [a/]

Subarea	Estimated	Projected					
		Baseline series			Program series		
	1960	1980	2000	2020	1980	2000	2020
		(1,000)					
Missouri Basin:							
Subarea 6	11.0	14.9	15.4	16.4	14.9	18.6	23.6
Subarea 8	1.3	1.3	1.0	0.9	1.3	1.2	1.2
Total	12.3	16.2	16.4	17.2	16.2	19.8	24.9
Upper Mississippi Basin:							
Subarea 11	16.6	21.7	21.8	22.4	22.7	29.6	38.5
Subarea 12	5.4	7.0	17.2	7.8	7.8	10.2	13.5
Subarea 13	13.8	21.9	25.6	29.5	19.7	26.1	34.5
Subarea 14	8.7	13.1	15.2	17.2	13.5	18.1	24.4
Total	44.5	63.8	69.7	76.9	63.7	84.0	110.9
Iowa	56.8	80.0	86.2	94.1	79.9	103.8	135.8

a/ Totals may not equal sum of parts because of rounding.

Table 8. Baseline and program projections of non-commodity-producing employment, by subarea, Iowa, 1960-2020. [a/]

Subarea	Estimated 1960	Projected					
		Baseline series			Program series		
		1980	2000	2020	1980	2000	2020
	(1,000)						
Missouri Basin:							
Subarea 6	104.6	100.6	116.6	128.3	133.5	178.8	251.3
Subarea 8	10.5	5.7	4.9	4.2	7.6	7.5	8.2
Total	115.1	106.3	121.5	132.4	141.1	186.3	259.5
Upper Mississippi Basin:							
Subarea 11	170.1	186.2	231.1	265.0	265.7	385.1	558.2
Subarea 12	46.2	51.7	61.9	70.0	72.4	108.4	162.3
Subarea 13	134.1	177.4	241.5	290.3	209.3	315.9	476.8
Subarea 14	86.3	100.5	131.4	152.6	137.0	211.6	326.9
Total	436.7	515.7	665.8	777.8	684.4	1,021.1	1,524.2
Iowa	551.8	622.1	787.3	910.3	825.5	1,207.4	1,783.7

a/ Totals may not equal sum of parts because of rounding.

PERSONAL INCOME

Rapidly rising output per worker is a characteristic of Iowa agriculture and, also, of much of the commodity-producing sector of the Iowa economy. The rising productivity has involved substantial capital expenditures on the part of Iowa farmers and businessmen. In addition, expected future pay-offs from these expenditures are based on the assumption that workers and managers will acquire the technical competences to efficiently employ the new machinery and processes obtained with the capital expenditures. Individuals and families, in turn, make investments in personal education and training because of the expectation of better jobs and higher incomes in future years. Thus, Iowa's economic progress is the result of more than population growth, or expansion of job opportunities; it involves fundamentally changes in the expectations of future production technology and consumption patterns.

Income Sources

By far, wage and salary disbursements are the primary source of personal income payments in Iowa. In 1960, wage and salary disbursements accounted for 54 percent of total income payments, as compared with 24 percent for proprietorial income and only 15 percent for property income. Farm proprietorial income amounted to $671,000,000, which, in 1960, was slightly more than half of the total proprietorial income, but only 12 percent of total personal income.

With the exception of transfer payments and other labor income, property is the most rapidly growing income source in Iowa. Property income includes rental income from farm as well as residential property. This part of the economic benefits of agricultural technology are manifested in higher returns to owners of farm real estate.

Rapid expansion of manufacturing payrolls is associated only partly with growth in manufacturing employment. The projected increase in wage and salary workers in manufacturing roughly balances the projected decrease in total agricultural employment. Remember, much of the increase in manufacturing employment is in the capital goods-producing industries (e.g., farm machinery); these industries are agriculturally-related, at least indirectly, if not directly.

Social security and other payments are expanding at a rate of five to six percent per year. In 1960, transfer payments to individual households were nearly four times larger than social insurance payments by individual households, but social insurance payments are increasing rapidly so that the relative difference is declining. Transfer payments to persons are projected to increase substantially, therefore, in light of (a) the projected expansion of both private and public medical and pension programs, and (b) the projected increase in persons of 65 years and over, which, for Iowa, is larger on a percentage basis than for almost any other state.

Contrary to the general pattern of substantial growth in Iowa income sources are the projections of proprieotrial income, which are growing at substantially below-average rates. Lagging growth rates for proprietorial income is attributed primarily, however, to the declining number of proprietors rather than below-average earnings per proprietor.

In 1960, an estimated 179,500 farm proprietors and 101,400 non-farm proprietors earned slightly more than $1.3 million. Self-employed workers are projected to decline by more than a fourth in 20 years. Both farm and nonfarm businesses thus are becoming larger in terms of dollar volume per unit (but not necessarily in terms of employees per unit).

Personal Welfare

Total income payments in the Iowa economy as a whole, when reduced to a per worker or per person basis, provide a better measure of personal welfare than the aggregate figures. Generally, growth on a per person basis is the major component in total personal income growth in Iowa.

A low base, plus a below-average growth rate, results in projected per farm earnings that barely keep up with the growth in average earnings per worker outside farming and that lag behind per capita income growth. If our assumptions are valid, farm proprietorial income per farm would increase by more than a half over the first 20-year projection period. Thus, ongoing farm adjustments in terms of larger, but fewer, farms are associated with higher earnings per farm.

The ratio between farm proprietorial income and wage and salary disbursements per manufacturing worker is one indicator of agriculture's relative economic position. In the Iowa projections this ratio remains at the 0.8 level for the entire projection period. On a household basis, the ratio would be slightly lower than 0.8 because of the larger size of the average farm family. If farm consolidation were to occur more rapidly than projected, and total farm income were to remain at projected levels, then net earnings per farm could equal the projected earnings per manufacturing worker. The 80 percent level thus is somewhat aribtary but nonetheless realistic in terms of recent farm-nonfarm income relationships in Iowa.

Low female labor force participation rates, coupled with general rural outmigration, provide a potential labor supply for many service activities. In these businesses, earnings per worker are lower than in manufacturing and other commodity-producing industries. Of all the personal income sources, the service industries account for the lowest projected growth rates.

Wage and salary disbursements in manufacturing are higher than in other industries because of the importance of the meat packing industry, which is characterized by industry-wide wage bargains that are among the highest in the manufacturing industries. Peripheral expansion of the Manufacturing Belt into eastern Iowa will introduce additional demands for local labor, which has a two-fold impact on local communities, first, by providing additional jobs in manufacturing and related service activities, and, second, by forcing upward wage adjustments on the part of local businesses seeking additional workers or attempting to maintain an existing labor force. The wage adjustments tend to start in the largest urban-industrial centers and move outward to the smaller, but growing, service centers in the commuting areas of the larger focal centers.

On a per person basis, projected earnings of nonfarm proprietors and property owners show the highest growth trends among the selected income components. Included in the proprety income are earnings on out-of-state investments of Iowa residents. Inasmuch as Iowa is a net capital-exporter (i.e., capital outflows in terms of loans to out-of-state institutions exceed capital inflows), an increase in property income from out-of-state investments denotes a continuing lack of profitable investment opportunities in Iowa. However, the components of property income are not readily estimated, so it is difficult to establish Iowa's current capital export and import positions. Yet, from the standpoint of being able to accurately assess Iowa's industrial growth prospects, information on trends in capital exports and imports is of vital importance.

Subarea Projections

Subarea total personal income projections are summarized in table 9. Generally, the income growth in western Iowa is substantially lower than in eastern Iowa, not only because of lower rates of population growth, but also because of lower rates of growth in per capita income levels. For the State, total income levels are projected to reach 2020 levels that are six to ten times the 1960 level of approximately $5.5 billion -- a projection that still lags behind national growth rates.

Table 9. Baseline and program projections of total personal income, in constant 1960 dollars, by subarea, Iowa 1960-2020. [a/]

Subarea	Estimated	Projected					
		Baseline series			Program series		
	1960	1980	2000	2020	1980	2000	2020
	(mil. dol.)						
Missouri Basin:							
Subarea 6	940	1,553	2,615	4.415	1,829	3,619	7,396
Subarea 8	85	93	112	149	110	155	250
Total	1,025	1,646	2,727	4,564	1,939	3,774	7,646
Upper Mississippi Basin:							
Subarea 11	1,653	3,032	5,473	9,618	3,832	8,553	18,323
Subarea 12	447	850	1,495	2,575	1,087	2,497	5,503
Subarea 13	1,440	3,191	6,318	11,590	3,554	7,509	16,178
Subarea 14	910	1,956	3,707	6,633	2,162	4,944	10,926
Total	4,450	9,029	16,993	30,416	10,635	23,503	50,930
Iowa	5,475	10,675	19,720	34,980	12,574	27,277	58,576

a/ Totals may not equal sum of parts because of rounding.

APPENDIX A: INCOME, EMPLOYMENT AND POPULATION OF IOWA HYDROLOGIC SUBAREAS, 1960-2020

Income, employment and population projections for each of the six hydrologic subareas and the Iowa portions of the Missouri Basin and the Upper Mississippi Basin are summarized in tables A-1 to A-10. Both the baseline and the program series are presented for comparison with comparable projections prepared by various federal, state and local agencies. Finally, all projections are subject to revision as the underlying national and regional assumptions change.

Before the individual subarea projections are presented, table A-1 is introduced to show the projected 1960-80 population trends for three categories of the more urbanized counties in Iowa. Growth center counties -- one for each of the 16 designated multi-county growth centers -- are the most rapidly growing counties in Iowa. These 16 counties include the seven metropolitan counties (SMSA's) and 12 of the 20 counties with urban places of 10,000 or more population.

Another rapidly growing category is the so-called "golden triangle" of Iowa, which covers about a third of the States, but in 1960, included 56 percent of the State's population. Most of Iowa's projected economic growth is concentrated in the "golden triangle".

A third category of rapidly growing counties includes the 20 counties with urban places of 10,000 population or more. Seventeen of the 20 large urban counties are in Iowa's "golden triangle"; 13 of these counties also are growth center counties. They combine, therefore, elements of the two principal growth phenomena in Iowa -- the focal centers of functional economic areas and the urban-industrial complexes of the western periphery of the Manufacturing Belt.

Table A-1. Estimated and projected population in selected counties, by subarea, Iowa, 1960 and 1980.

Subarea	Year	Baseline series						Program series					
		Growth center counties				"Golden triangle" counties	Large urban d/ counties	Growth center counties				"Golden triangle" counties	Large urban d/ counties
		SMSA's a/	Other large urban b/ counties	Other growth center c/ counties	Total			SMSA's a/	Other large urban b/ counties	Other growth center c/ counties	Total		
		(1,000)											
6	1960	19.1	--	18.5	209.5	--	191.0	191.0	--	18.5	209.5	--	191.0
	1980	225.2	--	17.5	242.7	--	225.2	267.9	--	20.6	28.4	--	267.9
8	1960	--	--	13.7	13.7	--	--	--	--	13.7	13.7	--	--
	1980	--	--	9.3	9.3	--	--	--	--	11.1	11.1	--	--
11	1960	266.3	93.9	23.4	383.7	452.5	432.5	266.3	93.9	23.4	383.7	452.5	432.5
	1980	371.3	91.4	21.5	484.2	550.8	531.5	472.4	114.3	27.2	613.9	699.4	675.1
12	1960	--	44.6	--	44.6	221.7	152.8	--	44.6	--	44.6	221.7	152.8
	1980	--	48.0	--	48.0	233.0	171.8	--	60.3	--	60.3	297.8	220.0
13	1960	259.4	87.9	--	347.3	530.1	434.8	259.4	87.9	--	347.3	530.1	434.8
	1980	433.4	95.2	--	528.6	736.6	651.2	487.7	106.5	--	594.1	822.6	730.2
14	1960	199.1	--	21.7	220.8	336.4	254.2	199.1	--	21.7	220.8	336.4	254.2
	1980	268.2	--	21.1	289.3	421.5	332.0	297.0	--	22.4	319.4	467.4	368.2
Total	1960	915.8	226.4	77.3	1,219.5	1,540.8	1,465.2	915.8	226.4	77.3	1,219.5	1,540.8	1,465.2
	1980	1,298.1	234.7	69.4	1,602.2	1,941.8	1,911.8	1,524.9	281.0	81.3	1,887.2	2,287.2	2,261.3

a/ Population of largest urban place in county 50,000 or more in 1960.
b/ Population of largest urban place in county 10,000 to 50,000 in 1960.
c/ Population of largest urban place in county less than 10,000 in 1960.
d/ Population of largest urban place 10,000 or more.

Table A-2. Baseline and program series projections of population, employment and income, Iowa, 1960-2020. [a/]

Item	Unit	Estimated	Projected					
			Baseline series			Program series		
		1960	1980	2000	2020	1980	2000	2020
Population, total	thou.	2,757.5	3,050.6	3,389.5	3,760.7	3,592.6	4,690.0	6,300.2
Income, total [b/]	mil. dol.	5,475.0	10,675.4	19,720.2	34,979.5	12,575.5	27,281.0	58,585.4
Employment, total	thou.	1,019.0	1,108.2	1,265.9	1,408.4	1,292.1	1,682.7	2,291.3
Agriculture	do.	215.9	129.2	84.9	65.9	176.8	137.3	107.5
Mining	do.	2.5	2.2	1.9	1.6	3.0	3.4	3.7
Contract construction	do.	54.3	77.8	84.3	92.5	76.8	100.4	132.1
Manufacturing:								
Food	do.	57.0	70.3	77.2	73.7	54.9	55.3	54.8
Textile	do.	0.6	0.5	0.3	0.2	0.2	0.2	0.1
Apparels	do.	4.2	6.7	8.7	11.3	4.0	4.2	4.5
Lumber & wood	do.	7.5	8.3	8.0	7.7	5.8	5.4	5.0
Printing & pub.	do.	18.0	30.0	38.6	48.6	20.0	22.1	24.6
Chemical	do.	5.1	5.5	4.6	3.8	4.9	4.9	5.1
Elect. & non-elect.	do.	56.2	79.8	75.4	74.1	63.9	76.1	91.7
Motor vehicles	do.	1.5	1.9	1.8	1.7	0.7	0.5	0.5
Other trans. equipment	do.	0.8	0.5	0.1	0	0.2	0	0
Other	do.	43.6	73.4	92.5	117.1	55.4	65.6	78.1
Total	do.	194.5	276.9	307.1	338.1	209.8	234.2	264.4
Non-commodity	do.	551.8	622.1	787.8	910.3	825.5	1,207.4	1,783.7

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-3. Baseline and program projections of population, employment and income in Iowa part of Missouri Basin, Subarea 6 and 8. 1960-2020. [a/]

Item	Unit	Estimated	Projected					
			Baseline series			Program series		
		1960	1980	2000	2020	1980	2000	2020
Population, total	thou.	584.7	533.3	531.2	555.9	628.0	735.0	931.2
Income, total [b/]	mil. dol.	1,024.9	1,646.2	2,727.4	4,563.7	1,938.7	3,773.7	7,645.6
Employment, total	thou.	209.7	185.8	191.2	200.0	225.5	264.0	336.7
Agriculture	do.	58.9	33.2	20.5	15.3	45.4	33.1	25.0
Mining	do.	0.7	0.5	0.4	0.3	0.5	0.5	0.5
Contract const.	do.	11.6	15.8	16.0	16.9	15.7	19.3	24.4
Manufacturing:								
Food	do.	10.4	11.9	12.4	11.7	9.0	9.5	9.1
Textile	do.	0.1	0	0	0	0	0	0
Apparel	do.	0.7	0.9	1.1	1.4	0.7	0.9	1.1
Lumber & wood	do.	0.8	0.9	0.8	0.8	0.7	0.6	0.6
Printing & pub.	do.	3.0	4.7	5.9	7.3	3.6	4.5	5.7
Chemical	do.	0.5	0.6	0.5	0.5	0.5	0.4	0.4
Elect. & non-elect.	do.	4.0	5.1	4.5	4.4	3.9	3.4	3.4
Motor vehicles	do.	0.6	0.7	0.6	0.6	0.5	0.5	0.5
Other trans. equip.	do.	0.1	0.1	0	0	0.1	0	0
Other	do.	3.2	5.3	6.5	8.3	4.0	5.0	6.5
Total	do.	23.4	30.1	32.4	35.0	22.8	24.7	27.4
Non-commodity	do.	115.1	106.3	121.9	132.4	141.1	186.3	259.5

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-4. Baseline and program projections of population, employment and income in Iowa part of Missouri Basin, Subarea 6, 1960-2020. [a]

Item	Unit	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population, total	thou.	526.8	497.1	504.9	534.0	585.4	698.7	894.6
Income, total [b]	mil. dol.	939.5	1,552.9	2,615.1	4,414.6	1,828.8	3,618.4	7,395.8
Employment, total	thou.	189.7	174.1	182.2	192.5	211.1	251.4	324.4
Agriculture	do.	51.9	29.8	18.7	14.2	40.8	30.3	23.1
Mining	do.	0.5	0.3	0.3	0.3	0.3	0.4	0.4
Contract const.	do.	10.5	14.6	15.1	16.1	14.6	18.2	23.2
Manufacturing:								
Food	do.	9.9	11.5	12.0	11.4	8.7	9.2	8.9
Textile	do.	0.1	0	0	0	0	0	0
Apparel	do.	0.7	0.9	1.1	1.3	0.7	0.8	1.1
Lumber & wood	do.	0.7	0.8	0.7	0.7	0.6	0.6	0.6
Printing & pub.	do.	2.8	4.4	5.5	7.0	3.3	4.2	5.5
Chemical	do.	0.5	0.6	0.5	0.5	0.4	0.4	0.4
Elect. & Non-elect.	do.	3.8	4.9	4.3	4.2	3.7	3.3	3.3
Motor vehicles	do.	0.6	0.7	0.6	0.6	0.5	0.5	0.5
Other trans. equip.	do.	0.1	0.1	0	0	0.1	0	0
Other	do.	3.0	5.0	6.2	7.9	3.8	4.7	6.2
Total	do.	22.2	28.7	31.1	33.7	21.8	23.7	26.3
Non-commodity	do.	104.6	100.6	117.0	128.3	133.5	178.8	251.3

[a] Totals may not equal sum of parts because of rounding.
[b] Constant 1960 dollars.

Table A-5. Baseline and program projections of population, employment and income in Iowa part of Missouri Basin, subarea 8, 1960-2020. [a/]

Item	Unit	Estimated	Projected					
			Baseline series			Program series		
		1960	1980	2000	2020	1980	2000	2020
Population, total	thou.	58.0	36.2	26.3	21.8	42.6	36.3	36.6
Income, total [b/]	mil. dol.	85.4	93.3	112.3	149.1	109.9	155.3	249.8
Employment, total	thou.	20.0	117.	9.0	7.5	14.5	12.6	12.3
Agriculture	do.	7.0	3.3	1.8	1.2	4.5	2.9	1.9
Mining	do.	0.2	0.2	0.1	0	0.2	0.1	0
Contract const.	do.	1.1	1.1	0.9	0.8	1.1	1.1	1.2
Manufacturing:								
Food	do.	0.5	0.4	0.4	0.3	0.3	0.3	0.2
Textile	do.	0	0	0	0	0	0	0
Apparel	do.	0	0.1	0.1	0.1	0	0	0.1
Lumber & wood	do.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Printing & pub.	do.	0.2	0.3	0.3	0.4	0.2	0.2	0.3
Chemical	do.	0	0	0	0	0	0	0
Elect. & non-elect.	do.	0.2	0.2	0.2	0.1	0.2	0.1	0.1
Motor vehicles	do.	0	0	0	0	0	0	0
Other trans. equip.	do.	0	0	0	0	0	0	0
Other	do.	0.2	0.3	0.3	0.4	0.2	0.2	0.3
Total	do.	1.2	1.4	1.3	1.3	1.1	1.0	1.0
Non-commodity	do.	10.5	.57	4.9	4.2	7.6	7.5	8.2

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-6. Baseline and program projections of population, employment and income in Iowa part of Upper Mississippi Basin, Subareas 11, 12, 13 and 14, 1960-2020. [a/]

Item	Unit	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population, total	thou.	2,172.8	2,517.4	2,858.3	3,204.8	2,964.6	3,955.0	5,369.0
Income, total [b/]	mil. dol.	4,450.2	9,029.2	16,972.8	30,415.8	10,636.8	23,507.3	50,939.8
Employment, total	thou.	809.3	922.3	1,074.7	1,208.4	1,066.6	1,418.7	1,954.6
Agriculture	do.	157.0	96.0	64.4	50.5	131.5	104.2	82.5
Mining	do.	1.8	1.7	1.5	1.3	2.6	2.9	3.2
Contract const.	do.	42.7	62.0	68.2	75.5	61.1	81.1	107.7
Manufacturing:								
Food	do.	46.6	58.4	64.8	62.0	45.9	45.8	45.7
Textile	do.	0.5	0.4	0.3	0.2	0.2	0.1	0.1
Apparel	do.	3.5	5.7	7.6	9.9	3.3	3.4	3.4
Lumber & wood	do.	6.7	7.5	7.2	6.9	5.1	4.8	4.4
Printing & pub.	do.	15.0	25.3	32.8	41.3	16.4	17.7	18.8
Chemical	do.	4.6	4.9	4.0	3.3	4.4	4.5	4.7
Elect. & non-elect.	do.	52.2	74.6	70.8	69.8	60.0	72.6	88.3
Motor vehicles	do.	0.9	1.3	1.2	1.0	0.2	0	0
Other trans. equip.	do.	0.7	0.4	0	0	0.1	0	0
Other	do.	40.4	68.1	86.0	108.8	51.4	60.6	71.6
Total	do.	171.1	246.8	274.7	303.1	187.0	209.5	237.0
Non-commodity	do.	436.7	515.7	665.8	777.8	684.4	1,021.1	1,524.2

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-7. Baseline and program projections of population, employment and income in Iowa part of Upper Mississippi Basin, Subarea 11, 1960-2020. [a/]

Item	Unit	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population, total	thou.	791.5	847.9	927.2	1,020.7	1,071.6	1,449.2	1,944.5
Income, total [b/]	mil. dol.	1,653.5	3,031.9	5,472.4	9,617.8	3,832.1	8,552.9	18,323.0
Employment, total	thou.	292.1	308.4	347.7	384.2	388.4	511.0	692.2
Agriculture	do.	52.0	29.2	18.2	13.6	43.7	34.6	27.5
Mining	do.	0.8	0.7	0.5	0.4	0.9	1.1	1.2
Contract const.	do.	15.8	21.1	21.3	22.0	21.8	28.5	37.3
Manufacturing:								
Food	do.	15.5	16.9	17.2	15.7	15.2	15.2	15.2
Textile	do.	0.2	0.1	0	0	0	0	0
Apparel	do.	1.1	1.6	2.0	2.4	1.0	1.0	1.0
Lumber & wood	do.	1.1	1.2	1.1	1.0	0.7	0.6	0.5
Printing & pub.	do.	7.7	12.2	15.0	18.3	8.4	8.9	9.4
Chemical	do.	1.6	1.6	1.1	0.8	1.6	1.7	1.8
Elect. & non-elect.	do.	10.4	12.8	11.0	9.7	12.0	14.6	17.7
Motor vehicles	do.	0.2	0.2	0.2	0.1	0	0	0
Other trans. equip.	do.	0.4	0.2	0	0	0.1	0	0
Other	do.	15.2	24.3	28.8	35.1	17.4	19.8	22.4
Total	do.	53.4	71.2	76.6	83.2	56.3	61.7	68.0
Non-commodity	do.	170.1	186.2	231.1	265.0	265.7	385.1	558.2

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-8. Baseline and program projections of population, employment and income, in Iowa part of Upper Mississippi Basin, Subarea 12, 1960-2020. a/

Item	Unit	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population, total	thou.	221.7	233.0	247.9	267.7	297.8	413.8	572.1
Income, total b/	mil. dol.	446.8	850.4	1,495.4	2,575.2	1,087.0	2,496.5	5,502.9
Employment, total	thou.	84.6	88.2	94.8	102.5	113.5	153.4	214.1
Agriculture	do.	16.6	9.2	5.6	4.0	13.9	11.1	8.8
Mining	do.	0.3	0.2	0.2	0.1	0.4	0.4	0.4
Contract const.	do.	5.1	6.8	7.0	7.6	7.4	9.9	13.1
Manufacturing:								
Food	do.	1.8	2.0	2.0	1.8	1.9	1.9	1.9
Textile	do.	0	0	0	0	0	0	0
Apparel	do.	0.7	0.8	0.8	1.0	0.5	0.5	0.5
Lumber & wood	do.	1.0	0.9	0.7	0.7	0.9	0.9	0.9
Printing & pub.	do.	1.3	2.0	2.4	3.0	1.4	1.6	1.6
Chemical	do.	0.2	0.2	0.1	0.1	0.2	0.2	0.2
Elect. & non-elect.	do.	7.3	8.8	7.5	6.5	9.9	13.8	19.1
Motor vehicles	do.	0.1	0.1	0.1	0.1	0	0	0
Other trans. equip.	do.	0	0	0	0	0	0	0
Other	do.	4.0	5.7	6.4	7.6	4.4	4.8	5.2
Total	do.	16.4	20.4	20.2	20.7	19.3	23.7	29.5
Non-commodity	do.	46.2	51.7	61.9	70.0	72.4	108.4	162.3

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-9. Baseline and program projections of population, employment and income in Iowa part of Upper Mississippi Basin, Subarea 13, 1960-2020. [a/]

Item	Unit	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population, total	thou.	686.1	883.1	1,053.9	1,210.7	983.7	1,252.5	1,689.9
Income, total [b/]	mil. dol.	1,439.9	3,190.7	6,318.2	11,589.8	3,554.2	7,509.0	16,177.8
Employment, total	thou.	258.5	328.7	401.3	462.4	338.6	452.2	626.0
Agriculture	do.	49.4	32.3	22.3	17.8	41.3	32.7	25.9
Mining	do.	0.5	0.5	0.5	0.5	0.7	0.8	1.0
Contract const.	do.	13.3	21.4	25.1	29.0	19.0	25.2	33.5
Manufacturing:								
Food	do.	18.2	25.5	29.5	28.7	17.6	17.5	17.4
Textile	do.	0.3	0.3	0.2	0.2	0.2	0.1	0.1
Apparel	do.	0.8	1.5	2.2	3.0	0.7	0.7	0.7
Lumber & wood	do.	1.7	2.0	2.0	2.0	1.3	1.2	1.1
Printing & pub.	do.	3.5	6.8	9.4	12.3	3.7	4.1	4.5
Chemical	do.	1.3	1.4	1.3	1.2	1.3	1.5	1.8
Elect. & non-elect.	do.	23.8	38.6	39.7	41.2	27.6	33.0	39.4
Motor vehicles	do.	0.4	0.6	0.6	0.5	0.1	0	0
Other trans. equip.	do.	0.1	0.1	0	0	0	0	0
Other	do.	11.1	20.2	27.1	35.7	15.7	19.4	23.9
Total	do.	61.2	97.0	111.9	124.8	68.3	77.5	88.9
Non-commodity	do.	134.1	177.4	241.5	290.3	209.3	315.9	476.8

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

Table A-10. Baseline and program projections of population, employment and income in Iowa part of Upper Mississippi Basin, Subarea 14, 1960-2020. [a/]

Item	Unit	Estimated 1960	Projected					
			Baseline series			Program series		
			1980	2000	2020	1980	2000	2020
Population, total	thou.	473.4	553.4	629.3	705.7	611.5	839.5	1,162.4
Income, total [b/]	mil. dol.	910.0	1,956.2	3,706.8	6,633.0	2,161.6	4,944.4	10,925.9
Employment, total	thou.	174.1	197.0	230.9	259.2	226.1	302.1	422.2
Agriculture	do.	39.0	25.3	18.3	15.1	32.5	25.7	20.3
Mining	do.	0.3	0.3	0.4	0.3	0.6	0.6	0.6
Contract const.	do.	8.4	12.8	14.8	16.9	12.9	17.5	23.8
Manufacturing:								
Food	do.	11.1	14.0	16.1	15.8	11.2	11.2	11.2
Textile	do.	0	0	0	0	0	0	0
Apparel	do.	0.9	1.8	2.6	3.4	1.1	1.1	1.2
Lumber & wood	do.	2.9	3.4	3.4	3.2	2.3	2.1	2.0
Printing & pub.	do.	2.5	4.3	5.9	7.7	2.9	3.2	3.4
Chemcial	do.	1.5	1.7	1.5	1.2	1.3	1.0	0.8
Elect. & non-elect.	do.	10.7	14.6	12.6	12.3	10.5	11.3	12.0
Motor vehicles	do.	0.2	0.3	0.3	0.3	0	0	0
Other trans. equip.	do.	0.2	0.1	0	0	0	0	0
Other	do.	10.1	17.8	23.7	30.4	13.8	16.6	20.0
Total	do.	40.1	58.1	66.1	74.3	43.1	46.6	50.6
Non-commodity	do.	86.3	100.5	131.4	152.6	137.0	211.6	326.9

a/ Totals may not equal sum of parts because of rounding.
b/ Constant 1960 dollars.

APPENDIX B: ASSUMPTIONS AND METHODS USED IN PREPARING PRELIMINARY PROJECTIONS FOR IOWA HYDROLOGIC SUBAREAS

Without explicitly describing the assumptions underlying any set of economic projections, it is unlikely that much reliable use can be made of the projections. One set of numbers oftentimes look as good as another without a framework within which to evaluate the numerical series. We present the assumptions and analytic framework, therefore, as a basis for assessing the strengths and weaknesses of any one numerical series in light of its intended uses.

Major national assumptions underlying the Iowa projection series are summarized in table B-1. The national data base for both the Office of Business Economics (OBE) and the National Planning Association (NPA) is presented along with their respective basin projections.

National Trends

The two major projection series -- OBE and NPA -- compare quite closely, with the OBE series being slightly higher in employment, but lower in gross national product (GNP) and personal income. Associated with these differences are corresponding differences in the proportion of total employment in the commodity-producing sectors, such as agriculture, mining and manufacturing, which have the high growth rates in per worker productivity.

For the most part, either the OBE or NPA assumptions could be used in developing the program series without incurring significant differences in the final results. With reference to the baseline projections, the economic assumptions are not explicitly stated. Presumably, the implicit assumptions for the baseline projections are significantly different to result in projected 1980 population levels that differ by over 400,000, which is nearly twice the projected increase in the baseline series.

Of fundamental importance is the projected growth in GNP by over four percent in both series. Personal income also is projected to increase by four percent or more in the two series.

Table B-1. Basic assumptions of population, employment and income projections, United States, Missouri Basin, and Upper Mississippi Basin, 1960-2020.

Item	Units	Estimated 1960	Projected 1980	2000	2020
Population [a]					
U.S., OBE series	thou.	176,291	243,900	336,800	467,700
U.S., NPA series	thou.	179,986	241,288	331,013	460,576
Missouri Basin	thou.	7,864	10,434	14,345	20,061
Upper Mississippi Basin	thou.	21,042	28,682	38,785	53,003
Employment [a]					
U.S., OBE series	thou.	66,373	94,800	130,600	181,200
U.S., NPA series [b]	thou.	66,679	94,680	129,200	174,100
Missouri Basin	thou.	2,985	4,074	5,594	7,823
Upper Mississippi Basin [b]	thou.	8,305	10,950	14,559	19,375
Personal income:					
U.S., OBE series (1954 $)	mil. dol.	351,582	785,000	1,680,000	3,630,000
U.S., NPA series (1960 $)	mil. dol.	399,028	989,500	2,218,400	4,854,100
Missouri Basin (1954 $)	mil. dol.	14,381	32,400	69,375	151,400
Upper Mississippi Basin (1960 $)	mil. dol.	51,153	117,479	253,255	540,200
Gross national product:					
U.S., OBE series (1954 $)	mil. dol.	440,000	1,001,000	2,144,000	4,686,000
U.S., NPA series (1960 $)	mil. dol.	503,800	1,201,300	2,680,300	5,857,900

a/ Excludes those stationed abroad.

b/ Civilian employment only.

Sources of growth in projected GNP differ between the two series, as shown below:

Sources of increase	OBE	NPA
Population	39%	33%
Labor force participation	4%	7%
Output per worker	57%	60%
Total	100%	100%

The higher rate of growth in GNP in the NPA series is associated with (a) a higher level of labor force participation by the total population and (b) a higher rate of increase in output per worker.

Regional Trends

Because of economic linkages between Iowa and the rest of the Nation, changes in Iowa employment can be attributed to at least three major economic determinants -- a national-growth effect, an industry-mix effect, and a regional-share effect. The national-growth effect corresponds with the change in employment in an industry that can be attributed to overall national growth. The industry-mix effect denotes the differential change in total employment resulting from industry composition. Because of varying rates of increase in per capita consumption of goods and services and output per worker, some industries will experience above-average while others will experience below-average increases in employment.

The third component of change in Iowa employment is attributed to the regional-share effect -- a proxy representing the competitive position of an industry in out-of-state product and local labor markets. Agriculture in Iowa, for example, experienced a positive regional-share effect during both the 1940-50 and 1950-60 periods. The percentage decline in agricultural employment was smaller for Iowa than for the Nation; consequently, the regional-share effect was favorable in Iowa in terms of total employment change. On the other hand, the lagging competitive position of the trade and service sectors can be attributed to lagging growth rates for the Iowa economy as a whole inasmuch as these activities are more closely related to overall population and income growth than to favorable opportunities for expanding the commodity-producing employment categories.

National Growth

On a national scale, growth in total employment can be attributed to growth in demand and output per worker. Without increases in output per worker, the percentage increase in employment would be identical to the percentage increase in demand. Historically, however, increases in demand have been two to three times the increases in employment because of increases in productivity (measured by physical output per worker).

Gross national product (measured in constant 1960 dollars in this report) serves as a proxy for demand. During the 1950-60 period, for example, GNP increased at an annual rate of 3.6 percent while total civilian employment increased at an annual rate of 1.2 percent. Thus, output per worker, measured in real terms, increased at an annual rate roughly twice as great as the annual growth in total civilian employment.

The national growth effect accounted for an increase of 145,408 in total employment in Iowa during the 1950-60 period, which amounted to 15 percent of the 1950 Iowa employment. Thus, the national growth effect accounts for a major portion of Iowa's economic growth.

Industry Mix

State economic growth, or the lack of it, is attributed, also, to the industrial composition of employment. The industry-mix effect measures differential rates of increase in industry output that is associated with differential rates of increase in final demand and output per worker. The increases in the output associated with changing consumer demands are the result of increases in per capita expenditures and total population. Increases in per capita expenditures, however, are associated with increases in per capita income, but these increases vary depending upon the consumption item (i.e., whether it is income-elastic, and if so, to what extent it is income-elastic).

Income-elastic goods and services show a faster rate of increase in total output than income-inelastic goods and services, and indeed, the income-elastic items account for an increasing proportion of total per capita consumer expenditures. Numerically, the rate of increase in output associated with a changing demand for a particular commodity is some fraction of the rate of increase in per capita income, plus the rate of increase in population. Growth in total employment in the industry, therefore, is equal to the growth in total output, less the growth in output per worker.

Because of the dominance of agriculture in the Iowa economy, the industry-mix effect reduces the total impact of the national-growth effect. The demand for agricultural products is income-inelastic, which means that a given percentage increases in per capita income results in a smaller percentage increase in the consumption of agricultural products than of non-agricultural products. Output per worker, on the other hand, is increasing less rapidly outside of agriculture than in agriculture. A low rate of increase in aggregate demand for agricultural products, coupled with a high rate of increase in output per worker, results in a net decrease in total agricultural employment. For most non-agricultural industries, however, the industry-mix effect is positive, but the positive effects are not sufficient to balance the very large negative industry-mix effects associated with agriculture. Until agricultural employment (or any other category of employment engaged in the production of demand-inelastic products under conditions of rapidly increasing output per worker) accounts for only a small percentage of total employment in Iowa, the industry-mix effect will tend to be negative for the state as a whole, even though the rate of increase in employment may compare favorably with the corresponding rate for the Nation as a whole.

Competitive Position

The competitive position of a region's industry is represented by the regional-share effect. The regional-share effect is the differential change in given industry's employment in a given region or state, which, presumably, is related to the comparative advantage of the region or state for that industry. The regional-share effect measures the difference in the relative growth in employment in a given industry in a given state as compared with the relative growth in employment in the same industry for the Nation.

For Iowa, the regional-share effect is positive for agriculture, presumably because of the superior competitive position of Iowa agricultural products in out-of-state markets. Manufacturing, also, shows a favorable regional-share effect, but the non-commodity-producing industries generally show unfavorable regional-share effects. Manufacturing industries are oriented to out-of-state markets while the non-commodity producing industries are oriented to state markets. Thus, when total state population growth lags behind national population growth, the local market demands for the goods and services produced by the non-commodity producing industires also lag behind corresponding national growth rates. Thus, the unfavorable regional share-effects for Iowa industries can be attributed primarily to the lower rate of population growth in Iowa as compared with the Nation.

An additional consideration, besides income and population growth, is involved in long-run employment forecasting, namely, the competitive position of Iowa products sold in out-of-state markets measured in terms of relative product price and quality. To the extent that consumers generally buy more of a product when its price falls or when its quality improves, a reduction in price or an improvement in quality can be expected to result in an increase in total sales and output. Thus, to the extent that a region's competitive position in a particular industry makes it possible for that industry to (a) sell its products in out-of-state markets at lower prices than its competitors in other states or (b) expand its share of the total national market as a result of quality improvements, the total sales and output of the industry are projected to increase at a faster rate than for the Nation. Particularly for those commodities with a price-elastic or a quality-elastic demand, the superior competitive position becomes a critical factor in accounting for above-average increases in regional or state output and employment.

The analytic approach used with the 1940-50 and 1950-60 data is applied to a series of industry employment projections prepared for the 1960-80 period. National industry employment projections were prepared, first, to obtain the national-growth and industry-mix coefficients needed in projecting the national-growth and industry-mix effect on future Iowa employment (table B-2). Thus, the 1980 employment projections are presented in terms of the two national determinants cited earlier. On the basis of the two national determinants, Iowa's total employment is projected to increase from the 1960 level of 1,019,000 to a 1980 level of 1,339,000 -- a 31 percent increase. However, because of lagging population growth, the 1980 employment will be less than the projected level when using only the two national growth determinants. When the regional share effect is introduced the projected 1980 baseline employment, for example, is reduced by 234,000 as shown in table B-2. The competitive position of Iowa industry in regional and national market is viewed, therefore, as a major determinant of its economic growth potential.

Table B-2. Sources of change in baseline and program projections of employment, by industry group, Iowa, 1960-1980. [a/]

Industry Group	Aggregate effects			Regional effects		Total change	
	National growth	Industry mix	Total	Baseline series	Program series	Baseline series	Program series
			(1,000)				
Agriculture	91.0	- 188.0	- 97.0	10.3	57.8	- 86.7	- 39.2
Mining	1.1	- 1.8	- 0.7	0.4	1.3	- 0.3	0.6
Contract construction	22.9	8.7	31.6	- 8.1	- 9.0	23.5	22.6
Manufacturing:							
Food products	24.0	- 7.4	16.6	- 3.3	- 18.7	13.3	- 2.1
Textile products	0.2	- 0.3	- 0.1	0	- 0.3	- 0.1	- 0.4
Apparel	1.8	- 0.7	1.1	1.4	- 1.3	2.5	- 0.2
Lumber & wood	3.2	- 2.3	0.9	0	- 2.6	0.9	- 1.7
Printing & publishing	7.6	0.7	8.3	3.7	- 6.3	12.0	2.0
Chemical products	2.2	0.3	2.5	- 2.1	- 2.7	0.4	- 0.2
Electrical machinery	23.7	12.5	36.2	- 12.6	- 28.5	23.6	7.7
Motor vehicles	0.6	0.5	1.1	- 0.7	- 1.9	0.4	- 0.8
Other trans. equip.	0.3	0.3	0.6	- 0.9	- 1.2	- 0.3	- 0.6
Other	18.4	- 2.9	15.5	14.3	- 3.8	29.8	11.7
Total	82.0	0.7	82.7	- 0.2	- 67.3	82.5	15.4
Non-commodity	232.7	74.3	307.0	- 236.7	- 33.3	70.3	273.7
Total	429.7	- 106.1	323.6	- 234.3	- 50.5	89.3	273.1

a/ Totals may not equal sum of parts because of rounding.