

CHANGING COMPOSITION OF NORTH DAKOTA'S ECONOMIC BASE

Randal C. Coon, Carlena F. Vocke, and F. Larry Leistriz

The North Dakota economy has shown steady growth during the past 25 years as measured by economic indicators such as personal income and employment. Current year dollar personal income, or income measured in terms of a dollar's purchasing power for a respective year, for North Dakota has grown from \$1.1 billion in 1958 to \$7.3 billion in 1982 while employment increased from 246,180 to 320,170 jobs during the same period (U.S. Dept. of Commerce, 1960 and 1983; North Dakota Employment Security Bureau, 1958 and 1982). The North Dakota economy is comprised of several segments, or components, which collectively are responsible for the state's economic growth. Analysis of the components' growth relative to the state's economic expansion provides an indicator of changes that have occurred within North Dakota. The changing contribution that each respective component makes to the state's economy has widespread implications for socioeconomic planning by both the governmental and private sectors.

Analytical Techniques

North Dakota's economic base is comprised of those economic activities producing a product that is paid for by nonresidents (i.e., products exported from the state). Included in these economic base activities are agriculture (livestock and crops production plus government payments for agricultural programs); mining; manufacturing; tourist expenditures for retail purchases and business and personal services; and federal government outlays for construction and to individuals. These activities can be categorized by industrial groupings, called sectors, as follows: Agriculture, Livestock; Agriculture, Crops; Construction; Agricultural Processing and Miscellaneous Manufacturing; Retail Trade; Business and Personal Services; Households; Coal Mining; Thermal-Electric Generation; Petroleum Exploration and Extraction; and Petroleum Refining (Table 1). These sectors differ significantly in the percentage of their total business volume representing basic activity. The business activity of North Dakota's natural resource-based industries (agriculture and energy) essen-

tially have been composed of basic economic activity, whereas the construction, retail trade, and business and personal services sectors have only a small basic component. The remaining sectors of the economy exist essentially to serve and support these basic economic sectors. Sectors included in this analysis of the state's economic base and their relative magnitudes may differ from those reported in other sources because of differences in research techniques.

Table 1. Economic sectors and associated standard industrial classification codes for the North Dakota input-output model.

Economic Sector	SIC Code ^a
1. Agriculture, Livestock	Group 013—Livestock
2. Agriculture, Crops	All of Major Group 01— Agricultural Production, Except Group 013—Live- stock
3. Nonmetallic Mining	Major Group 14—Mining and Quarrying of Non- metallic Metal, Except Fuels
4. Contract Construction	Division C—Contract Construction (Major Groups 15, 16, and 17)
5. Transportation	All of Division E—Trans- portation, Communica- tions, Electric, Gas, and Sanitary Services, Except Major Groups 48 and 49
6. Communications and Utilities	Major Group 48— Communication, and Major Group 49—Elec- tric, Gas and San- itary Services, Ex- cept Industry No. 4911
7. Agricultural Proces- sing and Miscellaneous Manufacturing	Major Group 50—Whole- sale Trade, Major Group 20—Food and Kindred Products Manufacturing

Coon is research specialist, Vocke is former research assistant, and Leistriz is professor, Department of Agricultural Economics.

Economic Sector	SIC Code ^a
8. Retail Trade	All of Division F—Wholesale and Retail Trade, Except Major Group 50—Wholesale Trade
9. Finance, Insurance, and Real Estate	Division G—Finance, Insurance, and Real Estate
10. Business and Personal Services	All of Division H—Services, Except Major Groups 80, 81, 82, 86 and 89
11. Professional and Social Services	Major Group 80—Medical and Other Health Services, Major Group 81—Legal Services, Major Group 82—Educational Services, Major Group 86—Nonprofit Membership Organizations, and Major Group 89—Miscellaneous Services
12. Households	Not Applicable
13. Government	Division I—Government
14. Coal Mining	Major Group 12—Bituminous Coal and Lignite Mining
15. Thermal-Electric Power Generation	Industry Number 4911—Electric Companies and Systems
16. Petroleum and Natural Gas Exploration and Extraction	Major Group 13—Crude Petroleum and Natural Gas
17. Petroleum Refining	Major Group 29—Petroleum Refining and Related Industries

^aExecutive Office of the President/Bureau of the Budget, **Standard Industrial Classification Manual, 1967, U.S. Government Printing Office, Washington, D.C. 1977.**

Input-output (I-O) analysis was used to analyze the composition of the state's economic base. Input-output analysis is a technique for tabulating and describing the linkages or interdependencies among the various sectors within an economy. The original North Dakota I-O Model was developed in the late 1960s (Sand, 1964; Barch, 1968) and expanded in the late 1970s (Hertsgaard et al., 1977) to include the energy-related sectors as they became an increasingly important part of the state's economic base. The model consists of a set of interdependence coefficients which indicate how a dollar injected into a respective sector is spent and respent within the local economy. Because of this spending and

responding, these values commonly are called multipliers. Application of the state's economic base revenues, or sales for final demand, to the multipliers results in measures of total economic activity or gross business volumes for North Dakota's economic sectors. A comparison of I-O model and Department of Commerce personal income estimates for the 1958-1982 period indicates the model simulates the North Dakota economy within about 5.25 percent.¹

Sales for final demand, or economic base revenues, were measured in current dollars and converted to constant 1980 dollars for this analysis. This was accomplished by inflating/deflating current year sales for final demand by the appropriate Implicit Price Deflator (Coon et al., 1984). Indexing sales for final demand to a base year removed inflation, allowing a comparison of a dollar's purchasing power over time. Throughout this analysis, growth, real growth, and growth in 1980 dollars all refer to the dollar increase that occurred in a sector over time with each dollar having the same purchasing power as in 1980. Data were not available at this time to calculate sales for final demand for 1983. Caution must be exercised when determining trends that include the 1982 data, as agricultural and energy prices were depressed during that year and it also was a time of general national recession.

Composition of the State's Economic Base

Each basic sector was analyzed with respect to its real growth (in terms of 1980 dollars) and its proportion of the state's total economic base. Sectors evaluated individually were Agriculture, Livestock; Agriculture, Crops; Agricultural Processing and Miscellaneous Manufacturing; Household; and Petroleum Exploration and Extraction. The Construction, Retail Trade, Business and Personal Services, Coal Mining, Thermal Electric Generation, and Petroleum Refining basic economic sectors were combined into one sector, called "Others," for purposes of this analysis, because they individually comprised a small percentage of the state's total economic base. Individual sectors will be presented graphically and discussed in order of the percentage they constituted of the North Dakota economic base in 1982.

The Agriculture, Crops (crops production) sector has grown steadily (in 1980 dollars) from 1958 to 1982 with the exception of the unusually high growth rate associated with the Russian wheat sales during the 1973-1975 period (Figure 1). Receipts from crop sales have grown from \$1.2 billion in 1958 to \$2.0 billion in 1982, with the peak of \$3.2 billion occurring in 1974. Crop sales for final demand have been an important part of the state's economic base as they usually have constituted 35 to 40 percent of the total. Crop sales have been the largest single source of dollars coming into

¹Gross business volume of the Household sector (the business activity of the Household sector estimated by application of sales for final demand to the multipliers) corresponds to personal income estimates as reported by the U.S. Department of Commerce, except for minor definitional differences. During the 1958-1982 period the average absolute difference in the personal income estimates was 5.25 percent.

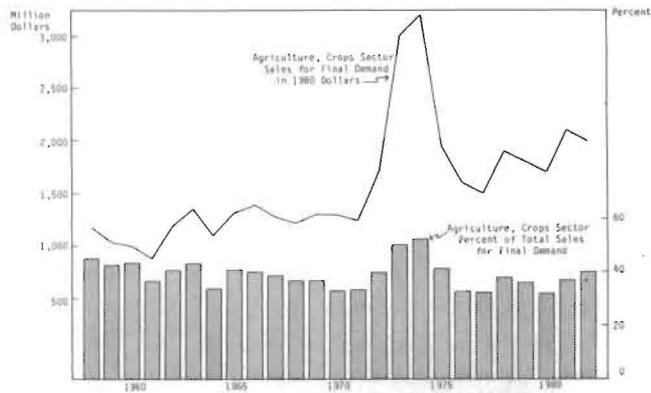


Figure 1. North Dakota Agriculture, Crops Sector Sales for Final Demand in 1980 Dollars, and Percent of State Total, 1958-1982.

North Dakota and each year have accounted for the largest percentage of the state's economic base.

Sales for final demand to the Household sector essentially are expenditures by the federal government for wages and salaries of federal employees and transfer payments. Federal government outlays in North Dakota were the second largest source of income to the state in 1982 with only the Crops sector being larger. With the exception of the last few years, Household receipts have grown steadily throughout the historic period (Figure 2). The Household sector receipts have increased from \$502.3 million in 1958 to a 1975 peak of \$1,478.7 million and remained around the \$1,300 million level until the 1981-1982 period when receipts declined to the \$750 million level. Household receipts ranged from 15.7 to 36.4 percent of state's total economic base and averaged more than 25 percent of the total during the period.

The sector that showed the most growth in recent years has been the Petroleum Exploration and Extraction sector. This sector has increased almost 5,000-fold (4,962.1 percent) from 1958 (\$14.5 million) to 1982

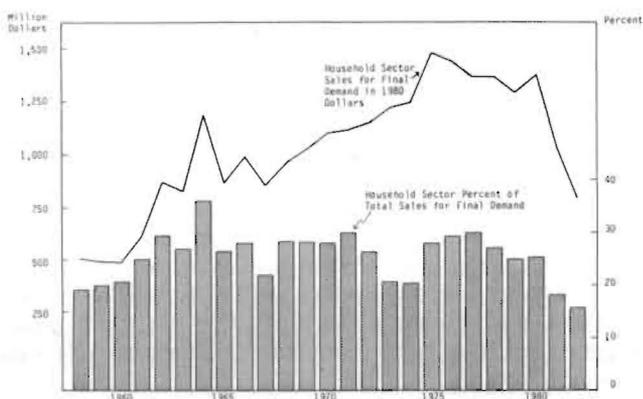


Figure 2. North Dakota Household Sector Sales for Final Demand in 1980 Dollars, and Percent of State Total, 1958-1982.

(\$734.0 million), which was the fastest growth rate of any sector in North Dakota (Figure 3). Most of the real growth has occurred since 1978, reflecting the world oil shortage and escalating energy prices. The increase in Petroleum Exploration and Extraction has resulted in this sector's increasing its share of the state's economic base from 2 percent in the 1958-1974 period to around the 15 percent level by the 1981-1982 period. Also, during this period of rapid growth, Petroleum Exploration and Extraction became the third largest component of North Dakota's economic base by surpassing livestock production and approaching the level of the second leading source, the Household sector.

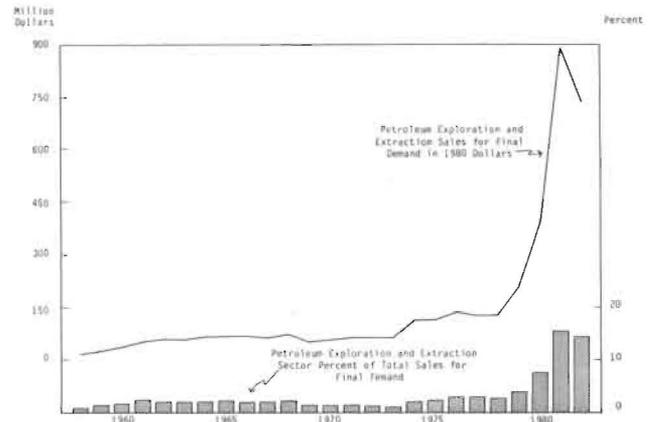


Figure 3. North Dakota Petroleum Exploration and Extraction Sector Sales for Final Demand in 1980 Dollars, and Percent of State Total, 1958-1982.

The Agriculture, Livestock (livestock production) sector has experienced considerable cyclical variation during the 1958-1982 period (Figure 4). Years of peak sales (1973 and 1980) reflected high industry prices, although the sector has not experienced much real growth during the period. Livestock sales (in real dollars) have been in the \$500-700 million range during

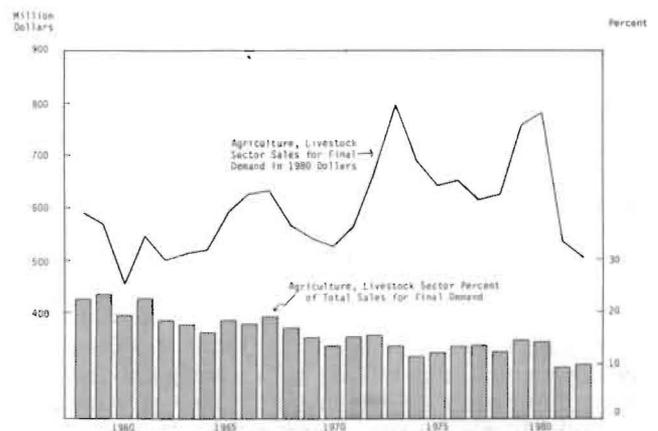


Figure 4. North Dakota Agriculture, Livestock Sector Sales for Final Demand in 1980 Dollars, and Percent of State Total, 1958-1982.

most of the period, making it a relatively stable component of North Dakota's economic base. The decrease in livestock numbers in the state was reflected by the decrease in the percentage livestock constituted of the state's total economic base, declining from about 20 percent in the late 1950s and early 1960s to 10 percent or less in the early 1980s.

Sales from the Agricultural Processing and Miscellaneous Manufacturing sector have realized 168.5 percent real growth from 1958 to 1982, despite a slight downward trend since 1976 (Figure 5). Growth in this sector has been substantial, increasing from \$167.9 million in 1958 to a 1982 level of \$450.8 million. Peak sales for final demand were \$627.1 million in 1976, with declines since then resulting from reduced demand for farm equipment and machinery caused by lower agricultural prices coupled with recessionary conditions nationwide. Increased sales for the Agricultural Processing and Miscellaneous Manufacturing sector have resulted in its portion of the state's economic base increasing to around the 10 percent level. Although this sector has been small relative to the Crops sector, it has experienced substantial real growth in sales and an increased share of total sales for final demand.

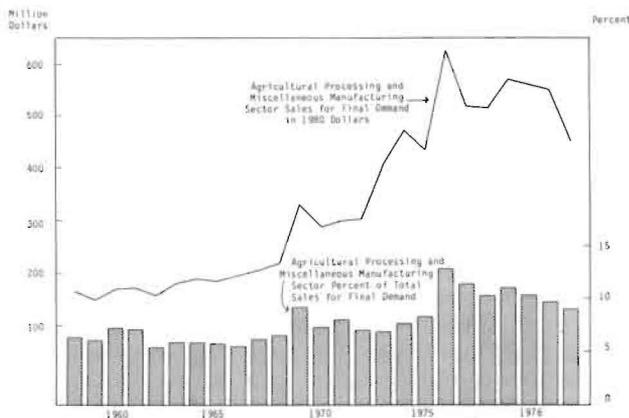


Figure 5. North Dakota Agricultural Processing and Miscellaneous Manufacturing Sector Sales for Final Demand in 1980 Dollars, and Percent of State Total, 1958-1982.

The remaining six sectors were combined and analyzed collectively as "Others" because they individually constituted a relatively small portion of the state's total economic base. These sectors collectively have experienced steady real growth for the 1958-1982 period (Figure 6). (A breakdown of sales for final demand for each individual sector contributing to the economic base of North Dakota is presented in Table 2). Receipts for 1970 were very large relative to preceding and following years. This deviation resulted from the construction of the antiballistic missile system by the federal government near Langdon. Construction occurred over several years, but payment was reported in federal budgets as a single-year expense item (Table 2). Corresponding with

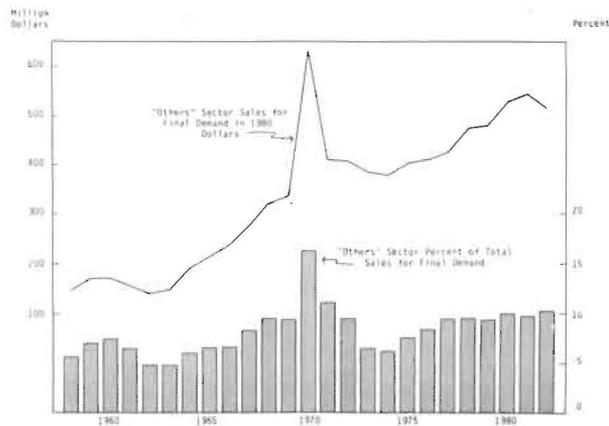


Figure 6. North Dakota "Others"^a Sector Sales for Final Demand in 1980 Dollars, and Percent of State Total, 1958-1982.

^a"Others" includes the Construction, Retail Trade, Business and Personal Service, Coal Mining, Thermal-Electric Generation, and Petroleum Refining Sectors.

real growth of the combined sectors was the increase in their proportion of the state's total economic base, to about 10 percent of the total since 1980.

Conclusions

North Dakota's economy is composed of many sectors which provide sources of income for the state, with Agriculture (livestock and crop sales) being the most important. The state's total economic base increased from \$2.6 billion in 1958 to \$5.0 billion in 1982 (in 1980 dollars). Although agriculture has dominated the state's economic base, its share of the total has decreased from 68.1 percent in 1958 to 50.3 percent in 1982 as receipts increased from \$1.8 to \$2.5 billion. During this period several sectors, including Agricultural Processing and Miscellaneous Manufacturing and the combined energy-related sectors, have come to comprise a greater share of the economic base (6.4 to 9.0 and 2.0 to 20.2 percent, respectively). The individual energy-related sectors — Coal Mining, Thermal-Electric Generation, Petroleum Exploration and Extraction, and Petroleum Refining — have all increased their individual share of the state's economic base from 1958 to 1982 (with a 0.1 to 1.0, 0.0 to 2.8, 0.6 to 14.6, and 1.4 to 1.8 percent change, respectively). The increased shares during the period resulted from increasing energy prices and the United States' goal of energy independence. Diversification of the state's economy was evident by the relative growth of the Agricultural Processing and Miscellaneous Manufacturing sector. Sectors such as Retail Trade and Business and Personal Services also increased their share of the state total even though the magnitude was relatively small.

North Dakota's economy has experienced a diversification during the 1958-1982 period. Although its economic base continues to be largely agriculturally

Table 2. Sales for final demand, by economic sector, North Dakota, million dollars (1980 = base dollars), 1958-1982.

Year	(1) Ag. Lvstk	(2) Ag. Crops	(4) Constr	(7) Ag Proc & Misc Mfg	(8) Retail Trade	(10) Bus & Pers Serv	(12) House- holds	(14) Coal Mining	(15) Thermal- Elec Gen	(16) Pet Exp/Ext	(17) Pet Refining	Total
1958	591.7	1,182.6	49.2	167.9	44.3	14.8	502.3	3.0	--	14.5	35.2	2,605.5
1959	570.0	1,035.9	71.4	149.5	47.2	15.7	489.2	2.6	--	28.6	33.8	2,443.9
1960	452.8	1,009.0	84.4	170.6	38.5	12.9	485.0	2.6	--	37.4	32.3	2,325.5
1961	547.1	873.9	61.4	172.6	44.0	14.8	606.6	3.3	--	53.7	32.2	2,409.6
1962	500.6	1,197.7	41.4	157.2	47.0	15.8	864.6	3.8	--	57.3	31.4	2,916.8
1963	513.6	1,343.0	42.3	180.5	53.7	17.8	827.2	3.2	--	57.6	30.9	3,069.8
1964	520.0	1,100.0	73.6	191.1	63.9	21.2	1,182.8	3.7	--	63.1	31.0	3,250.4
1965	590.0	1,321.8	73.9	186.9	78.7	26.2	861.5	3.6	--	66.7	31.9	3,241.2
1966	627.2	1,407.7	53.8	194.5	104.0	34.7	990.1	3.0	10.2	68.6	32.3	3,526.1
1967	630.1	1,275.0	54.7	205.7	122.7	40.8	854.2	4.7	18.8	62.8	32.8	3,302.3
1968	567.7	1,225.8	58.0	218.1	149.8	49.8	962.4	5.2	26.4	73.7	31.6	3,368.5
1969	541.4	1,311.1	71.9	330.9	154.9	51.7	1,024.5	4.9	23.9	53.5	30.4	3,599.1
1970	528.3	1,300.9	353.0	287.1	166.1	55.3	1,100.6	6.2	26.8	58.7	29.5	3,912.5
1971	563.0	1,244.8	112.2	299.3	173.3	57.8	1,118.1	6.5	32.3	60.8	29.4	3,697.5
1972	667.4	1,728.7	129.3	301.4	153.0	51.1	1,150.7	5.9	37.9	61.3	29.8	4,316.5
1973	798.4	3,012.4	103.3	407.6	158.5	52.8	1,219.1	6.9	32.4	64.4	32.0	5,887.8
1974	691.9	3,196.7	111.7	470.2	142.9	48.0	1,243.4	7.6	34.6	117.4	34.9	6,099.3
1975	639.5	2,197.5	117.1	433.1	158.9	53.0	1,478.7	10.0	29.1	119.1	35.3	5,271.3
1976	650.1	1,603.1	60.3	627.1	180.1	60.1	1,431.8	21.5	51.8	135.3	36.2	4,857.4
1977	612.8	1,494.4	65.6	517.4	182.1	60.6	1,365.2	23.1	58.7	129.3	37.0	4,546.2
1978	625.6	1,908.8	77.8	515.0	195.0	64.9	1,368.2	26.0	77.3	128.2	36.4	5,023.2
1979	756.1	1,843.8	85.0	570.6	160.7	53.6	1,285.0	35.1	99.8	198.8	47.2	5,135.7
1980	781.4	1,721.6	108.1	562.2	144.5	48.2	1,378.5	48.3	120.1	410.4	64.9	5,388.2
1981	538.9	2,122.4	71.5	559.1	145.5	48.5	1,032.8	49.4	127.7	882.8	103.1	5,681.7
1982	504.5	2,017.6	48.0	450.8	143.2	47.7	787.0	49.5	138.7	734.0	89.5	5,010.5
Percent- age change 1958-82	-14.7	70.6	-2.4	168.5	223.3	222.3	56.7	1550.0	1259.8	4962.1	154.3	92.3
Average Annual Growth Rate	.99	1.02	.99	1.04	1.05	1.05	1.02	1.12	1.18	1.18	1.04	1.03

oriented, the degree of dependence on livestock and crop sales has declined. Natural-resource-based (energy) industries have experienced a tremendous growth in recent years, but other nonresource-based industries also have realized an increased importance in North Dakota during this period. If trends of the 1960s and 1970s were to continue, North Dakota will rely less on agriculture for its future economic growth and (increasingly) more on development of energy-related industries, processing of agricultural products raised in the state, and miscellaneous manufacturing as an important source of income and employment within the state.

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