STRATEGIC PLANNING FOR AGRICULTURE: A PROJECTION TO 1995 OF NORTH DAKOTA CROP PRODUCTION AND AGRICULTURAL SECTOR FINANCIAL STATEMENTS

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Prudent farm managers periodically make long-term plans in addition to devising annual or shorter-term programs for crop and livestock production. A forward look of five to 10 years permits the manager to be strategically prepared for both growth and survival. The Farm Credit Administration recently executed a large project looking to the year 1995 to provide information for strategic planning of their business. It contracted with the Agricultural Economics Department at North Dakota State University as a part of this effort to use the National Inter-Regional Agricultural Projections (NIRAP) model to estimate regional production patterns of agricultural commodities, production expenditures, income statement and balance sheet for the 12 U.S. farm credit districts. In this article, the methods and results of that study are used to provide estimates of the 1995 production and financial condition for the farm sector of North Dakota.

PROJECTING THE FUTURE

The Farm Credit Administration's "Project 1995" developed its projections prior to release of the 1982 Agricultural Census. It, therefore, relied upon USDA agricultural data which is generally estimated using sampling methods. The subsequent release of a total census by the Department of Commerce provided information not attainable through sampling. The USDA is expected (as it has traditionally done) to revise data estimated since the previous census to reflect the new information. Consequently, some results in this report would be different had the census information been available. Probably the most significant changes are reduction in farm numbers and shifts in crop production.

Estimates of the future should begin by citing the information that is forecast most accurately. For North Dakota agriculture, the most stable characteristic is the land, followed by the population's need for land and human need for food.

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LAND USE

Total land area of North Dakota is slightly less than 45 million acres. Of this area, population needs of 134 thousand acres are projected for residental and businesses in urban areas, and over 3.3 million acres are projected for special uses, such as highways, airports, and public property not in agricultural use. The remaining 40.9 million acres is total agricultural land available to meet human food demands.

Agricultural land can be divided two different ways (Tale 1). It can be categorized into forest and rangeland versus cropland and improved pasture. These are projected to be 10.7 million and 30.2 million, respectively. The other categorization is to separate the forested area, projected to be approximately one-half million acres, from pasture and rangeland, projected to be 10.5 million acres. The remaining 29.9 million acres is cropland not including pasture.

Cropland not including pasture is further disaggregated into 5.2 million acres projected to be in summerfallow and 4.1 million acres idle due to wasteland (uneconomic to plant), inability to plant the crop, or conservation uses. The remaining land is all cropped but 830 thousand acres are likely to encounter crop failure. The result is 19.7 million acres of harvested cropland, a decrease from the 20.3 million acres reported in the 1982 Agricultural Census. Approximately 540 thousand acres of the cropland harvested in 1995 is projected to be irrigated compared to 163 thousand irrigated acres as reported in the 1982 Agricultural Census.

FARM NUMBERS

The decline in number of farms from the 40,357 reported in the 1978 Census of Agriculture to 36,436 reported in the 1982 census was unexpected even in USDA as evidenced by its report of 38,000 farms for 1982. The projection for 1995 is 10 percent fewer farms or approximately 33,000. Estimated farm numbers on a regional level probably would have been somewhat

Table 1. Summary of Land Use, North Dakota.

	1982 Agricultural Census[a]	1995 NIRAP[b]
	----------000 Acres ----------	
Total Land Area		44,339
Special Uses		3,321
Urban Area		134
Total Agricultural Land Use		40,884
Category 1		
Forest and Rangeland		10,663
Cropland and Improved Pasture	28,117	30,221
Category 2		
Forested Area		542
Pasture and Range	9,755	10,491
Summer Fallow	5,300	5,211
Cropland Idle		4,141
Crop Failure		833
Cropland Harvested	20,310	19,665
Cropland Less Pasture		29,850
Irrigated Land	163	541
Number of Farms	36,436	33,096

[a]Information available from Preliminary 1982 Census, U.S. Department of Agriculture.

[b]Watt, David L., "Disaggregation of Financial Indicators of the Agricultural Sector," Prepared for Farmbank Services' "Project 1995," Department of Agricultural Economics, North Dakota State University, February 1984.

lower had information from the 1982 Census been available at the time of "Project 1995." It can be hypothesized that the number of North Dakota farms and farm households projected by this research also would have been lower. A reduction in number of farm households affects assets and some costs and thus impacts the projected balance sheet and income statement (discussed later). One implication for North Dakota farmers is that the reduction in farm numbers will continue primarily through enlargement of remaining farms, not through reduction in land available to farm.

COMMODITIES PRODUCED

Table 2 summarized acreage and yield of major crops in North Dakota for 1982 (as reported in the preliminary 1982 Census), 1983 (as reported in the 1984 North Dakota Agricultural Statistics), and 1995 (as projected by the study completed in February 1984). Differences between 1982 and 1983 presented in Table 2 are not only year-to-year variations but also are due to the different sources of information. Data for both years are presented to provide a broader basis of comparison for the various statistics. "Project 1995" did not include projection of sunflower production because the study was national in scope and sunflower was not included in the enterprise list as weighted by national standards.

The 1995 projections of crop acreage and yields were developed from a large collection of information inputs. Basic projections of the U.S. economy, food demand,

Table 2. Acreage and Yield of Major Crops for 1982, 1983, and 1995 Projections, North Dakota.[a]

	1982 Agricultural Census[b]		1983 NDAS[c]		1995 NIRAP[d]	
	Acres	Yield/ac	Acres	Yield/ac	Acres	Yield/ac
	(000)		(000)		(000)	
Wheat (bu.)	9,820	30	7,220	27	10,248	33
Rye (bu.)	67	31	150	34	98	38
Corn (bu.)	522	65	435	67	459	75
Corn Silage (tons)	307	6.6	262	6.3	260	8.1
Oats (bu.)	963	49	1,260	51	700	66
Barley (bu.)	1,809	51	2,700	46	2,153	56
Hay (tons)	2,655	1.6	3,320	1.5	4,030	1.6
Soybeans (bu.)	412	21	530	28	642	22
Flaxseed (bu.)	417	13	440	12	699	13
Sugarbeets (tons)	149	17	142	17	262	15
Irish Potatoes (cwt.)	121	141	124	165	134	175
Dry Beans (cwt.)	239	10	160	10	84	16
Sunflower (lbs.)	3,116	1,042	2,314	1,043	na	na

[a]Sunflower are not included in NIRAP model because it is a national model and the regional production of sunflower has not yet been added.

[b]U.S. Dept. of Commerce, Bureau of the Census, **1982 Census of Agriculture; Preliminary Report.**

[c]North Dakota Crop and Livestock Reporting Service, **North Dakota Agricultural Statistics, 1984.**

[d]Watt, David L., "Disaggregation of Financial Indicators of the Agricultural Sector," Prepared for Farmbank Services' "Project 1995," Department of Agricultural Economics, North Dakota State University, February 1984.

national agricultural output, and national financial information for the agricultural sector were produced by Chase Econometrics for Farmbank Services "Project 1995." These projections were combined with results from research at the University of Nebraska, Lincoln which investigated probable yield increases for major U.S. agricultural commodities (Hanway et al., 1982).

Projections of technological change and its impact on costs of production were developed from historical data. Technology in this context is measured by the ratio of the quantity of inputs required to output quantity of each commodity. The model assumes technological advances will increase output relative to inputs at a rate slightly greater than 1 percent annually or approximately 14 percent by 1995. Similarly, technological innovations which tend to reduce costs were considered in estimating production expenditures for livestock.

Projected yields for each state were derived from the national projections and based on the individual state's variation from national average yield. Available cropland was allocated to crops and individual states based primarily upon historical patterns of production. These projections, when combined with yield, determined the acres required within each state.

These acreages, yields, and number of farms were used to project crop production costs. Data on production and prices from Chase Econometrics provided information necessary to estimate gross farm income. When production expenditures were deducted, net farm income for the 1995 projections resulted.

FINANCIAL STATEMENTS

Projected 1995 income statement and balance sheet for the farm credit district in which North Dakota is located were used to estimate similar statistics for the state. Projected shifts in financial indicators for the farm credit district were attributed proportionally to North Dakota. Totals were adjusted to insure internal consistency of the results as presented in Tables 3 and 4.

In Table 3, the real income and cash receipts decline slightly as does real production expenses. The result is that total net income remains nearly constant in real terms.

In the balance sheet of agriculture, Table 4, the financial ratios at the bottom of the table indicate that little relief is expected in the ability of farmers to repay debt, since the ratio of debt to net farm income is projected to be 9.9. The debt to net farm income ratio reported in the article by Pederson et al. (1984) in this issue of Farm Research indicates an average of 9.0 for 1978 through 1982, the most recent five years of data available.

STRATEGIES FOR THE FUTURE

The implication is that farmers will have an increasing sensitivity to the interest rate of debt and will need to be

Table 3. Income Statement of the North Dakota Farming Sector (Including Net Commodity Credit Corporation Loans and Farm Households).

	5-Year Average[a] (1978-82)		1995 NIRAP[b]	
	Real 1967 Dollar	Nominal	Real 1967 Dollar	Nominal
	Million Dollars			
Total Cash Receipts	882.7	2,415.0	846.0	5,431.5
Gov't Payments to Farmers	58.6	154.4	30.5	196.1
Nonmoney Income	58.6	160.1	60.4	387.9
Other Income	13.9	38.3	15.7	100.6
Realized Gross Income	1,013.9	2,767.9	952.6	6,115.9
Production Expenses	844.1	2,315.1	772.9	4,961.7
Realized Net Income	169.8	452.7	179.8	1,154.2
Change in Inventories	8.1	25.2	0.0	0.0
Total Net Income	177.9	477.9	179.8	1,154.2

[a]U.S. Department of Agriculture, **Economic Indicators of the Farm Sector: State Income and Balance Sheet Statistics, 1982,** Economic Research Service, January 1984.

[b]Watt, David L., "Disaggregation of Financial Indicators of the Agricultural Sector," Prepared for Farmbank Services' "Project 1995," Department of Agricultural Economics, North Dakota State University, February 1984.

Table 4. Balance Sheet of the North Dakota Farming Sector, (Including Farm Households) January 1.

	5-Year Average[a] (1979-83)		1995 NIRAP[b]	
	Real 1967 Dollar	Nominal	Real 1967 Dollar	Nominal
	Million Dollars			
ASSETS				
Physical Assets				
Real Estate	5,719.6	16,838.5	5,286.6	33,940.0
Nonreal Estate				
Livestock	333.5	971.5	249.3	1,600.4
Machinery & Motor Vehicles	1,089.5	3,208.3	1,394.6	8,953.3
Crops Stored on and Off-Farms	528.6	1,559.7	546.5	3,508.3
Household Equipment and Furn.	90.2	266.5	80.6	517.6
Financial Assets				
Deposits and Currency	102.2	299.3	54.6	350.2
U.S. Savings Bonds	51.9	150.5	18.2	116.8
Investments in Cooperatives	257.3	764.7	407.7	2,617.4
TOTAL	8,172.7	24,058.8	8,038.0	51,604.1
CLAIMS				
Liabilities				
Real Estate Debt	635.7	1,893.8	697.4	4,477.1
Nonreal Estate Debt to:				
CCC	166.6	498.0	29.6	190.0
Other Nonreal Estate Debt	677.3	2,009.8	1,052.3	6,756.0
Total Liabilities	1,479.6	4,401.6	1,779.3	11,423.1
Proprietors' Equities	6,693.1	19,657.2	6,258.7	40,181.0
TOTAL	8,172.8	24,058.8	8,038.0	51,604.1
Equity/Total Assets	0.82		0.78	
Debt/Equity	0.22		0.28	
Debt/Total Assets	0.18		0.22	
Debt/Net Farm Income	9.0[c]		9.9	

[a]U.S. Department of Agriculture, **Economic Indicators of the Farm Sector: State Income and Balance Sheet Statistics, 1982,** Economic Research Service, January 1984.

[b]Watt, David L., "Disaggregation of Financial Indicators of the Agricultural Sector," Prepared for Farmbank Services' "Project 1995," Department of Agricultural Economics, North Dakota State University, February 1984.

[c]Pederson, et al., "A Financial Profile of North Dakota's Agricultural Sector," **North Dakota Farm Research,** Vol. 42, No. 1, 1984.

careful about expanding and becoming too highly leveraged within their operations. This becomes apparent after a closer investigation of projected production expenses.

The underlying model assumes technology will increase production efficiency and output about 14 percent by 1995. Increased efficiency decreases real production costs at approximately the same rate. Expenses, however, are projected to decline only 8 percent rather than 14 percent as suggested. This discrepancy indicates another component of production expenses must be projected to increase. Debt servicing appears to be the culprit.

The debt to asset ratio is projected to increase; that is, farmers are expected to continue increasing their reliance upon borrowed capital to expand their operations. This will result in increased obligation to debt servicing even without higher interest rates. Debt service is a fixed expense and is projected to increase relative to net farm income.

Relative increases of fixed costs multiply the farm operator's risk. The opportunity to rapidly reduce production costs after a decrease in commodity prices is drastically diminished. Farmers will be operating with smaller margins for error since a significant crop failure without insurance coverage can radically change the equity position of any farm. It appears there will be substantially more downside risk in future years than there has been in the past.

Higher debt to asset ratios indicate that greater gains will be enjoyed if commodity prices increase dramatically, but the opportunities for such windfalls also may be on the decline. Temporary increases in commodity prices in excess of increases in production costs may be eliminated through an improved and more efficient market place which will react more quickly to future price changes. Variable interest rate and deregulation of the overall financial industry are examples of recent changes which remove market rigidity and facilitate more rapid adjustments. Opportunities for rapid farm growth such as experienced during the 1970s are unlikely to arise again. Consequently, the opportunity to reap extra benefits from a leveraged position is realtively less than the chance of suffering devastating losses.

Reduction in opportunities for windfall gains to offset downside income risk indicates that a farmer with a significant loss in one year may find it nearly impossible to recover. As a result, risk averse farmers may again be the survivors in the next decade.

SUMMARY

This may be the time to cease rapid growth through use of borrowed capital if the farm owner has not already done so. Farm income and production costs are expected to decrease over the next years, but increased leverage and debt repayment obligations also increase downside income risk. Farmers who maintain an equity to total asset ratio currently experienced will find themselves increasingly squeezed by debt repayment needs and any reduced net farm income will make survival more difficult.

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change is occurring with the trend being toward fewer and larger elevators to take advantage of economies associated with high throughput. As elevators become more efficient and are able to take advantage of multiple-car rates, cost savings will be shared throughout the grain marketing system. One danger in the rapid changes occurring in the grain marketing system is that we overbuild (or expand too rapidly). This occurred in Iowa and Nebraska; important lessons can be learned from the expansion process observed in those two states.

The analysis represented in the set of articles appearing on the following pages provides an important benchmark for conducting a similar exercise again in the future. Social and economic change is a dynamic process; it impacts differently on various segments of society. There is no reason to believe that the next 10 years will be any less dynamic than the last decade.