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2002 North Dakota Agricultural Outlook: Representative Farms, 2002-2011

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Abstract

Net farm income for most representative farms in 2011 will be lower than in 2002. Low profit farms, which consist of 25% of the farms in the study, may not have financial resiliency to survive. The new farm bill will provide higher net farm income than a continuation of the FAIR Act. Cropland prices and cash rental rates are projected to increase slightly in all regions. Debt-to-asset ratios for most farms will increase slightly throughout the forecast period. Debt-to-asset ratios for the low-profit and small-size farms are higher than those for large and high-profit farms.

Keywords: net farm income, debt-to-asset ratios, cropland prices, land rental rates, farm operating expenses, capitalization rate

Highlights

Net farm income for the large-size farm is predicted to decrease from $108 to $82 thousand for the 2002-2011 period, and the net farm income for the medium-size farm will decrease from $46 to $34 thousand. Net farm income for the small-size farm will decrease from $18 to $13 thousand for the same period.

Net farm income also differs among different farms in the profit categories and decreases for the period. Net farm income is predicted to decrease from $128 to $98 thousand for the 2002-2011 period for the high-profit farm, and from $52 to $33 thousand for the average-profit farm, and will decrease from $15 to $8 thousand for the low-profit farm.

The new farm bill provides higher net farm income than a continuation of the FAIR Act. Net farm income averages 18.4% higher for the large-size representative farm, 19.4% higher for the medium-size representative farm and 27% higher for the small-size representative farm. Net farm income averages 14.7% higher for the high-profit representative farm, 27.8% higher for the average-profit representative farm and 150% higher for the low-profit representative farm.

Price risk is transferred from the producer to the federal government under the new farm bill. If prices are 10% lower than forecasted prices, net farm income for the size representative farms will be about 3.5% lower, and net farm income will be about 2% lower for the profit representative farms. Government spending increases 35.7% if prices are 10% lower and decreases 32.5% if prices are 10% higher. Higher prices would increase net farm income less than 6% across the state.

Debt-to-asset ratios for all representative farms are predicted to increase slightly throughout the forecast period. Debt-to-asset ratios are projected to increase 33% for the large-size, 41% for the medium-size, and 52% for the small-size representative farms in 2011. The ratios are also projected to increase 41%, 50%, and 65% for high, average, and low-profit representative farms in 2011, respectively.

For the average-profit representative farm, state average cropland prices will increase 3.4% from $465 per acre in 2002 to $481 per acre in 2011. Cash rents will increase 2.6% from $38 per acre in 2002 to $39 per acre in 2011.

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INTRODUCTION

North Dakota represents a major agricultural area with distinctive climate and crop mix in the United States. The state is uniquely situated in terms of marketing and logistics within the United States because it shares a border with Canada, which is the United States' largest trading partner. Changes in government policies through recent farm bills and the Uruguay Round Agreement (URA) have affected the region's economy.

The main objective of this analysis is to evaluate changes in net farm income and debt-to-asset ratios for different sizes and profit categories of representative farms. The representative farms are developed from the North Dakota Farm and Ranch Business Management Education Program farm records and are forecasted over the 2002 to 2011 period under the Farm Security and Rural Investment Act (FSRIA) of 2002, the URA, and the Canada - United States Free Trade Agreement (CUSTA). Secondary objectives are to evaluate the reaction of cropland prices and cash rental rates to the farm income estimates over the same time horizon and to compare net farm income under a continuation of the FAIR Act to that under the current farm bill.

The North Dakota agricultural outlook for the 2002-2011 period is based on the baseline results produced by the Food and Agricultural Policy Research Institute (FAPRI) global model and the North Dakota Global Wheat Policy Simulation Model.

U.S. agriculture has been influenced by major changes in agricultural and trade policies. The FAIR Act intended to limit spending for government commodity payments to $35.63 billion between 1996 and 2002. However, due to falling prices, there were large unanticipated subsidies, coupled to production, in the form of loan deficiency payments (LDPs), and gains from marketing loans. Also, emergency payments were made each year, 1998-2001. In addition, several trade agreements, such as CUSTA, the North American Free Trade Agreement (NAFTA), and the URA, have liberalized agricultural trade and will continue to liberalize agricultural trade for the next decade.

The new farm bill, the Farm Security and Rural Investment Act of 2002, has been signed by the President. It increases government spending by $73 billion over the life of the bill. Figure 1 shows the FAPRI forecasts for national government spending from 2000 through 2011 for the Baseline (FAIR Act) and the new farm bill. Government spending will be much higher than the FAIR Act but will decrease from $21 billion in 2002 to about $13.5 billion in 2011.

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Figure 1. FAPRI's Forecast of Government Agricultural Spending

DEVELOPMENT OF AN EMPIRICAL MODEL

Major crops produced in North Dakota are hard red spring wheat, durum wheat, barley (malting and feed), corn, soybeans, and minor oilseeds, including sunflower and canola. In addition, the region produces dry edible beans, sugarbeets, and potatoes. The agricultural sector contributes the second largest share to the state economy following federal transfers. Most farms in this state differ from farms in other states in terms of farm structure and marketing options. The average farm size in North Dakota is 1,300 crop acres. About 43% of total farms in North Dakota have a farm size less than 1,000 crop acres. In addition, small farms (less than 200 acres) account for 26% of total farms in North Dakota and only 3% of total farmland.

The North Dakota Representative Farm Model is a deterministic simulation model designed to analyze the impacts of policy changes on farm income. The model projects average net farm incomes, debt-to-asset ratios, cash rents, and cropland prices for representative farms producing five major crops: wheat, barley, corn, soybeans, and sunflowers. The model is linked to the FAPRI and North Dakota econometric simulation models, and uses the prices of the crops generated from the models (Figure 2). The base model assumes an average trend yield based on historical data and average predicted prices received by farmers based on the historical relationships between FAPRI prices and North Dakota prices received by farmers. In addition, macro policies and assumptions, trade policies, and agricultural policies are incorporated into the model directly or indirectly by the assumptions made by the FAPRI in their price series.

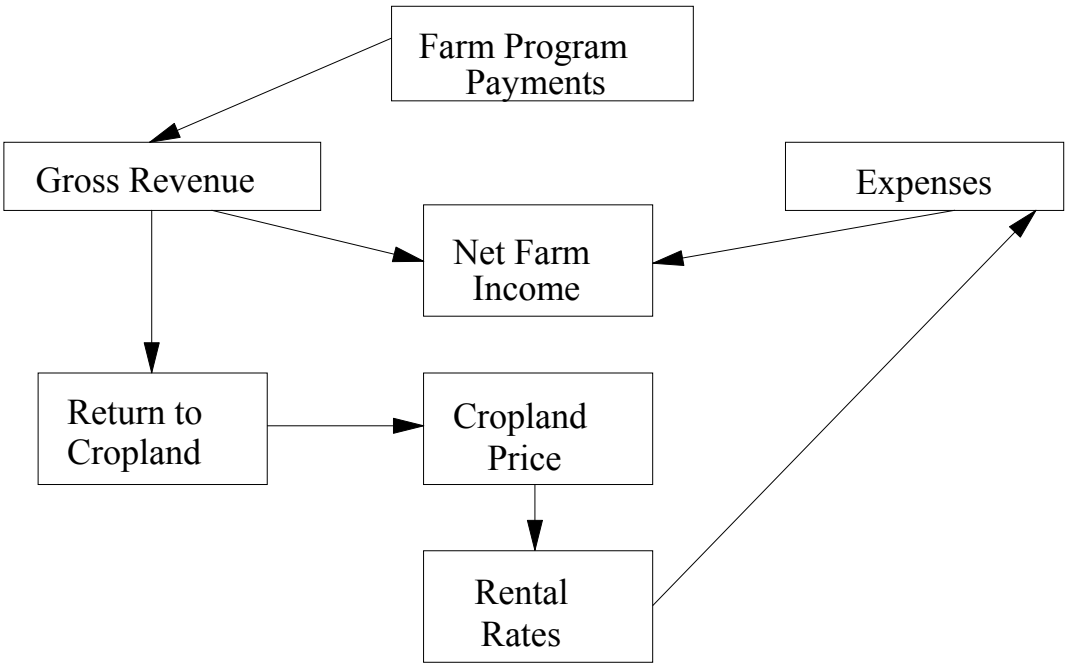


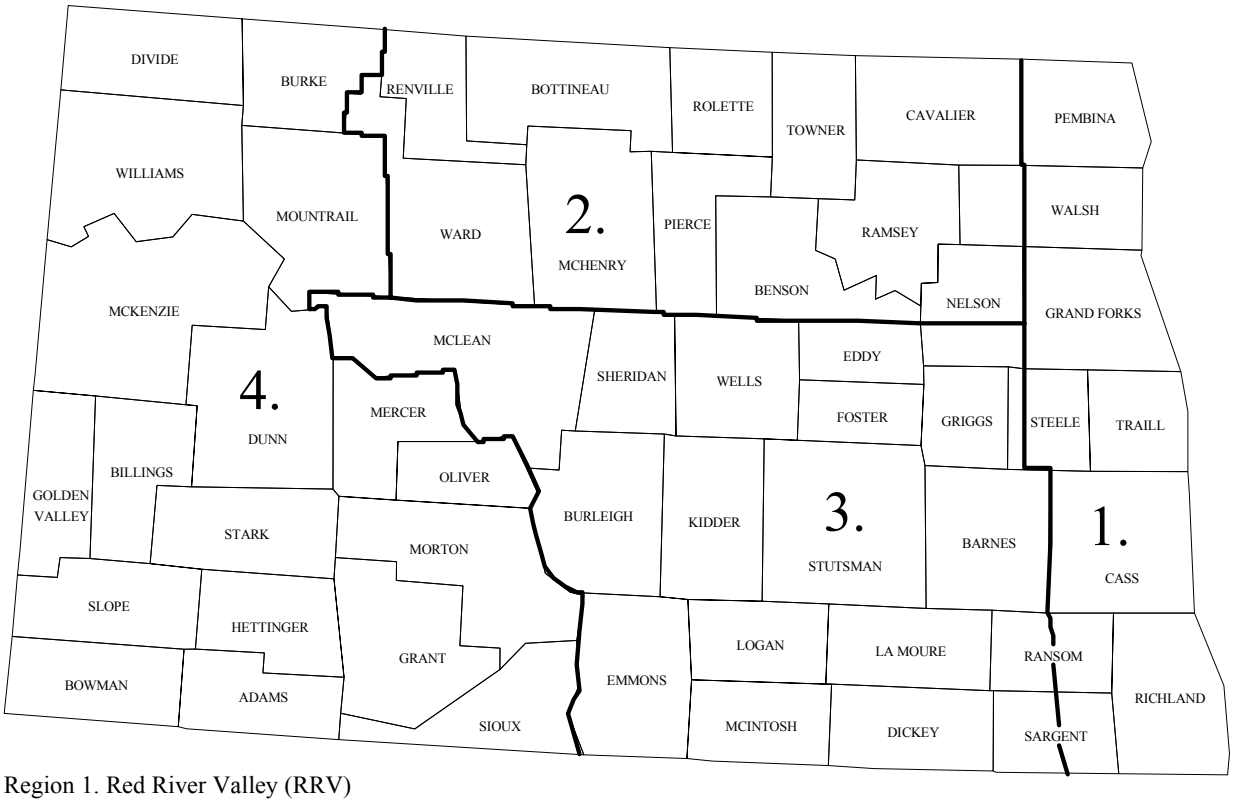
Figure 2. Structure of the North Dakota Representative Farm Model

Alternative farm policies affect net farm income for the representative farms. Changes in return to cropland, given the market-determined capitalization rate, result in changes in land prices. Changes in return to cropland affect cash rental rates that farmers are willing to pay on land used to produce crops. Changes in land price and cash rental in turn affect net farm income through adjustments in farm expenses. These changes affect the debt-to-asset ratios of the representative farms.

The North Dakota Representative Farm

The model has 24 representative farms: six farms in each of four regions of North Dakota. These regions are the Red River Valley (RRV), North Central (NC), South Central (SC), and Western (West) (Figure 3). The farms in each region are representative of the average, high, and low profit farms and small, medium, and large-size farms enrolled in the North Dakota Farm and Ranch Business Management Education Program.

The representative farms average 1,839 acres of cropland and 410 acres of pasture. The farms in the study are about 73% larger than the state average reported by the North Dakota Agricultural Statistics Service. A reason for this difference is the state average includes all farms with $1,000 or more in sales; therefore, hobby farms, farms operated as part of combined larger farms, semi-retired farms, and commercial farms are included, while the farms used in this study mainly represent commercial farms.



Region 1. Red River Valley (RRV)
Region 2. North Central (NC)
Region 3. South Central (SC)
Region 4. Western (West)

Figure 3. North Dakota Farm and Ranch Business Management Regions

The average representative farm is an average of all farms in the Farm and Ranch Business Management Records System for the state in each production region. The high-profit representative farm is an average of farms in the top 20% of farm profitability for each production region. The low-profit representative farm is an average of farms in the low 20% of farm profitability in each production region. Average farm sizes are 2,481 cropland acres for the high-profit farm, 1,647 cropland acres for the average-profit farms, and 1,389 cropland acres for the low-profit farms (Table 1).

The large representative farm is the average of the largest 25% of farms in cropland acres for each producing region. The small representative farm is an average of the smallest 25% of the farms for each producing region. Average farm sizes are 3,110 cropland acres for the large-size farms, 1,436 cropland acres for the medium-size farms, and 553 cropland acres for the small-size farms (Table 1).

Table 1. Characteristics of Representative North Dakota Farms, 2001

	Size			Profit		
	Large	Medium	Small	High	Average	Low
Number of Farms	133	266	133	97	486	97
Total Cropland (ac)	3,110	1,436	553	2,481	1,647	1,389
Spring Wheat (ac)	1,043	479	153	547	382	299
Durum Wheat (ac)	309	90	49	358	239	91
Barley (ac)	192	87	47	293	217	217
Corn (ac)	124	64	31	177	108	94
Sunflower (ac)	183	103	31	280	189	187
Soybeans (ac)	391	184	89	218	163	125

Summary of the 2002 Farm Bill

The U.S. Congress passed and the President has signed the FSRIA of 2002. The bill incorporated the additional emergency federal funding that agriculture received during 1998 through 2001 into legislation. The legislation provides a continuation of planting flexibility, fixed payments, and commodity marketing loan programs. FSRIA includes a counter-cyclical feature that is tied to market prices but not to current production.

The bill allows producers to retain their current base acres and add oilseed acres up to maximum crop acres, or it allows them to update base acres using 1998-2001 acres planted and prevented planted acres for all covered commodities. Payment yields may be updated for the counter-cyclical payments if a producer decides to update base acres. The updated yield is the higher of the current Agricultural Market Transition Act (AMTA) yield plus 70% of the difference between current AMTA yield and a full yield update based on 1998-2001 yields on planted acreage or 93.5% of 1998-2001 yields on planted acreage. The bill provides for a "plug" of 75% of the county average yield for years in which the actual farm yield is less than the county average yield.

Table 2. National Loan Rates, Direct Payments, and Target Prices for Covered Commodities

	Loan Rate		Direct Payment	Target Price	
	2002-2003	2004-2007	2002-2007	2002-2003	2004-2007
	----------$----------				
Corn (bu)	1.98	1.95	0.28	2.60	2.63
Barley (bu)	1.88	1.85	0.24	2.21	2.24
Wheat (bu)	2.80	2.75	0.52	3.86	3.92
Soybeans (bu)	5.00	5.00	0.44	5.80	5.80
Minor Oilseeds (cwt)	9.60	9.30	0.80	9.80	10.10

Table 2 shows the national loan rates, direct payments and target prices for the major commodities grown in North Dakota. The national loan rate for corn increased from $1.89 under the FAIR Act to $1.98 for the FSRIA. National wheat loan rates increased $0.22, from $2.58 to

$2.80. Loan rates for barley and minor oilseed were also increased. The national loan rate for soybeans was lowered from $5.26 to $5.00.

Direct payments for each crop are calculated by base acres times 0.85 times yields times the direct payment rate for each crop. Direct payment rates increased from $0.46 per bushel for wheat under the FAIR Act to $0.52 per bushel under FSRIA. The direct payment rate for corn increased from $0.26 to $0.28. The direct payment rate for barley increased from $0.22 to $0.24. Oilseeds are included in the direct payment program for the first time. The payment levels are $0.44 per bushel for soybeans and $0.80 per cwt for minor oilseeds. One-half of the direct payments can be received December 1 prior to the year that the crop is harvested, with the balance paid in October of the harvest year.

Counter-cyclical payment rates are calculated by subtracting direct payment rates and the higher of the loan rate or the national average marketing year price from the target price. The payment rate is multiplied by the payment base yield times base acres times 0.85. For example, in 2002 if wheat price is equal to the loan rate, the counter-cyclical payment rate would be $3.86 -0.52 - $2.80 = $0.54. That rate would be multiplied by the payment yield times base acres times 0.85. A producer would receive 35% of the counter cyclical payments in October of the harvest year, 35% in February of the following year, and the balance after the end of the 12-month marketing year for the specific crop.

Total payment limits increased 57% from the FAIR Act because of the addition of the counter-cyclical payment with a limit of $65,000. Limits for direct payments remain at $40,000 and limits for loan deficiency payments and marketing loan gains remain at $75,000. The current rules on spouses, 3-entities, actively engaged requirements , and generic commodity certificates, which allow unlimited benefits from the marketing loan program remain the same. Total dollar limitation is set at $180,000 per entity or $360,000 per married couple where each spouse is a farming entity.

Conservation spending increased to $17.1 billion under the new farm bill. Conservation Reserve Program acres increased from 36.4 million acres to 39.2 million acres. Wetland Reserve Program acres increased to 2.275 million acres. A new program to enroll up to 2 million acres of virgin and improved pastureland was established. The Grasslands Reserve Program would provide payments for 10, 15, or 20 year rental agreements or 30 year agreements or easements for the protection of grasslands. The Environmental Quality Incentives Program was increased and priority areas were eliminated.

Programs directed toward increasing trade were enlarged with a total of $1.144 billion budgeted for trade programs.

Structure of the Representative Farm Model

The model consists of four components: net farm income, debt-to-asset ratio, land price, and cash rent. This section discusses the definition of each component and the formulas used to calculate the components.

Net Farm Income. Net farm income is calculated by subtracting total crop and livestock expenses from total farm income. Crop and livestock expenses consist of direct costs, including

seed, fertilizer, fuel, repairs, feed, supplies, feeder livestock purchases, and hired labor; and indirect costs that include machinery depreciation, overhead such as insurance and licenses, land taxes, and land rent or interest on real estate debt. Total farm income is the sum of cash receipts from crop and livestock enterprises, government payments, CRP payments, custom work, patronage dividends, insurance income, and miscellaneous income. Net farm income is calculated as

$$NFI=\sum_{j=1}^{n} Y_j P_j A_j+\sum_{h=1}^{m} P_h L_h+\sum_{j=1}^{n} S_j A_j+I^{o}-\sum_{h=1}^{m} EX_h^{L}-\sum_{j=1}^{n} EX_j^{C} \quad (1)$$

where

Y_j = yield per acre for crop j,
P_j = price of crop j,
A_j = planted acres of crop j,
P_h = price of livestock h,
L_h = number of livestock h sold,
S_j = government subsidies for crop j per acre,
I^o = other farm income,
EX^C_j = total expenses in producing crop j,
EX^L_h = total expenses in producing livestock h.

Inventory changes, accounts receivable, accounts payable, and prepaid expenses and supplies are assumed to be constant from year to year. Cash receipts are based on predicted cash prices and yields in North Dakota. Cash prices received by farmers are estimated from North Dakota price equations which were estimated on the basis of the historical relationships between North Dakota prices and U.S. export prices of the commodities. Annual data from 1974 to 1999 were used to estimate price equations. The price equations were used to estimate cash prices received by North Dakota farmers for the 2002-2011 period. The FAPRI prices are used as exogenous variables in the price estimates.

Regional North Dakota yield trend equations were estimated from historical yield data reported by the North Dakota Agricultural Statistics Service from 1974 to 2000. The estimated equations were used to forecast crop yield trends for future years. A dummy variable was used to compensate for two drought years: 1980 and 1988.

Cropland Prices and Cash Rent. Land prices for representative farms are estimated on the basis of the implicit discount rate the farms have previously used and the expected return on land. Therefore, the land prices are defined as the amount that farms can afford to pay for farmland. They are not prevailing market prices. Financial data from average representative farms for each region are used to calculate a dollar return to land. To do this, all production expenses for the crops, including depreciation, land taxes, a labor charge for unpaid family labor, net return from a livestock enterprise, and a management fee equivalent to that charged by bank trust departments for management of share-rented farms, are subtracted from gross farm income. To the remaining balance, interest on real estate debt is added back because the return to land is not affected by ownership of the land. This figure is used as the return allocated to cropland.

The average return allocated to each acre of cropland per year is divided by the average cropland price to determine the long-run capitalization rate used by farmers as follows:

(2)

$$R_g = \frac{M_g}{PL_g}$$

where

R_g = long-run capitalization rate in region g,
M_g = average net return allocated to cropland in region g,
PL_g = average observed price of cropland in region g.

For the forecast years, this capitalization rate is applied to the estimated average income per acre allocated to cropland to determine cropland value for land utilized to produce wheat, corn, soybeans, barley, and sunflowers. The average income is an n-year weighted moving average of annual per acre income. Calculation of cropland prices is summarized as

(3)

$$PL_{gT} = \frac{1}{R_g} \sum_{t=T-n}^{T} W_t M_{tg} + T_r$$

where

PL_{gT} = cropland price in region g in time T,
W_t = weighting factor for year t,
M_{tg} = net return allocated to cropland in region g and year t.
T_r = Trend

The price of cropland calculated in Equation 3 can be defined as the amount farmers are willing to pay for the cropland to produce wheat, barley, corn, soybeans, and sunflowers.

Cash Rent. Cash rent for cropland is calculated by multiplying a k-year moving average of estimated price of cropland by the long-run capitalization rate, plus taxes on land. Calculation of cash rent is summarized by

$$CR_{gT} = \sum_{t=T-k}^{T} EM_{gt} R_g + TX_T \qquad (4)$$

CR_{gT} = cropland cash rent in region g in time T,
EM_{gt} = estimated price of cropland in region g and year t,
TX_T = taxes on land in time T.

The cash rent is defined as the amount farmers are willing to pay for the rented cropland to produce wheat, barley, corn, soybeans, and sunflowers.

DATA USED FOR THE REPRESENTATIVE FARM

The commodity prices for crops are obtained from the FAPRI and ND Global Wheat Policy simulation models for average farm prices of the crops in the United States. The national average farm prices are converted to the prices received by North Dakota representative farms by regressing average farm price of each crop produced in North Dakota against the national average farm price of the same crop. The price equation used for this study is specified in a dynamic framework on the basis of Nerlove's partial adjustment hypothesis as follows:

$$P_{it} = a_0 + a_1 P_t + a_2 P_{it-1} + e_{it} \quad (5)$$

where P_{it} = average farm price of a crop in region i in time t.
P_t = national average farm price of a crop in time t.

The price equation is estimated for each crop produced in North Dakota using the time series data from 1975 to 2000. The estimated equations are used to predict average prices received by farmers in each region in North Dakota from the national average prices from the FAPRI and ND simulation models. The predicted farm prices are shown in Table 3. The numbers in bold are loan rates. Figure 4 shows that prices for soybeans are forecasted to increase faster than prices for other crops.

Table 3. North Dakota Baseline Price Estimates from Projected FAPRI Baseline*

	Spring Wheat	Durum Wheat	Malting Barley	Feed Barley	Soybeans	Corn	Sunflower
	----------dollars/bushel----------						-$/cwt-
2002	2.81	2.81	2.17	1.78	**5.00**	2.00	**9.60**
2003	2.93	2.93	2.20	1.80	**5.00**	2.04	**9.60**
2004	3.01	3.01	2.23	1.82	**5.00**	2.08	**9.30**
2005	3.07	3.07	2.27	1.85	**5.00**	2.14	**9.30**
2006	3.15	3.15	2.31	1.88	5.09	2.20	**9.30**
2007	3.24	3.24	2.34	1.90	5.27	2.26	**9.30**
2008	3.29	3.29	2.38	1.93	5.45	2.31	**9.30**
2009	3.36	3.36	2.42	1.96	5.56	2.37	9.33
2010	3.45	3.45	2.48	2.01	5.66	2.44	9.50
2011	3.45	3.45	2.48	2.01	5.66	2.44	9.50

Note: National loan Rate is bolded.
* National loan rate assumed at time of publication

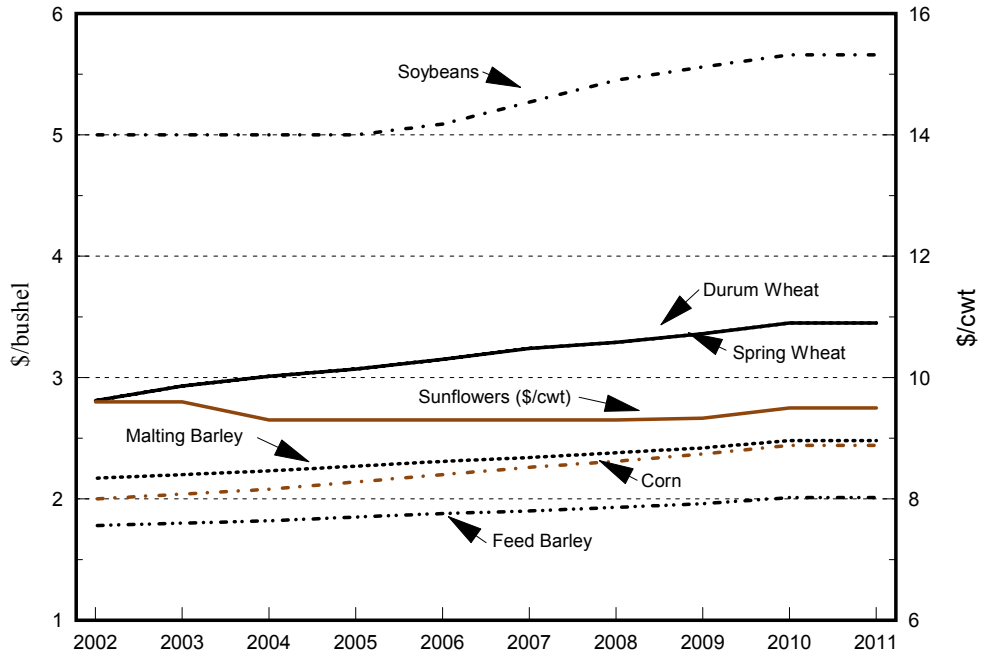


Figure 4. North Dakota Baseline Price Estimations from the Projected FAPRI Baseline

Crop yields in each region also are predicted by using the estimated yield equations for crops produced in each region. The yield equation for each crop in each region is specified in the same dynamic framework as that in the price equation, as follows:

$$y_{it} = b_0 + b_1 \text{ trend} + b_2 y_{it-1} + e_{it} \quad (6)$$

where y_{it} represents yield of a crop in region i in time t, and e_{it} is a random error term. A dummy variable was used to compensate for two drought years: 1980 and 1988. The trend variable is included to capture changes in production technology.

This equation is estimated for each crop in each region using time series data from 1976 to 1999. The estimated equations are used to predict crop yields in each region.

Crop mix changes over time as a function of prices of the crops produced in each region. A dynamic acreage equation for each crop is specified on the basis of Nerlove's partial adjustment hypothesis as follows:

$$A_{jit}=c_o+\sum_{j=1}^{n} c_j P_{jit}+c_{n+1}A_{jit-1}+c_{n+2}G_{it}+e_{jit} \quad (7)$$

where A_{jit} = the total acres of the jth crop in region i in time t,
P_{jit} = the price of the jth crop in region i in time t,
G_{it} = government policy variables applied to the jth crop in time t,
$e_{jit.}$ = a random error term.

The equations are estimated using time series data from 1976 to 1999. The estimated equations are used to predict the total acres of each crop produced in each region. The predicted prices from Equation 5 are used in the acreage equations. The jth crop share in region i in time t is then calculated as follows:

$$S_{jit}=A_{jit}/\sum_{j=1}^{i} A_{jit} \quad (8)$$

where S_{jit} is an acreage share of the jth crop in region i in time t.

The estimated share of a crop is applied to calculate the total acres of the crop produced in the region by multiplying the total acres in the region by the share.

Other data needed for the model are obtained from the North Dakota Farm and Ranch Business Management Association (farm record system data).

AGRICULTURAL OUTLOOK FOR THE REPRESENTATIVE FARMS, 2002-2011

The North Dakota Representative Farm Model was used to estimate net farm income, debt-to-asset ratios, land prices, and rental rates under the 2002 FSRIA for 2002-2011.

Additional assumptions used in this study are:

1. Net farm income from livestock operation and production of other crops, including potatoes and dry beans, remains constant during the period.

2. All farm enterprises in size and operation remain constant in the analysis.

3. The farm equipment stock remains constant, indicating that depreciation allowances are invested back into farm equipment.

4. Inventory changes, accounts receivable, accounts payable, and prepaid expenses and supplies are constant from year to year.

Net Income for North Dakota Representative Farms

Table 4 presents net farm income for farms by size and profitability under a continuation of the FAIR Act and the FSRIA. Average net income for North Dakota representative farms varies, depending upon the size of farm and its profitability. The net income for the large-size farm will decrease from $108 thousand in 2002 to $82 thousand in 2011 (Figure 5). The net income in 2011 will be 24% lower than that in 2002. Net farm income for the medium-size farm is $46 thousand in 2002, decreasing to $34 thousand in 2011. Net farm income for the small-size farm is $18 thousand in 2002 and will decrease to $13 thousand in 2011. State average net farm income over the 10-year, 2002-2011 period, is $90 thousand for the large-size farm, $37 thousand for the medium-size farm, and $14 thousand for the small-size farm. This result implies that the large-size farm has enough net income to survive and expand, but the medium and small-size farms under the new farm bill and the current international market conditions may not be able to expand and take advantage of economies of size.

Table 4. State Average Net Farm Income for Different Size and Profit Representative Farms

	Size						*Profit*					
	FAIR			FSRIA			FAIR			FSRIA		
	Large	Medium	Small	Large	Medium	Small	High	Average	Low	High	Average	Low
	thousand $											
2002	91	38	15	108	46	18	114	43	7	128	52	15
2003	87	37	14	102	44	18	113	43	10	128	54	19
2004	80	33	13	98	42	17	110	41	8	129	54	19
2005	77	32	12	93	39	15	110	40	9	128	52	19
2006	74	30	11	88	37	14	104	36	6	121	48	16
2007	71	28	10	84	34	13	101	36	7	116	46	15
2008	69	27	9	82	33	12	95	33	4	112	44	14
2009	69	27	9	82	33	12	92	31	4	109	42	14
2010	69	27	10	81	33	12	90	28	4	105	38	13
2011	70	28	10	82	34	13	88	27	2	98	33	8
10yr	76	31	11	90	37	14	102	36	6	117	46	15

The decreases in net farm income from 2002 to 2011 are mainly due to the nature of the counter-cyclical payments. Any price increase up to the target price level is offset by decreases in government spending. Increases in yields do not make up for increases in expenses. Crop production in the United States and around the world is predicted to be consistent with annual trend line increases, while demand is predicted to increase faster than supply due mainly to the expected increases in income and slow but steady growth in population in developing countries. However, price levels will not rise above target price levels in the United States.

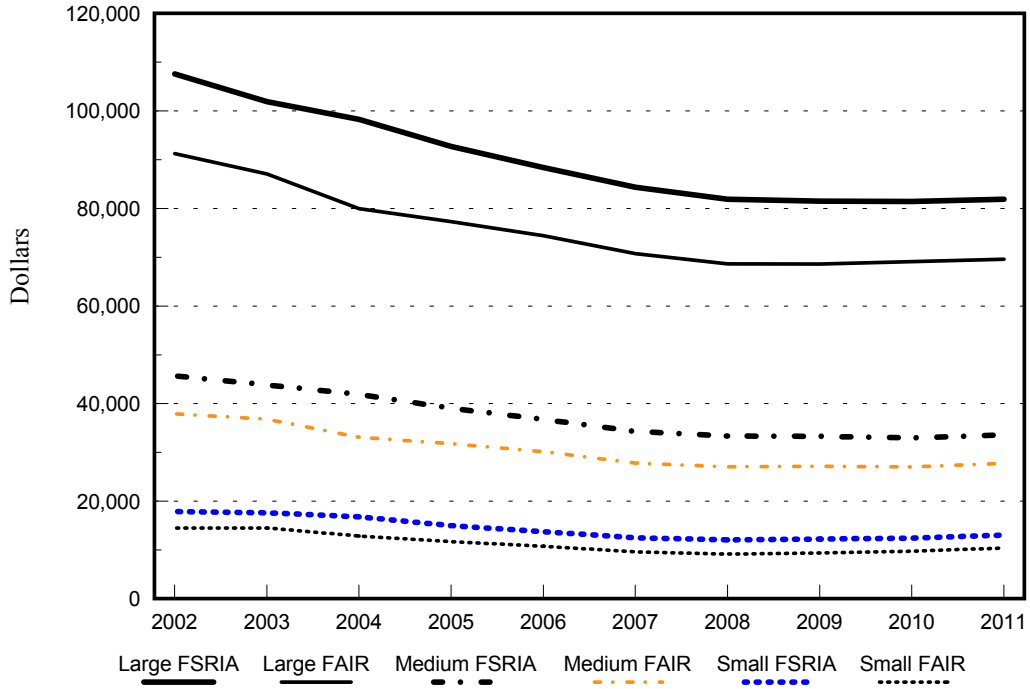


Figure 5. Net Farm Income by Size for North Dakota Representative Farms under the FAIR Act and FSRIA

Net farm income for the high-profit farm is $128 thousand in 2002 and will decrease to $98 thousand in 2011 (Figure 6). The income in 2011 is 23% lower than that in 2002. Net farm income for the average-profit farms is $52 thousand in 2002 and will decrease to $33 thousand in 2011. Net farm income for the low-profit farm is $15 thousand in 2002 and will decrease to $8 thousand by 2011. The low-profit farm may not have the financial resiliency to survive without government involvement in agriculture. State average net farm income over the 2002-2011 period is $117 thousand for the high-profit farm, $46 thousand for the average-profit farm, and $15 thousand for the low-profit farm.

North Dakota farms will have higher net farm incomes under the new farm bill than under a continuation of the FAIR Act. Average net farm income for the large-size representative farm between 2002 and 2011 is $76 thousand under the FAIR Act compared to $90 under the new farm bill. Average net farm income for the medium and small-size representative farm is $31 thousand and $11 thousand compared to $37 thousand and $14 thousand, respectively, when compared to the new farm bill. Net farm income for the high-profit representative farm average between 2002 and 2011 would be $102 thousand under the FAIR Act compared to $117 under the new farm bill. Net farm income for the average and low-profit representative farm average is $36 thousand and $6 thousand, respectively, under the FAIR Act compared to $46 thousand and $15 thousand, respectively, under to the new farm bill.

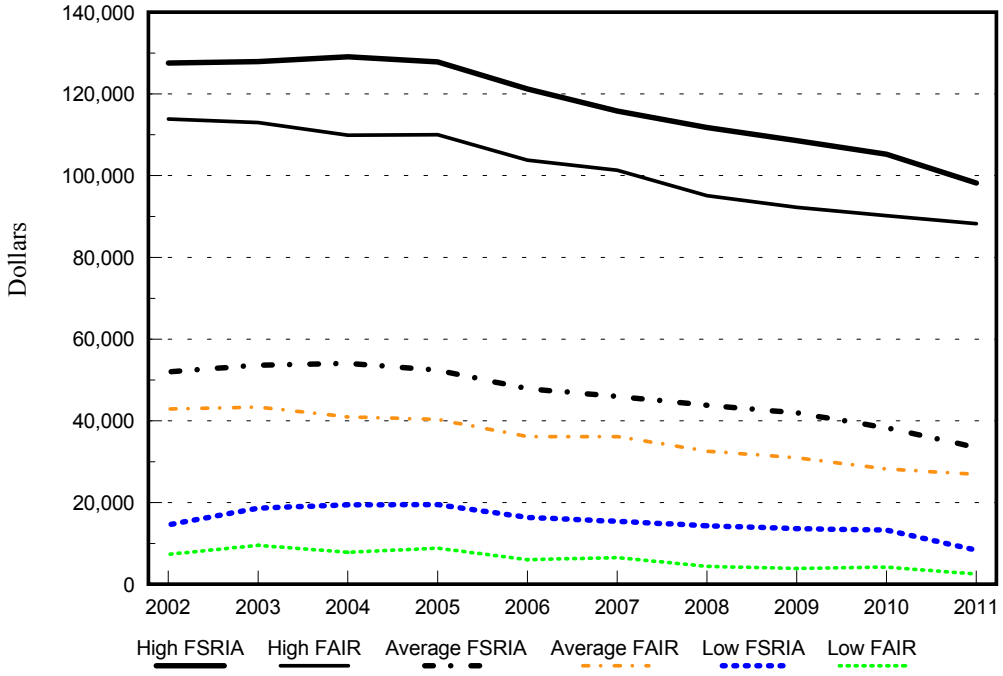


Figure 6. Net Farm Income by Profit for North Dakota Representative Farms under the FAIR Act and FSRIA

Table 5. North Dakota Net Farm Income for Size Representative Farms under FSRIA With Various Price Forecast Scenarios

	Base			Scenario 1			Scenario 2		
	Large	Medium	Small	Large	Medium	Small	Large	Medium	Small
2002	108	46	18	110	48	19	107	45	18
2003	102	44	18	105	45	18	100	43	18
2004	98	42	17	102	43	17	96	41	17
2005	93	39	15	97	40	15	90	38	15
2006	88	37	14	92	38	14	86	36	14
2007	84	34	13	89	36	13	81	33	13
2008	82	33	12	87	35	12	78	32	12
2009	82	33	12	89	36	13	78	32	12
2010	81	33	12	92	37	14	77	32	12
2011	82	34	13	94	38	15	75	31	12
10yr	90	37	14	96	40	15	87	36	14

Table 5 shows the net farm income under various price scenarios. Scenario 1 represents a 10% increase in the prices of all commodities except sugar. Likewise, scenario 2 represents a 10% decrease in all prices. Both scenarios are well within one standard deviation of the price fluctuations during the past few years. Under scenario 1, net farm income is 6.7% higher for the large-size farm, 8.1% higher for the medium-size farm, and 7.1% higher for the small-size farm. Under scenario 2, net farm income is 3.3% lower for the large-size farm, 2.7% lower for the medium-size farm, and almost unchanged for the small-size farm.

Table 6. North Dakota Net Farm Income for Profit Representative Farms under FSRIA With Various Price Forecast Scenarios

	Base			Scenario 1			Scenario 2		
	High	Average	Low	High	Medium	Low	High	Medium	Low
2002	128	52	15	131	53	14	126	51	14
2003	128	54	19	131	54	18	127	53	19
2004	129	54	19	132	55	19	128	54	20
2005	128	52	19	131	54	19	126	52	20
2006	121	48	16	126	50	16	119	47	17
2007	116	46	15	121	48	15	113	45	16
2008	112	44	14	118	47	14	109	43	15
2009	109	42	14	116	46	14	105	41	15
2010	105	38	13	116	45	16	101	37	14
2011	98	33	8	114	44	15	97	34	11
10yr	117	46	15	124	50	16	115	46	16

Table 7 shows the net farm income under various price scenarios for the profit representative farms. Under scenario 1, net farm income is 6.0% higher for the high-profit farm, 8.7% higher for the average-profit farm, and 6.7% higher for the low-profit farm. Under scenario 2, net farm income is 1.7% lower for the high-profit farm, almost unchanged for the average-profit farm, and 16% higher for the low-profit farm.

Table 7. Changes in North Dakota Average Net Farm Income and Government Payments under Various Price Forecast Scenarios

Price Levels	Average Net Farm Income	Percent Change	Government Payments	Percent Change
Base	59,655		6,204,101	
Scenario 1	63,022	5.64	4,186,355	-32.5
Scenario 2	58,949	-3.01	8,416,527	35.7

Table 8 shows the changes in average net farm income for a profit representative farm and changes in total government payments to those farms under the two price scenarios. If prices increase 10%, average net farm income would increase 5.6%, while government spending would decrease 32.5%. If prices decrease 10%, average net farm income would decrease 3.0%, while government spending would increase 35.7%. The new farm bill removes most of the market price risk from the producers and transfers it to the federal government.

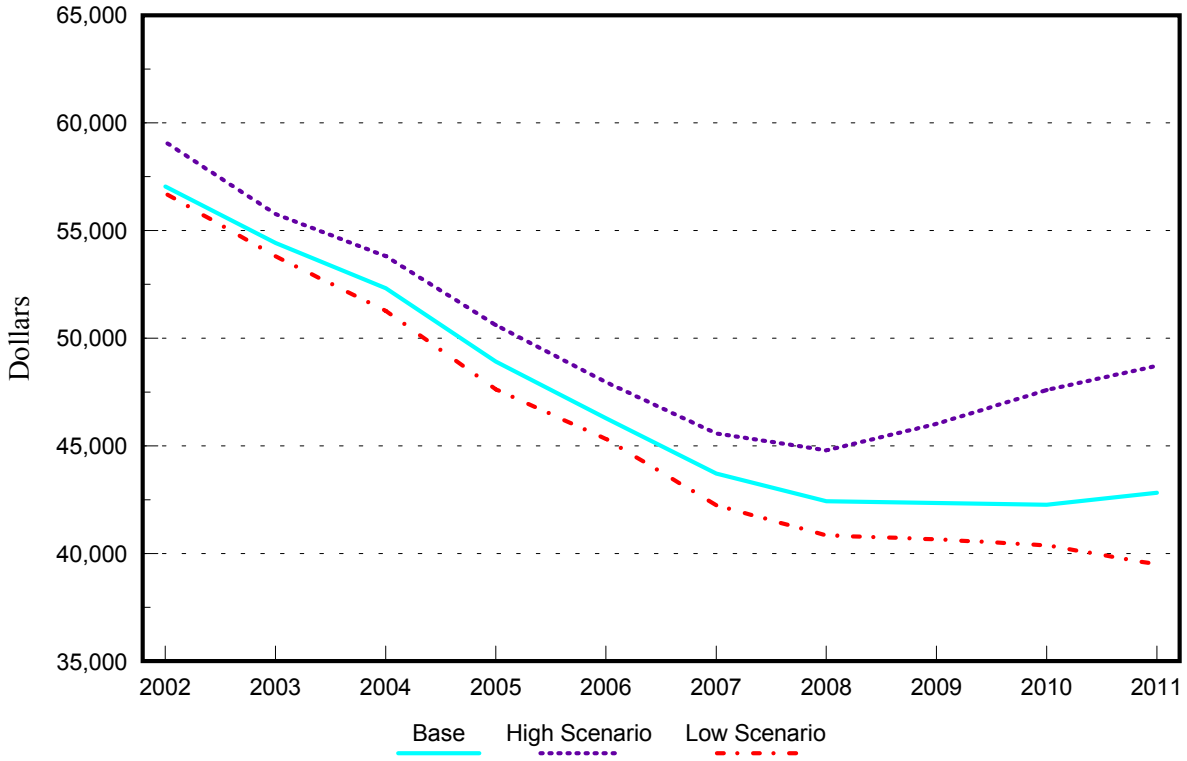


Figure 7. Average North Dakota Net Farm Income for Size Representative Farms under Various Price Forecast Scenarios

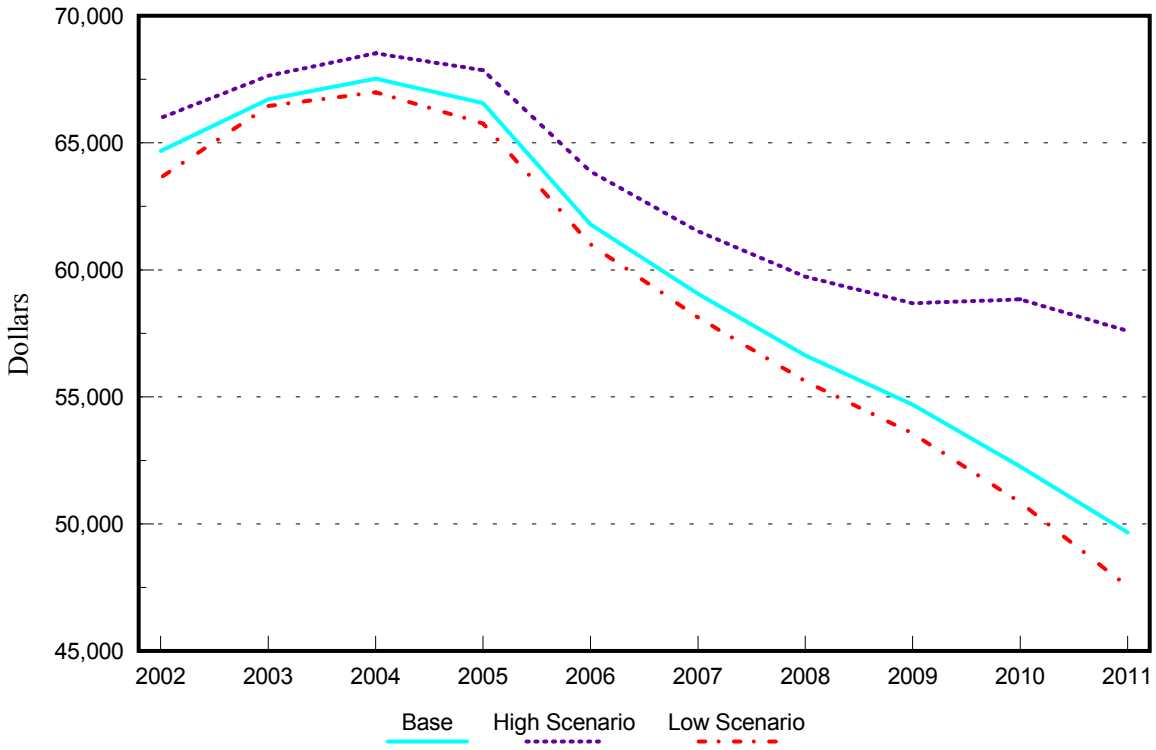


Figure 8. Average North Dakota Net Farm Income for Profit Representative Farms under Various Price Forecast Scenarios

Debt-to-asset Ratios for North Dakota Representative Farms

Debt-to-asset ratios for all size farms remain relatively constant throughout the forecast period (Table 8). For the 2002-2011 period, the debt-to-asset ratio increases slightly for all profit farms (Figure 10). The debt-to-asset ratios for the low-profit farm are higher than those for other farms, but may not reach a critical level that would impair access to new bank credit.

Table 8. State Average Debt-to-asset Ratios for Different Size and Profit Representative Farms

	Size			Profit		
	Large	Medium	Small	High	Average	Low
2002	0.33	0.41	0.51	0.38	0.46	0.61
2003	0.33	0.41	0.51	0.38	0.46	0.62
2004	0.34	0.41	0.51	0.39	0.47	0.62
2005	0.34	0.42	0.52	0.39	0.47	0.63
2006	0.34	0.42	0.52	0.40	0.48	0.64
2007	0.34	0.42	0.52	0.40	0.49	0.64
2008	0.33	0.41	0.52	0.40	0.49	0.64
2009	0.33	0.41	0.52	0.41	0.50	0.65
2010	0.33	0.41	0.52	0.41	0.49	0.64
2011	0.33	0.41	0.52	0.41	0.50	0.65
Ave	0.34	0.41	0.52	0.40	0.48	0.63

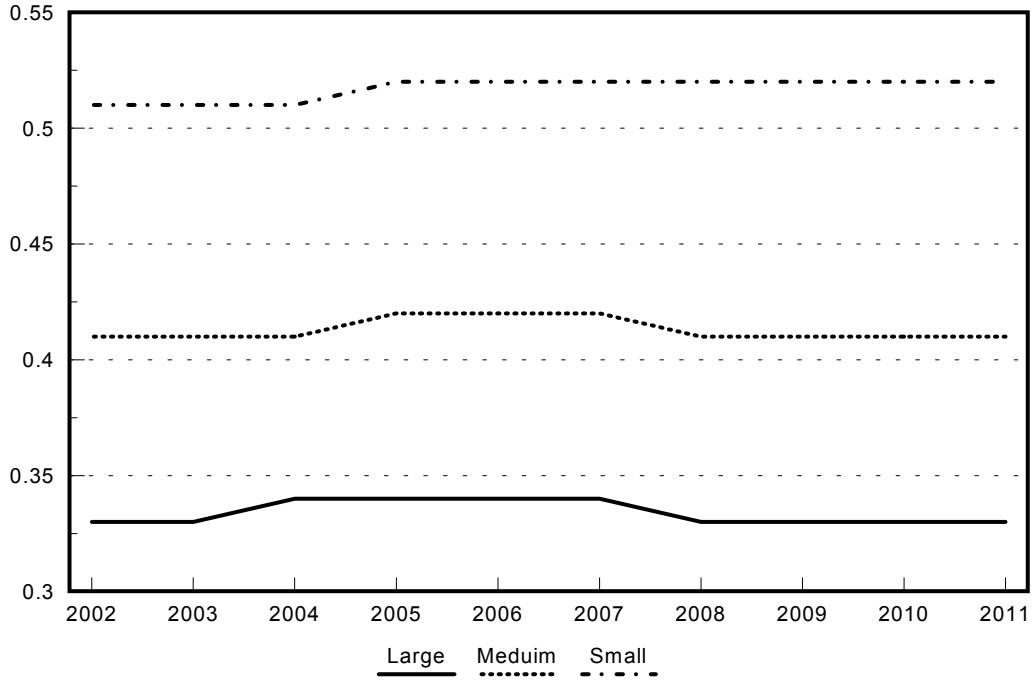


Figure 9. Debt-to-asset Ratio for North Dakota Representative Farms by Size

Debt-to-asset ratios for large, medium, and small-size farms remain relatively constant throughout the forecast period (Figure 9). The debt-to-asset ratio for the large-size farm is 0.33 in 2001, increases to 0.34 in 2004, and then decreases to 0.33 in 2008. The debt-to-asset ratio for the medium-size farm is 0.41 in 2001, increases to 0.42 in 2005, and then decreases to 0.41 in 2008. The debt-to-asset ratio for the small-size farm is 0.51 in 2001, increases to 0.52 in 2005, and then remains at that level.

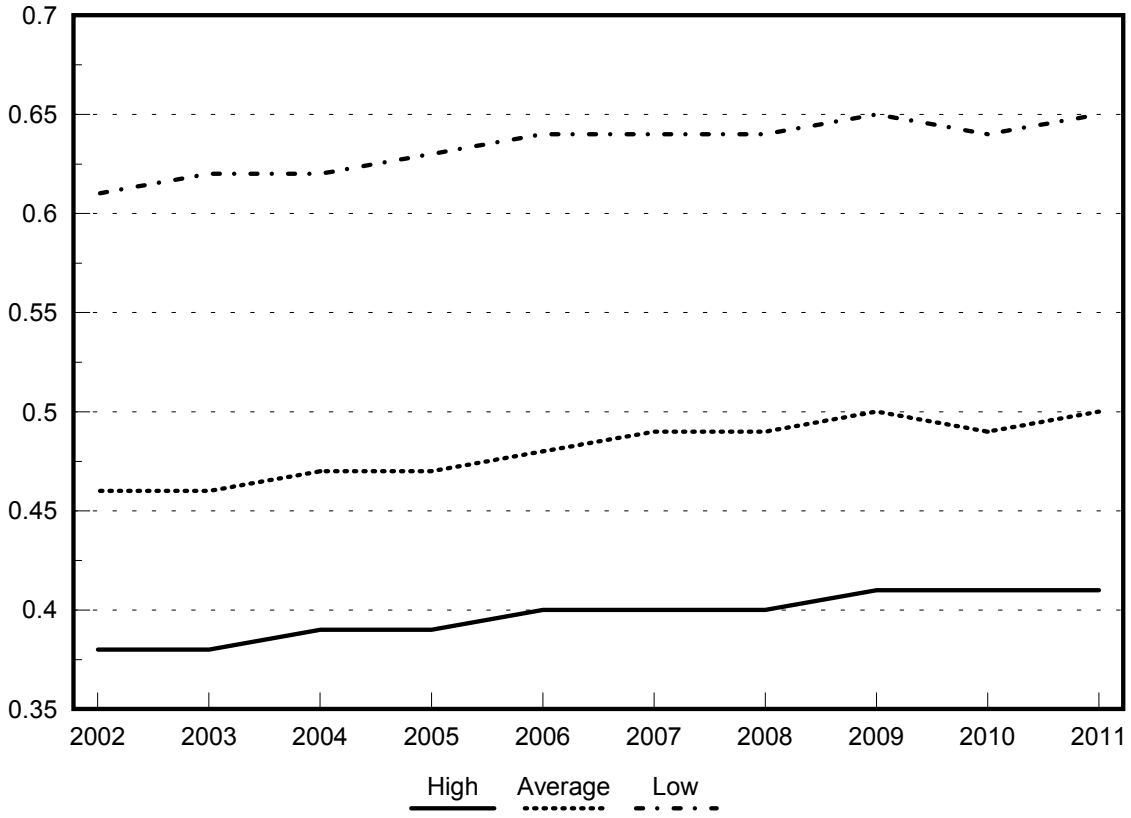


Figure 10. Debt-to-asset Ratio for North Dakota Representative Farms by Profit

Higher debt-to-asset ratios for the low-profit and small-size farms, when coupled with low net farm income, suggest serious problems in sustaining the farm business unless substantial off-farm income is earned. Without off-farm income to provide family living requirements, it is unlikely that the low-profit farm can survive or be able to obtain operating credit. The farm operator may wish to investigate other investment opportunities in which higher returns can be earned or markedly restructure the farming operation to improve its profitability.

Land Value and Cash Rents

Table 9 presents land prices for various representative farms in North Dakota. Land values for the average-profit representative farms are shown in Figure 11. Land prices differ between the regions; the highest prices are in the RRV, and the lowest are in the West region. Land prices also change over the forecast period. Land prices are forecasted to increase 3.4% during the forecast period.

Table 9. North Dakota Land Prices for Average-Profit Representative Farms

	RRV	NC	SC	West	State
			$/acre		
2002	787	390	386	298	465
2003	787	391	387	300	466
2004	792	392	389	302	469
2005	796	392	390	305	471
2006	800	393	391	306	473
2007	804	393	392	308	474
2008	810	394	392	310	476
2009	814	394	393	311	478
2010	818	394	392	312	479
2011	826	395	390	314	481
2002-2011 Average	803	393	390	307	473

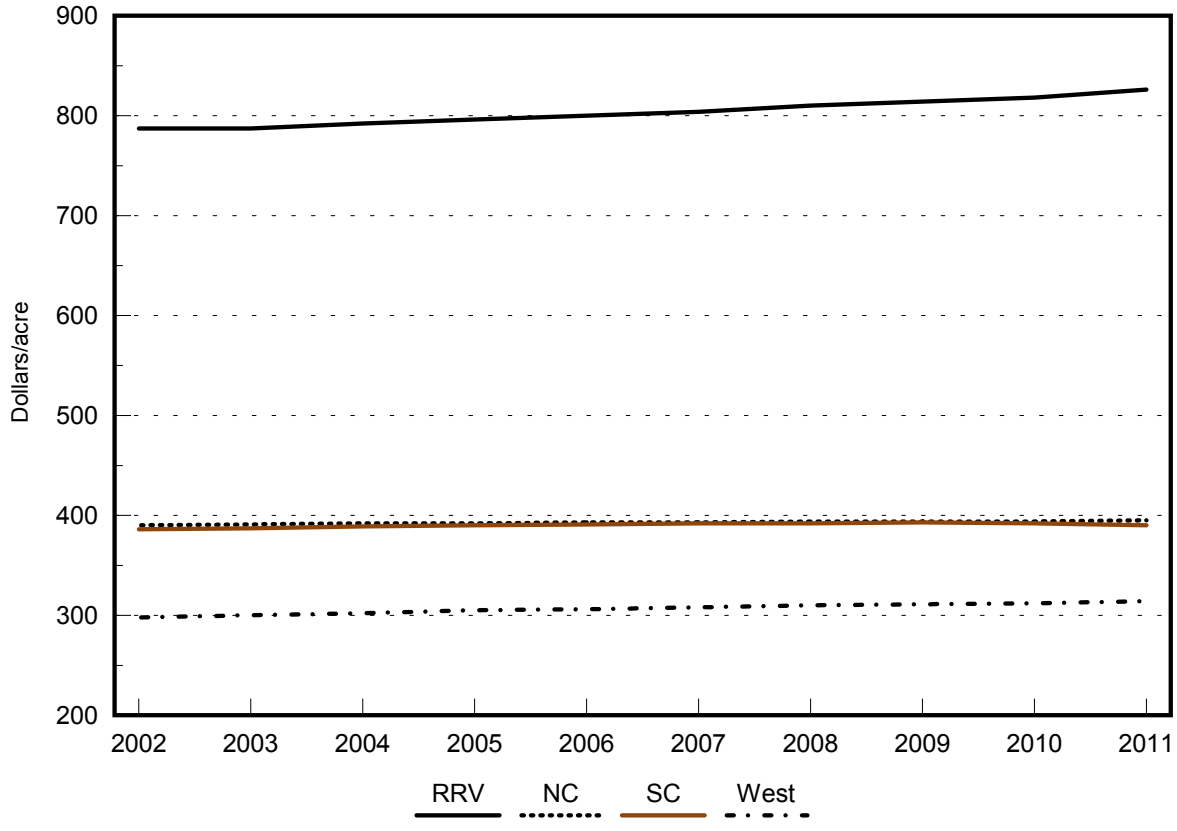


Figure 11. Average Prices of Cropland for North Dakota

Cash rents for the average-profit farms slowly increase in all regions (Table 10). Cash rents also differ between regions; the highest are in the RRV, and the lowest are in the West (Figure 12).

Table 10. Cash Rent for Average-Profit Representative Farms

	RRV	NC	SC	West	State
	----------$/acre----------				
2002	59	32	33	28	38
2003	59	33	33	28	38
2004	59	33	33	29	38
2005	60	33	34	29	39
2006	60	33	34	29	39
2007	60	33	34	29	39
2008	61	33	34	29	39
2009	61	33	34	29	39
2010	61	33	34	29	39
2011	62	33	34	30	39
2002-2011 Average	60	33	34	29	39

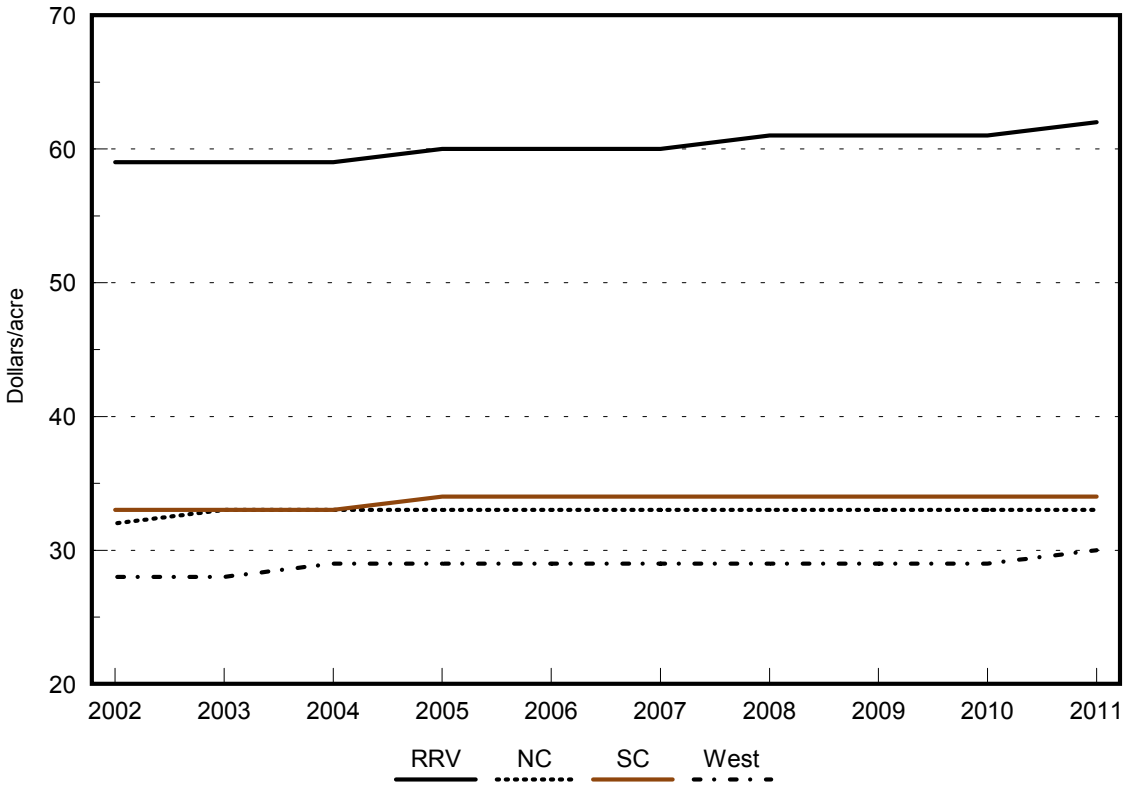


Figure 12. Cash Rent Paid for Cropland for North Dakota

CONCLUDING REMARKS

The federal government no longer manages supplies of program crops through acreage bases and planting controls, but the new farm bill provides counter-cyclical payments which insulate producers from market signals. Higher loan rates, direct payments, and target prices raise net farm income above the levels that the FAIR Act would have provided.

Net farm income in 2011 will be lower than in 2002. Net farm income for all representative farms is projected to fall slowly throughout the forecast period. Crop production in the United States and around the world is assumed to be normal with annual trend-line increases. The counter-cyclical payments protect producers from market price decreases, but they also insulate them from market price increases, until target minus direct payments are surpassed. The risk of price changes is transferred to the federal government.

Debt-to-asset ratios are predicted to increase slowly throughout the forecast period. The debt-to-asset ratios for the small-size and low-profit farms, when coupled with their low net farm income, suggest problems in sustaining the farm business unless substantial off-farm income is earned.

Land prices are predicted to increase slightly during the forecast period. Cash rent levels follow a pattern similar to land prices.

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