# 1999 North Dakota Agricultural Outlook: Representative Farms 1999-2008

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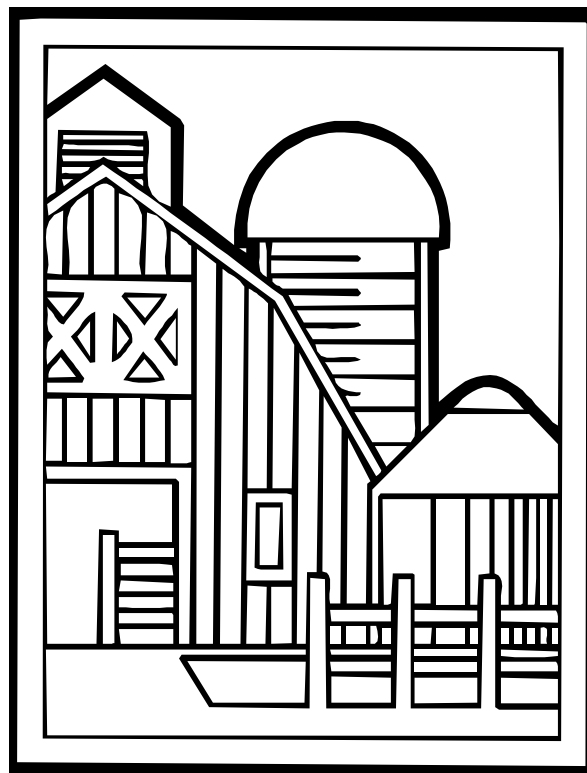
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# Abstract

Net farm income for most representative farms in 2008 will be higher than in 1999. However, low profit farms, which consist of 25% of the farms in the study, may have a negative net farm income throughout the forecasting period and may not have financial resiliency to survive. This is true under both optimistic and pessimistic scenarios. All farms except low profit farms may do well under the optimistic scenario, while only high profit farms may be able to survive under the pessimistic scenario. Cropland prices are projected to remain constant. Cash rental rates are projected to fall slightly. Debt-to-asset ratios for most farms will remain unchanged 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. Under the optimistic scenario, all North Dakota farms, except for the low profit farm, fair well. Under the pessimistic scenario, only the high profit farm maintains its net income at a level close to the 1998 level.


**Key Words:**   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 increase from $39 to $44 thousand for the 1999-2008 period, and the net farm income for the medium size farm will increase from $19 to $26 thousand.  Net farm income for the small size farm will increase from $6 to $10 thousand for the same period.

Net farm income for the high profit farm is predicted to increase from $83 to $100 thousand for the 1999-2008 period, and net farm income for the average profit farm is predicted to increase from $21 to $22 thousand.  Net farm income for the low profit farm will range between $-38 and $-35 thousand for the period.

Debt-to-asset ratios for all representative farms are predicted to vary slightly throughout the forecast period.  Debt-to-asset ratios are projected to be 40% for large size and 46% for the medium size representative farms, and 53% for the small size representative farms in 2008.  The ratios are also projected to be 34%, 45%, and 56% for high, average, and low profit representative farms in 2008, respectively.

For medium size representative farms, cropland  prices will fall 0.4% from $432 per acre in 1999 to $430 in 2008.

For medium size representative farms, cash rents will fall 11.4% from $35 per acre in 1999 to $31 in 2008.

Because of low net farm income and high debt-to-asset ratios for low profit representative farms, the farms may not have financial resiliency to survive.

Under the optimistic scenario, most North Dakota representative farms will fair relatively well, but under the pessimistic scenario, the only North Dakota representative farm that maintains positive net income is the high profit farm.

# 1999 North Dakota Agricultural Outlook:
## Representative Farms 1999-2008

**Won W. Koo, Richard D. Taylor,**
**Andrew L. Swenson, and Marvin R. Duncan**[*]

## Introduction

North Dakota represents a major agricultural area with distinctive climate and crop mix in the United States. The state also is uniquely situated in terms of marketing and logistics within the United States because it shares a border with Canada, which is the largest trading partner of the United States. Changes in government policies through the 1996 Federal Agriculture Improvement Reform (FAIR) Act and the Uruguay Round Agreement (URA) are likely to have affected the region's economy. The Canada/U.S. Free Trade Agreement (CUSTA) and the North American Free Trade Agreement (NAFTA) also have affected the region more than any other region in the United States.

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 developed from the North Dakota Farm and Ranch Business Management Education Program farm records over the 1999 to 2008 period under the 1996 FAIR Act, the URA, and CUSTA. The secondary objective of this analysis is to evaluate the reaction of cropland prices and cash rental rates to the farm income estimates over the same time horizon.

The North Dakota agricultural outlook for the 1999-2008 period is based on the baseline results produced by the FAPRI global model and ND global wheat model under the optimistic and pessimistic scenarios. The optimistic scenario provides an economically desirable situation for the U.S. agricultural economy with increases in U.S. exports to major importing countries, such as India, China, and the Former Soviet Union. It also assumes decreases in exportable surplus of commodities in major exporting countries, such as Canada, the European Union, and Australia. The pessimistic scenario is the reverse case of the optimistic scenario.

U.S. agriculture has been influenced by major changes in agricultural and trade policies. The FAIR Act will limit spending for government commodity payments to $35.63 billion between 1996 and 2002. This legislation represents a departure from the supply management and income support strategies of farm programs since the 1930s. The legislation decouples government farm subsidy payments from both price and production and provides farmers with nearly complete planting flexibility. The legislation substitutes a 7-year fixed benefit contract for an annually determined entitlement farm payment. In addition, several trade agreements, such as the CUSTA, NAFTA, and the URA, have liberalized agricultural trade and will continue to liberalize agricultural trade for the next decade. The initial emergency payments made by the federal government for 1998 have been included in the model. Further payments most likely will be made for 1999.

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Impacts of these policy changes on North Dakota agriculture differ from overall impacts on U.S. agriculture mainly because North Dakota has its unique soils, climate, crop mix, marketing conditions, and economic base.  Even within North Dakota, there is substantial variability in these features leading to different farm sizes and categories impacts.

## Methodology

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 sugar beets and potatoes.  The agricultural sector contributes the largest share to the state economy, followed by the energy sector.  Most farms in this state differ from farms of other states in terms of farm structure and marketing options.  The average farm size in North Dakota is 796 crop acres.  About 43% of total farms in North Dakota have a farm size less than 1,000 crop acres, while the remainder have more than 1,000 cropland acres.  In addition, small farms (less than 200 acres) account for 25% 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 for producing five major crops:  wheat, barley, corn, soybeans, and sunflowers.  The model is linked to the FAPRI and North Dakota price models, and uses the prices of the crops generated from the models (Figure 1).  This 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.  This model cannot incorporate price discounts due to loss of crop quality or decreases in yields due to disease or weather conditions, such as scab or drought, for the forecasting period.  In addition, macro policies and assumptions, trade policies, and agricultural policies are incorporated into the model directly or indirectly by the assumptions made by FAPRI in their price series.

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 affects 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 2).  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.
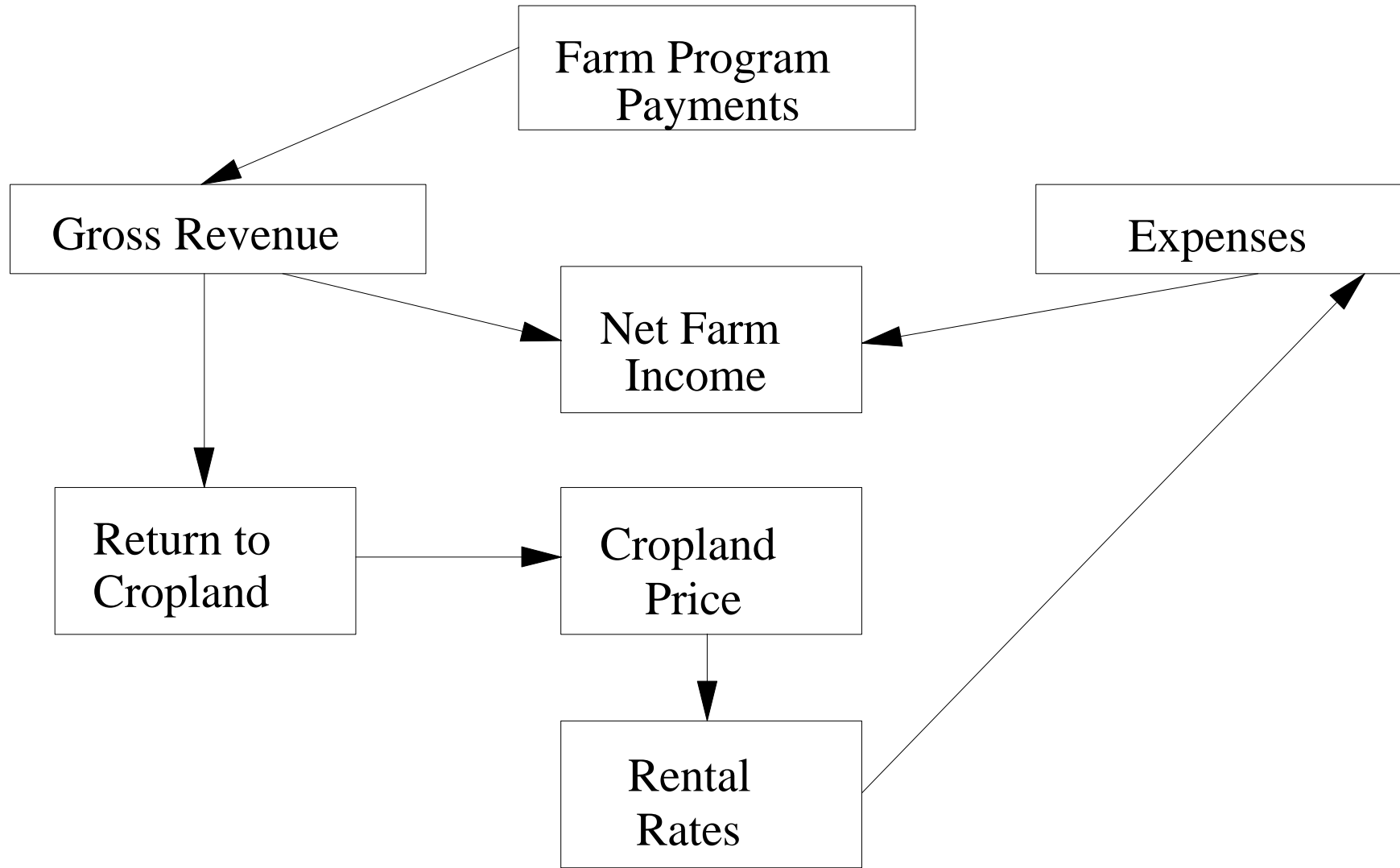
Figure 1. Structure of the North Dakota Representative Farm Model

DIVIDE

BURKE

RENVILLE

BOTTINEAU

ROLETTE

TOWNER

CAVALIER

PEMBINA

WILLIAMS

MOUNTRAIL

WARD

2.

MCHENRY

PIERCE

RAMSEY

WALSH

MCKENZIE

BENSON

NELSON

GRAND FORKS

MCLEAN

SHERIDAN

WELLS

EDDY

4.

MERCER

DUNN

OLIVER

FOSTER

GRIGGS

STEELE

TRAILL

BILLINGS

GOLDEN VALLEY

STARK

BURLEIGH

KIDDER

3.

STUTSMAN

BARNES

1.

MORTON

CASS

SLOPE

HETTINGER

GRANT

EMMONS

LOGAN

LA MOURE

RANSOM

BOWMAN

ADAMS

SIOUX

MCINTOSH

DICKEY

SARGENT

RICHLAND

Region 1. Red River Valley (RRV)

Region 2. North Central (NC)

Region 3. South Central (SC)

Region 4. Western (West)

Figure 2. North Dakota Farm and Ranch Business Management Regions

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The representative farms average 1,460 acres of cropland and 410 acres of pasture. The farms in the study are about 50% larger than the state average reported by National Agricultural Statistical Service (NASS). A reason for this difference is the state average farm includes all farms with $1,000 or more sales; therefore, hobby farms, farms operated as part of a combined larger farm, semi-retired farms, and commercial farms are included, while the farms used in this study mainly represent commercial farms.

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 for the state or for each production region. Average farm sizes are 1,903 cropland acres for the high profit farm, 1,460 for the average profit farms, and 1,540 for the low profit farms (Table 1).

The large 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 2,631 cropland acres for the large size farm, 1,292 cropland acres for the medium size farms, and 550 cropland acres for the small size farms (Table 1).

**Table 1. Characteristics of Representative North Dakota Farms, 1997**

|  | Size | | | Profit | | |
|---|---|---|---|---|---|---|
|  | Large | Medium | Small | High | Average | Low |
| Number of Farms | 140 | 292 | 140 | 114 | 572 | 114 |
|  | ------------------acres---------------------------- | | | | | |
| Total Cropland | 2,631 | 1,292 | 550 | 1,903 | 1,460 | 1,540 |
| Spring Wheat | 636 | 295 | 178 | 495 | 422 | 457 |
| Durum Wheat | 286 | 183 | 76 | 178 | 135 | 159 |
| Barley | 293 | 193 | 86 | 205 | 145 | 152 |
| Corn | 137 | 93 | 67 | 115 | 75 | 51 |
| Sunflowers | 269 | 177 | 42 | 105 | 93 | 107 |
| Soybeans | 249 | 120 | 67 | 146 | 108 | 101 |

## 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, 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:

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

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 |
| $EX_j^C$ = | | total expenses in producing crop j |
| $EX_h^L$ = | | 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 1997 were used to estimate price equations.  The price equations were used to estimate cash prices received by North Dakota farmers for the 1999-2008 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 NASS from 1974 to 1997.  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 and 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:

$$(2) \qquad\qquad R_g = \frac{M_g}{PL_g}$$

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:

$$(3) \qquad\qquad PL_{gT} = \frac{1}{R_g} \sum_{t=T-n}^{T} W_t M_{tg}$$

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

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 annual return to farmland by the long-run capitalization rate, plus taxes on land.  Calculation of cash rent is summarized by

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

$CR_{gT}$ = cropland cash rent in region g in time T
$EM_{gt}$ = estimated net return to 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 FAPRI and ND 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 the Nerlove's partial adjustment hypothesis as follows:

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

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 1997. 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 under the base, optimistic, and pessimistic scenarios are shown in Table 2.

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:

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

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 technology in producing the crops.

This equation is estimated for each crop in each region using the time series data from 1976 to 1997. The estimated equations are used to predict crop yields in each region.

The 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 the Nerlove's partial adjustment hypothesis as follows:

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

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

**Table 2. North Dakota Baseline Price Estimates From the Projected FAPRI Baseline, Optimistic, and Pessimistic Price Scenarios**

| | Spring Wheat | Durum Wheat | Malting Barley | Feed Barley | Soybeans | Corn | Sunflower |
|---|---|---|---|---|---|---|---|
| | ------------------------dollars/bushel------------------------- | | | | | | -$/cwt- |
| Base scenario | | | | | | | |
| 1998 | 2.75 | 2.81 | 1.80 | 1.53 | 5.22 | 1.86 | 10.26 |
| 1999 | 3.07 | 3.27 | 1.84 | 1.56 | 5.07 | 1.91 | 10.11 |
| 2000 | 3.24 | 3.52 | 1.89 | 1.59 | 5.17 | 1.97 | 10.44 |
| 2001 | 3.34 | 3.67 | 1.92 | 1.61 | 5.26 | 2.00 | 10.76 |
| 2002 | 3.42 | 3.80 | 2.02 | 1.68 | 5.38 | 2.07 | 11.12 |
| 2003 | 3.54 | 3.97 | 2.08 | 1.72 | 5.42 | 2.13 | 11.33 |
| 2004 | 3.62 | 4.09 | 2.13 | 1.76 | 5.48 | 2.18 | 11.59 |
| 2005 | 3.72 | 4.23 | 2.18 | 1.79 | 5.53 | 2.23 | 11.81 |
| 2006 | 3.74 | 4.26 | 2.22 | 1.82 | 5.59 | 2.27 | 12.08 |
| 2007 | 3.77 | 4.31 | 2.27 | 1.85 | 5.68 | 2.31 | 12.39 |
| 2008 | 3.82 | 4.38 | 2.34 | 1.91 | 5.67 | 2.37 | 12.51 |
| Optimistic scenario | | | | | | | |
| 1998 | 2.75 | 2.81 | 1.80 | 1.53 | 5.22 | 1.86 | 10.26 |
| 1999 | 3.42 | 3.79 | 2.02 | 1.68 | 5.21 | 2.00 | 10.38 |
| 2000 | 3.55 | 3.98 | 2.13 | 1.76 | 5.33 | 2.07 | 10.76 |
| 2001 | 3.84 | 4.40 | 2.18 | 1.80 | 5.55 | 2.12 | 11.32 |
| 2002 | 4.01 | 4.66 | 2.30 | 1.87 | 5.72 | 2.25 | 11.80 |
| 2003 | 4.20 | 4.93 | 2.41 | 1.95 | 5.91 | 2.37 | 12.30 |
| 2004 | 4.32 | 5.10 | 2.48 | 2.00 | 6.03 | 2.44 | 12.67 |
| 2005 | 4.53 | 5.42 | 2.57 | 2.06 | 6.20 | 2.54 | 13.15 |
| 2006 | 4.62 | 5.55 | 2.62 | 2.10 | 6.37 | 2.60 | 13.61 |
| 2007 | 4.73 | 5.70 | 2.69 | 2.15 | 6.57 | 2.66 | 14.15 |
| 2008 | 4.84 | 5.87 | 2.79 | 2.22 | 6.66 | 2.75 | 14.45 |
| Pessimistic scenario | | | | | | | |
| 1998 | 2.75 | 2.81 | 1.80 | 1.53 | 5.22 | 1.86 | 10.26 |
| 1999 | 2.75 | 2.81 | 1.68 | 1.45 | 4.94 | 1.83 | 9.85 |
| 2000 | 2.95 | 3.10 | 1.67 | 1.44 | 5.01 | 1.87 | 10.13 |
| 2001 | 2.90 | 3.03 | 1.70 | 1.46 | 4.99 | 1.89 | 10.22 |
| 2002 | 2.93 | 3.07 | 1.74 | 1.49 | 5.06 | 1.91 | 10.49 |
| 2003 | 2.99 | 3.16 | 1.78 | 1.52 | 4.97 | 1.92 | 10.45 |
| 2004 | 3.05 | 3.24 | 1.81 | 1.54 | 4.98 | 1.95 | 10.61 |
| 2005 | 3.06 | 3.27 | 1.83 | 1.56 | 4.93 | 1.97 | 10.64 |
| 2006 | 3.04 | 3.23 | 1.86 | 1.57 | 4.91 | 1.99 | 10.74 |
| 2007 | 3.02 | 3.20 | 1.89 | 1.60 | 4.91 | 2.01 | 10.88 |
| 2008 | 3.00 | 3.18 | 1.95 | 1.63 | 4.83 | 2.05 | 10.85 |

The equations are estimated using time series data from 1976 to 1997. 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:

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

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 Under the 1996 FAIR Act

The North Dakota Representative Farm Model was used to estimate net farm income, debt-to-asset ratio, land prices, and rental rates under the 1996 FAIR Act for 1999-2008.

Additional assumptions used in this study are
1. Net farm income from livestock operation and production of other crops, including potatoes, canola, 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.
5. Government payments continue for the years after 2002, at the same level as 2002.

## Net Income for North Dakota Representative Farms

Table 3 presents net farm income for farms by size and profitability. 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 increase from $39 thousand in 1999 to $51 thousand in 2005 and then declines to $44 thousand in 2008 (Figure 3). The net income in 2008 will be 13% higher than that in 1999. The net farm income for the medium size farm is $19 thousand in 1999 and will increase to $30 thousand in 2005 and then decline to $26 thousand in 2008. The net income in 2008 will be 37% higher than that in 1999. The net farm income for the small size farm is $6 thousand in 1999 and will increase to $13 thousand in 2005 and then declining to $10 thousand in 2008. State average net farm income is $45 thousand for the large size farm, $24 thousand for the medium size farm, and $10 thousand for the small size farm. This implies that the large size farm will operate better than the medium and small size farms under the 1996 FAIR Act and the current international market conditions.

**Table 3.  State Average Net Farm Income for Different Size and Profit Representative Farms Under Alternative Scenarios**

| | Size | | | Profit | | |
|---|---|---|---|---|---|---|
| | Large | Medium | Small | High | Average | Low |
| | --------------------------thousand $--------------------- | | | | | |
| Base scenario | | | | | | |
| 1997 | 42 | 22 | 6 | 88 | 21 | -35 |
| 1998 | 43 | 17 | 3 | 82 | 17 | -37 |
| 1999 | 39 | 19 | 6 | 83 | 21 | -38 |
| 2000 | 43 | 22 | 9 | 86 | 23 | -37 |
| 2001 | 42 | 23 | 9 | 88 | 24 | -36 |
| 2002 | 43 | 25 | 10 | 93 | 27 | -33 |
| 2003 | 46 | 28 | 12 | 101 | 30 | -30 |
| 2004 | 48 | 29 | 13 | 104 | 30 | -27 |
| 2005 | 51 | 30 | 13 | 107 | 31 | -27 |
| 2006 | 48 | 28 | 12 | 106 | 28 | -29 |
| 2007 | 46 | 27 | 12 | 104 | 26 | -31 |
| 2008 | 44 | 26 | 10 | 100 | 22 | -35 |
| 1999-2008 | | | | | | |
| Average | 45 | 26 | 10 | 97 | 26 | -32 |
| Optimistic scenario | | | | | | |
| 1997 | 42 | 22 | 6 | 89 | 21 | -35 |
| 1998 | 43 | 18 | 3 | 82 | 17 | -37 |
| 1999 | 56 | 29 | 10 | 95 | 30 | -30 |
| 2000 | 60 | 31 | 13 | 98 | 32 | -29 |
| 2001 | 67 | 36 | 15 | 105 | 37 | -24 |
| 2002 | 72 | 40 | 17 | 111 | 40 | -21 |
| 2003 | 77 | 45 | 19 | 120 | 43 | -18 |
| 2004 | 80 | 46 | 21 | 122 | 43 | -17 |
| 2005 | 87 | 51 | 23 | 126 | 45 | -15 |
| 2006 | 85 | 50 | 22 | 125 | 43 | -18 |
| 2007 | 88 | 51 | 22 | 124 | 41 | -20 |
| 2008 | 89 | 51 | 22 | 117 | 36 | -26 |
| 1999-2008 | | | | | | |
| Average | 76 | 43 | 18 | 114 | 39 | -22 |
| Pessimistic scenario | | | | | | |
| 1997 | 42 | 22 | 6 | 89 | 21 | -35 |
| 1998 | 43 | 18 | 3 | 82 | 17 | -37 |
| 1999 | 24 | 11 | 2 | 72 | 12 | -46 |
| 2000 | 27 | 13 | 5 | 75 | 15 | -45 |
| 2001 | 20 | 11 | 4 | 73 | 14 | -46 |
| 2002 | 19 | 11 | 4 | 77 | 16 | -43 |
| 2003 | 19 | 13 | 5 | 85 | 18 | -40 |
| 2004 | 21 | 13 | 6 | 89 | 19 | -36 |
| 2005 | 20 | 14 | 6 | 91 | 19 | -36 |
| 2006 | 16 | 11 | 4 | 90 | 17 | -37 |
| 2007 | 13 | 8 | 3 | 88 | 14 | -40 |
| 2008 | 8 | 5 | 1 | 85 | 11 | -43 |
| 1999-2008 | | | | | | |
| Average | 19 | 11 | 4 | 83 | 15 | -41 |
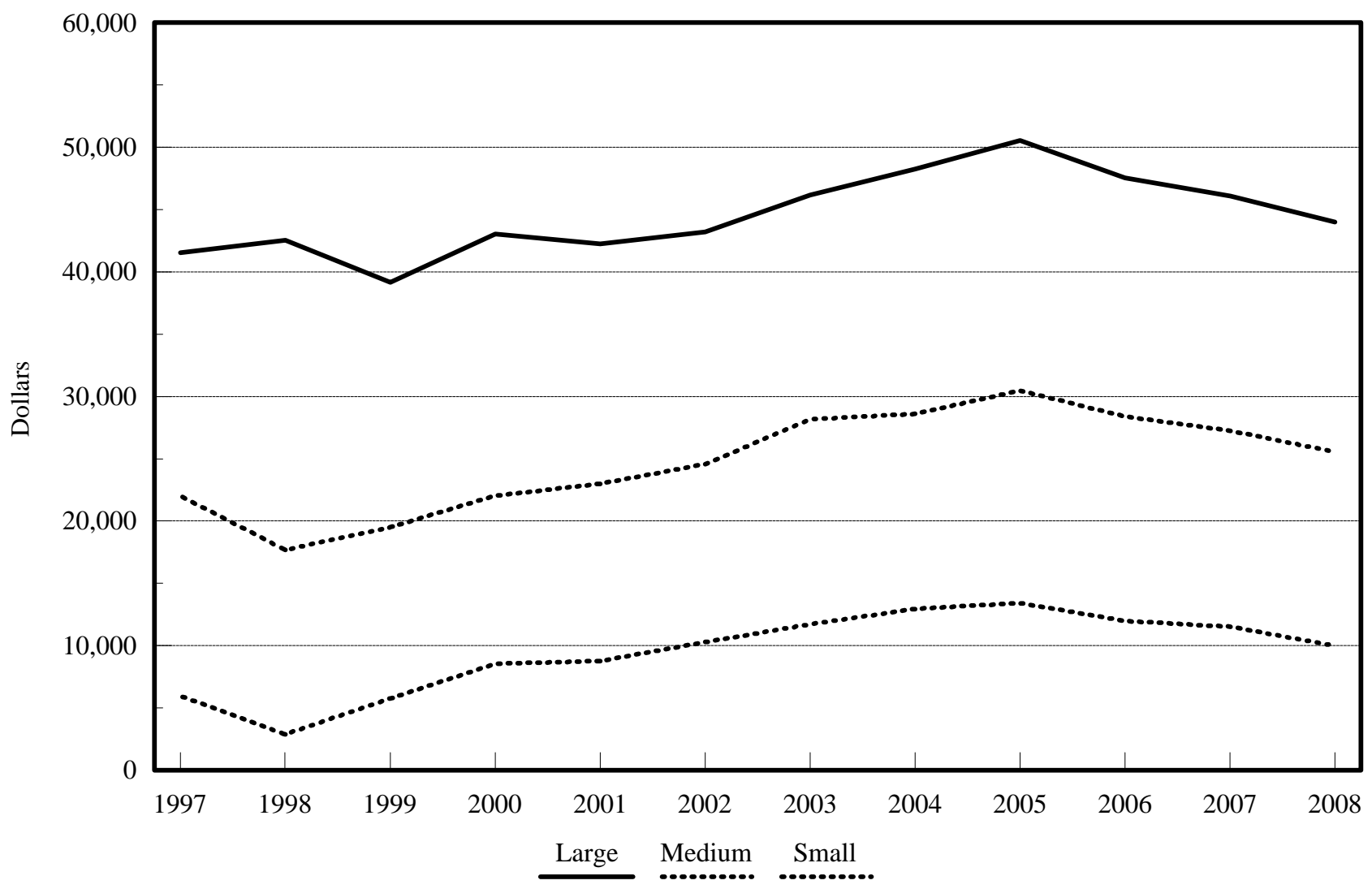
Figure 3. Net Farm Income by Size for North Dakota Representative Farms
under the Base Scenario

Increases in net farm income from 2000 to 2008 are mainly due to strong import demand for agricultural crops from developing countries. 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.

The net farm income for the high profit farm was $83 thousand in 1999 and will increase until 2005 (Figure 4). The income in 2008 is 20% higher than that in 1999. Changes in the net farm income for the average profit farm are similar to those for the high profit farms, but recovery rate is slower than that for the high profit farm. The net farm income for the low profit farm is negative and remains negative throughout the forecast period. This clearly indicates that management efficiency plays an important role in farm operation. The low profit farm may not have financial resiliency to survive in a more market oriented environment. State average net farm income is $97 thousand for the high profit farm, $26 thousand for the average profit farm, and $-32 thousand for the low profit farm.

Net farm income increases for all farms under the optimistic scenario. The net farm income for the large size farm increases 59% by 2008 to $89 thousand, increases 76% to $51 thousand for the medium size farm, and increases 120% to $22 thousand for the small size farm (Figure 5). Under the pessimistic scenario the net farm income for the large, medium, and small size farms all falls below $10 thousand by year 2008.

The net farm income for the high profit farm increases 33% from 1999 to 2005 and then falls through 2008 (Figure 6). The average profit farm net farm income increases 50% from 1999 to 2005 and then falls through 2008. The low profit farm does not return a positive net farm income under even the optimistic scenario. Under the pessimistic scenario, the high profit farm maintains its net farm income in the $85 to $90 thousand range but net farm income for the average and low profit farm decreases.

## Debt-to-asset Ratio for North Dakota Representative Farms

Debt-to-asset ratios for all size farms remain relatively constant throughout the forecast period (Table 4). From 1999 to 2008, the debt-to-asset ratio is 0.41-0.42 for the large size farm, 0.46 to 0.49 for the medium size farm, and 0.53 to 0.55 for the small size farm (Figure 7). The debt-to-asset ratios for the small size farm are much higher than those for other farms, but do not reach a critical level that would impair access to new bank credit.

Debt-to-asset ratios for high, average, and low profit farms increase from 1999 to 2001 and then decrease slightly through 2008 (Figure 8). The debt-to-asset ratio for the high profit farm is 0.34 in 1999, rises to 0.35 in 2001, and then decreases to 0.34 in 2008. The debt-to-asset ratio for the average profit farm is 0.46 in 1999, rises to 0.48 in 2001, and then decreases to 0.45 in 2008. The debt-to-asset ratio for the low profit farm is 0.58 in 1999, rises to 0.61 in 2001, and then decreases to 0.56 in 2008. The debt-to-asset ratio for the low profit farm may reach levels that imperils creditworthiness.
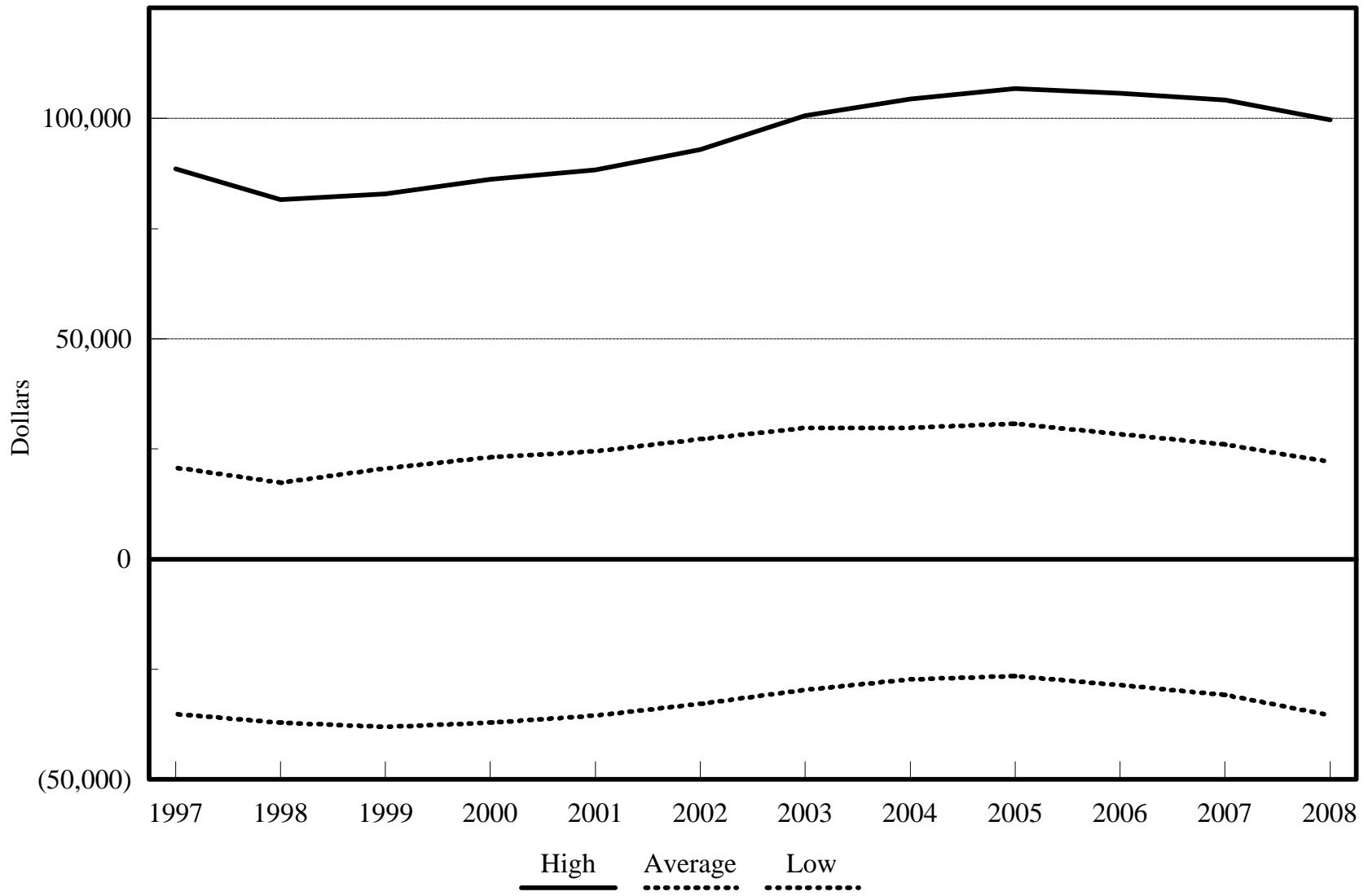
Figure 4. Net Farm Income by Profit for North Dakota Representative Farms under the Base Scenario
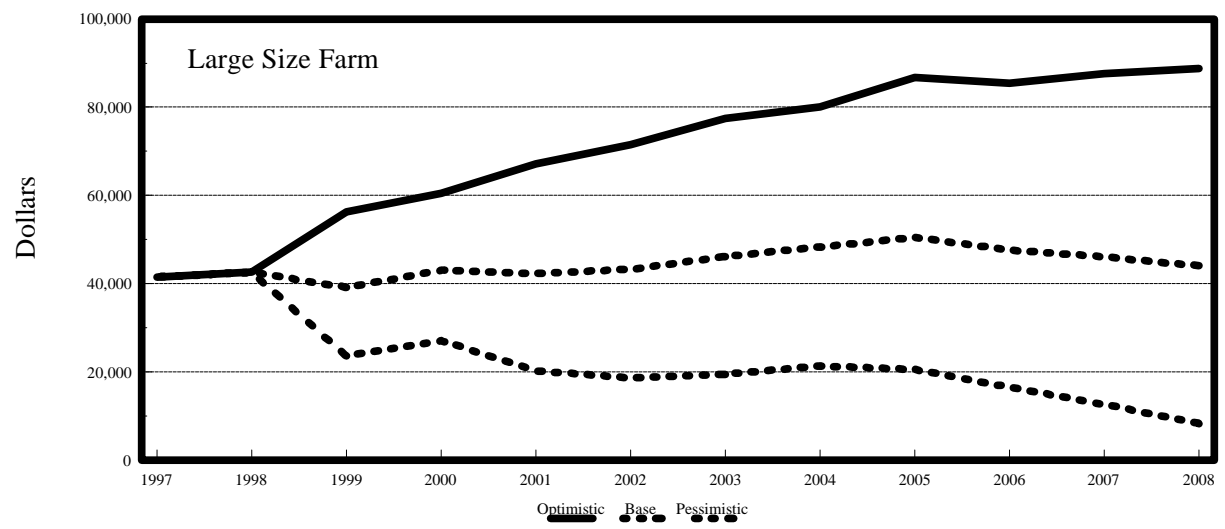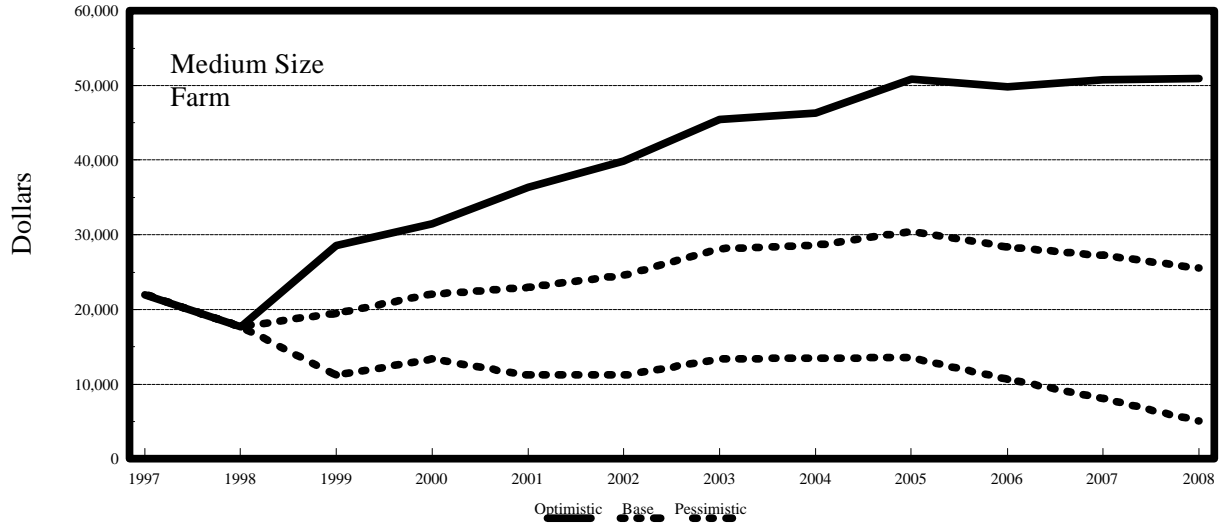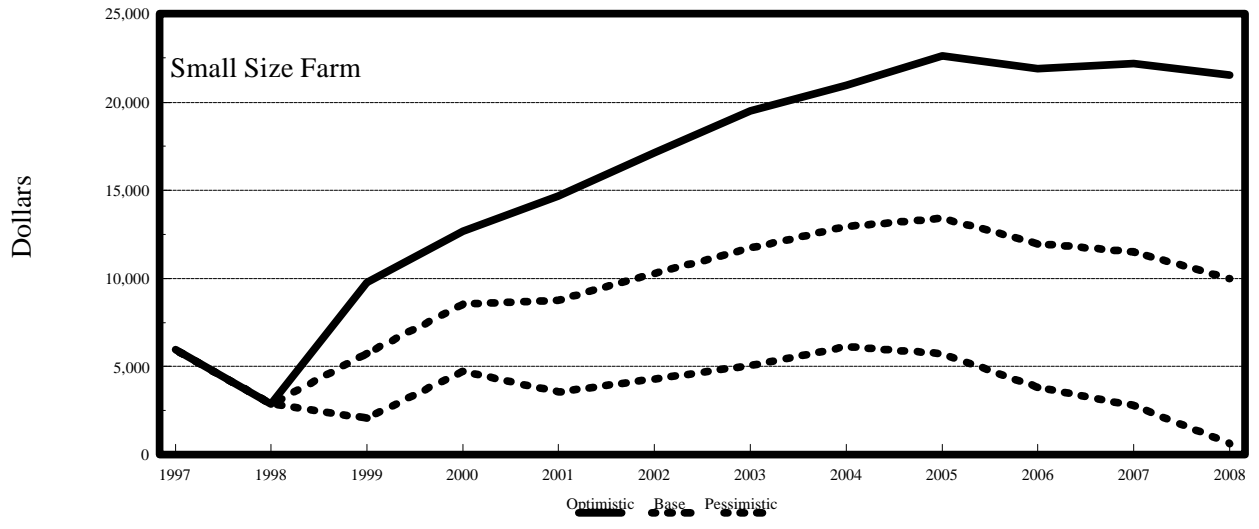
Figure 5.  North Dakota Net Farm Income by Size under the
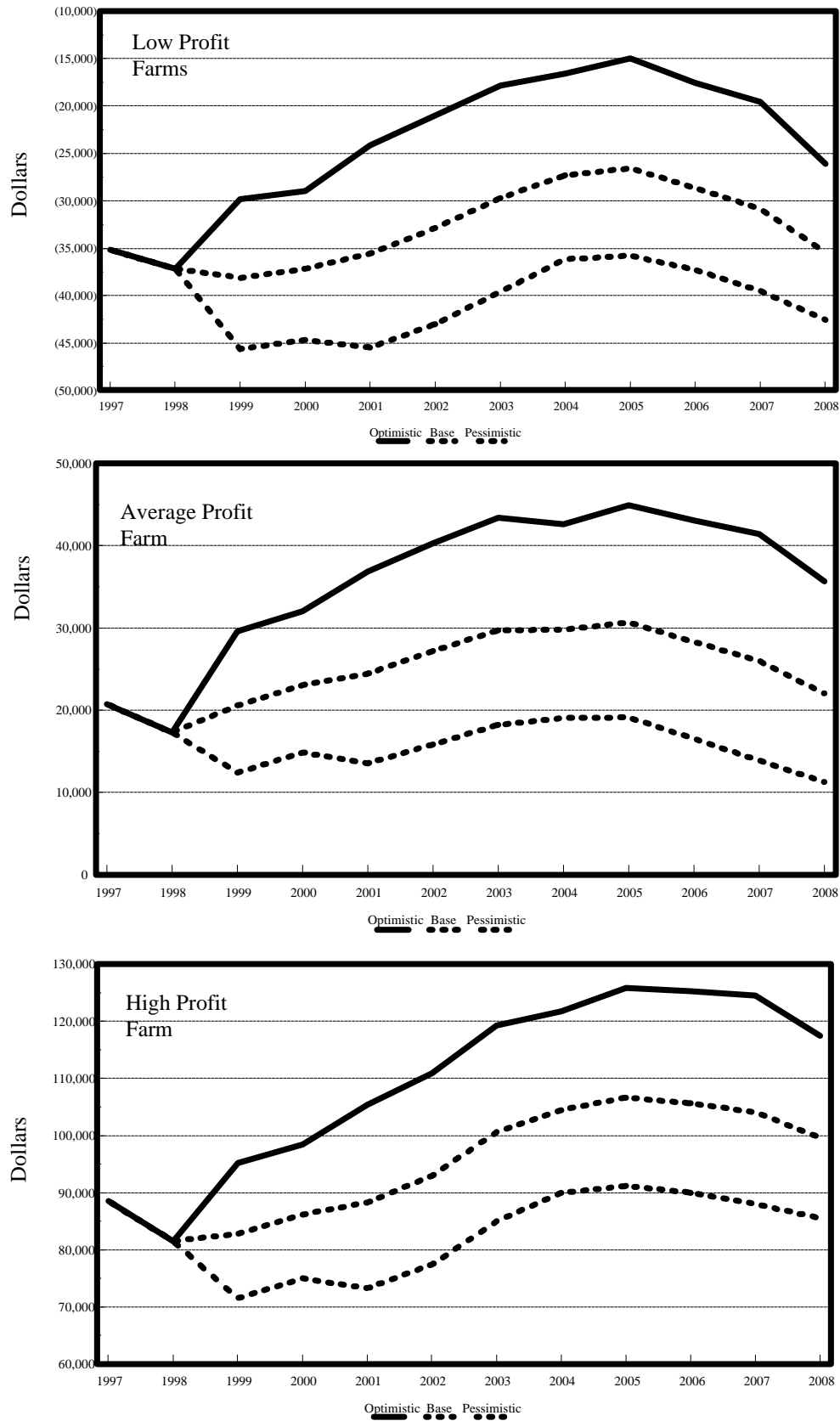Optimistic and Pessimistic Scenarios

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Figure 6. North Dakota Net Farm Income by Profit under
the Optimistic and Pessimistic Scenarios

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**Table 4. State Average Debt-to-asset Ratios for Different Size and Profit Representative Farms under Alternative Scenarios**

| | Size | | | Profit | | |
|---|---|---|---|---|---|---|
| | Large | Medium | Small | High | Average | Low |
| Base scenario | | | | | | |
| 1997 | 0.39 | 0.46 | 0.52 | 0.32 | 0.44 | 0.53 |
| 1998 | 0.40 | 0.47 | 0.54 | 0.33 | 0.45 | 0.56 |
| 1999 | 0.41 | 0.48 | 0.54 | 0.34 | 0.46 | 0.58 |
| 2000 | 0.42 | 0.49 | 0.55 | 0.34 | 0.47 | 0.61 |
| 2001 | 0.42 | 0.49 | 0.55 | 0.35 | 0.48 | 0.61 |
| 2002 | 0.42 | 0.49 | 0.55 | 0.35 | 0.48 | 0.61 |
| 2003 | 0.41 | 0.48 | 0.54 | 0.33 | 0.45 | 0.59 |
| 2004 | 0.41 | 0.47 | 0.53 | 0.33 | 0.46 | 0.57 |
| 2005 | 0.40 | 0.46 | 0.53 | 0.33 | 0.45 | 0.56 |
| 2006 | 0.40 | 0.46 | 0.52 | 0.33 | 0.45 | 0.56 |
| 2007 | 0.40 | 0.47 | 0.53 | 0.33 | 0.45 | 0.57 |
| 2008 | 0.40 | 0.46 | 0.53 | 0.34 | 0.45 | 0.56 |
| 1999-2008 | | | | | | |
| Average | 0.41 | 0.47 | 0.54 | 0.34 | 0.46 | 0.58 |
| Optimistic scenario | | | | | | |
| 1997 | 0.39 | 0.46 | 0.52 | 0.32 | 0.44 | 0.53 |
| 1998 | 0.40 | 0.47 | 0.54 | 0.33 | 0.45 | 0.56 |
| 1999 | 0.39 | 0.46 | 0.52 | 0.32 | 0.43 | 0.53 |
| 2000 | 0.39 | 0.46 | 0.52 | 0.32 | 0.43 | 0.53 |
| 2001 | 0.38 | 0.45 | 0.51 | 0.31 | 0.42 | 0.50 |
| 2002 | 0.37 | 0.43 | 0.50 | 0.30 | 0.40 | 0.48 |
| 2003 | 0.36 | 0.42 | 0.48 | 0.28 | 0.37 | 0.45 |
| 2004 | 0.35 | 0.40 | 0.47 | 0.28 | 0.37 | 0.42 |
| 2005 | 0.33 | 0.39 | 0.46 | 0.27 | 0.36 | 0.40 |
| 2006 | 0.33 | 0.38 | 0.45 | 0.27 | 0.35 | 0.39 |
| 2007 | 0.32 | 0.38 | 0.45 | 0.26 | 0.34 | 0.38 |
| 2008 | 0.31 | 0.37 | 0.44 | 0.26 | 0.34 | 0.37 |
| 1999-2008 | | | | | | |
| Average | 0.35 | 0.41 | 0.48 | 0.29 | 0.38 | 0.45 |
| Pessimistic scenario | | | | | | |
| 1997 | 0.39 | 0.46 | 0.52 | 0.32 | 0.44 | 0.53 |
| 1998 | 0.40 | 0.47 | 0.54 | 0.33 | 0.45 | 0.56 |
| 1999 | 0.43 | 0.50 | 0.56 | 0.35 | 0.49 | 0.63 |
| 2000 | 0.45 | 0.52 | 0.58 | 0.37 | 0.52 | 0.70 |
| 2001 | 0.47 | 0.54 | 0.60 | 0.39 | 0.55 | 0.77 |
| 2002 | 0.48 | 0.55 | 0.60 | 0.40 | 0.57 | 0.82 |
| 2003 | 0.48 | 0.55 | 0.60 | 0.39 | 0.57 | 0.82 |
| 2004 | 0.48 | 0.55 | 0.60 | 0.40 | 0.58 | 0.83 |
| 2005 | 0.48 | 0.55 | 0.60 | 0.40 | 0.59 | 0.86 |
| 2006 | 0.49 | 0.56 | 0.61 | 0.41 | 0.60 | 0.90 |
| 2007 | 0.51 | 0.58 | 0.62 | 0.43 | 0.63 | 0.98 |
| 2008 | 0.51 | 0.58 | 0.63 | 0.44 | 0.65 | 1.01 |
| 1999-2008 | | | | | | |
| Average | 0.48 | 0.55 | 0.60 | 0.40 | 0.57 | 0.83 |
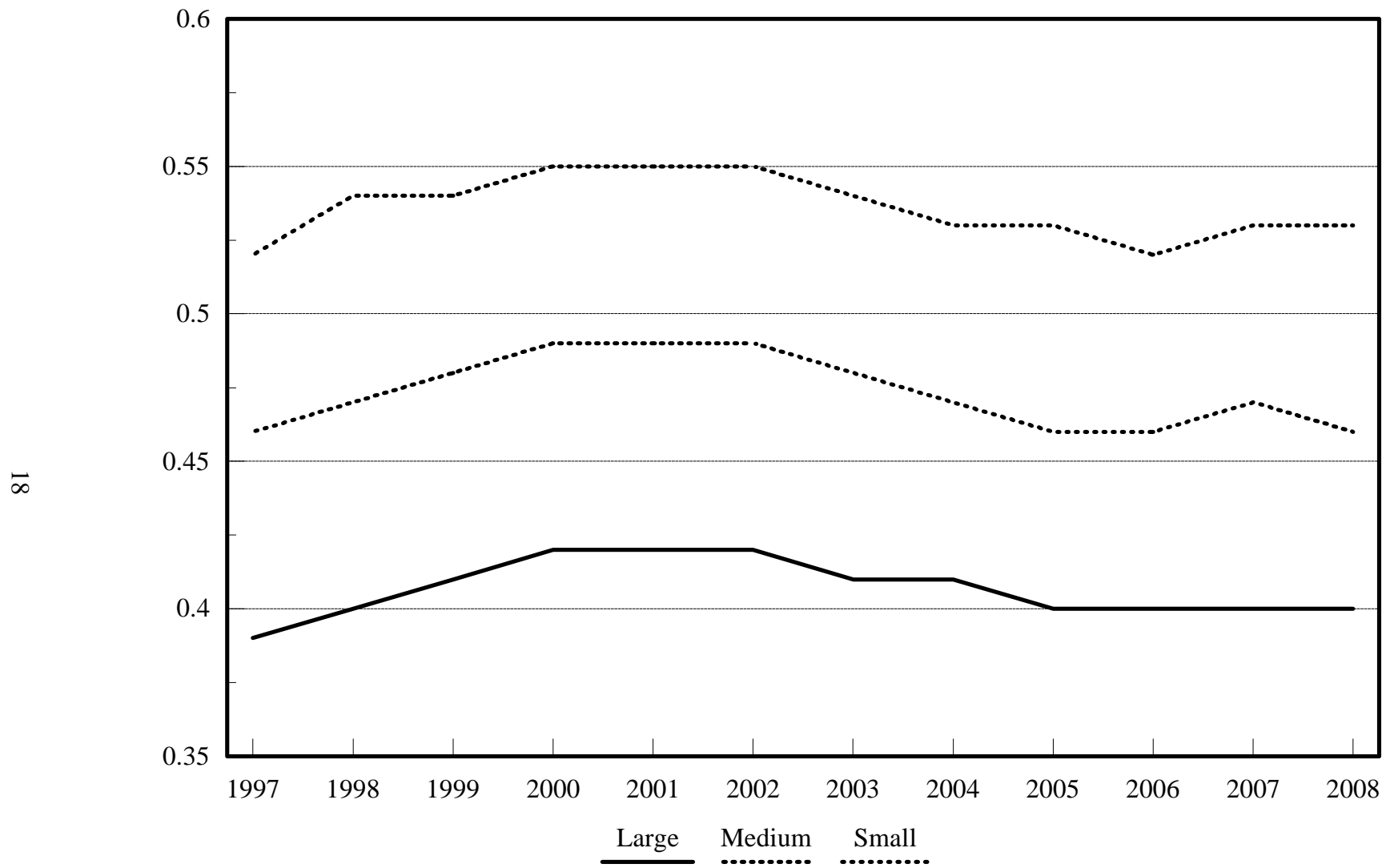
Figure 7.  Debt-to-asset Ratio by Size for North Dakota Representative Farms
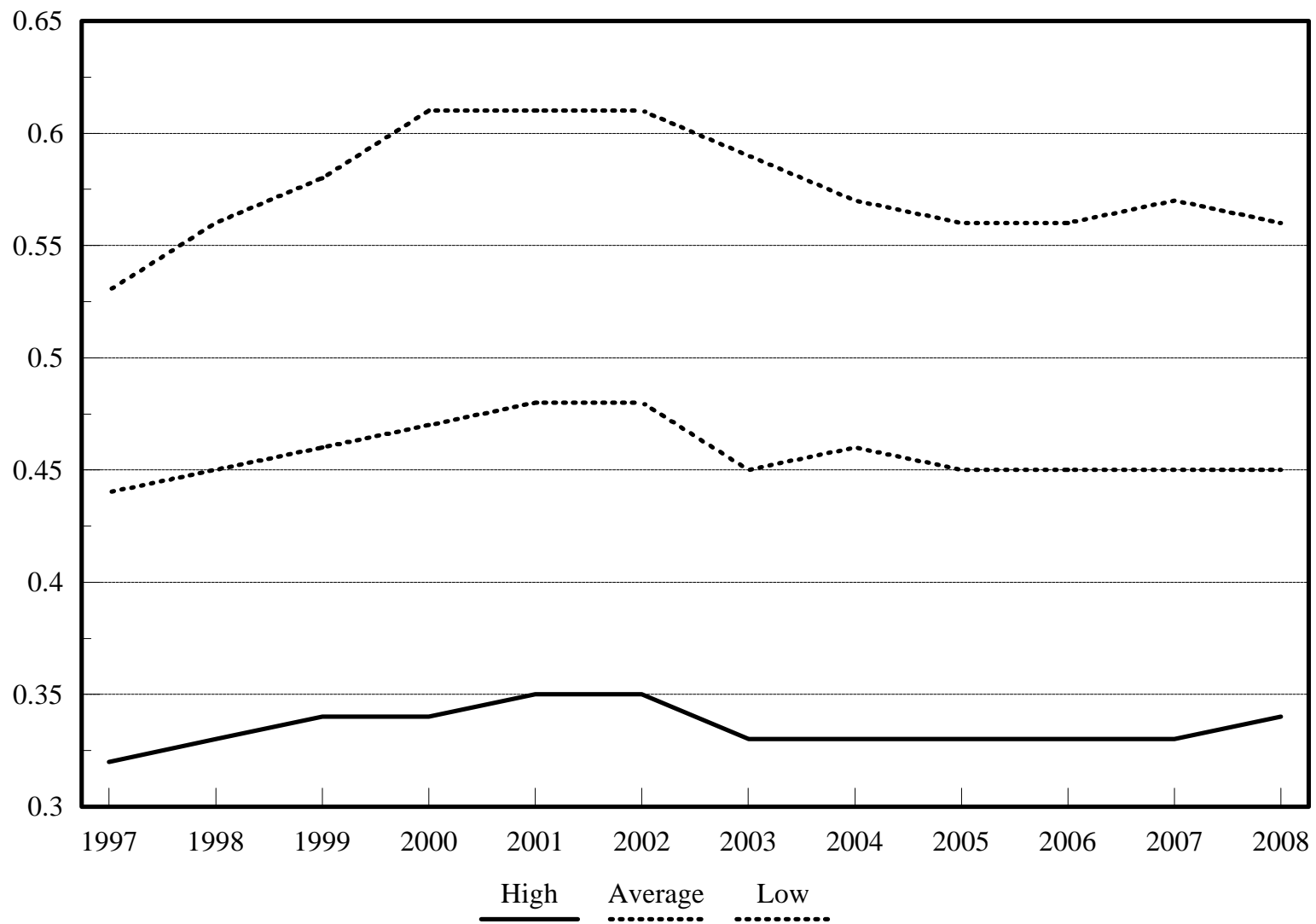under the Base Scenario

Figure 8. Debt-to-asset Ratio by Profit for North Dakota Representative Farms
under the Base Scenario

Higher debt-to-asset ratios for the low profit and small size farms, when coupled with their low net farm income, suggest serious problems in sustaining the farm business unless substantial off-farm income is earned by the farm families.  This is especially true for the low profit farm which has negative net farm income.  Without off-farm income to provide family living requirements, it is unlikely that the low profit farm can survive or that it could 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.

Under the optimistic scenario, all debt-to-assets decrease.  The debt-to-asset ratio for the large, medium, and small size farm falls from 0.39 in 1999 to 0.31 in 2008, from 0.46 in 1999 to 0.37 in 2008, and from 0.52 in 1999 to 0.44 in 2008, respectively (Figure 9).  Under the pessimistic scenario, the debt-to-asset ratios increase throughout the forecast period.  The debt-to-asset ratio for the large, medium, small size farm increased from 0.43 in 1999 to 0.51 in 2008, from 0.50 in 1999 to 0.58 in 2008, and from 0.56 in 1999 to 0.63 in 2008, respectively.

Under the optimistic scenario, the debt-to-asset ratio for the high, average, and low  profit farm falls from 0.32 in 1999 to 0.26 in 2008, (Figure 10), from 0.43 in 1999 to 0.34 in 2008, and from 0.53 in 1999 to 0.37 in 2008, respectively.   Under the pessimistic scenario, the debt-to-asset ratios increased throughout the forecast period.  However, the debt-to-asset ratios do not reach the level that imperils creditworthiness for the high and average profit farms.  The debt-to-asset ratio for the low profit farm increased to levels that imperil creditworthiness. Under the pessimistic scenario, the debt-to-asset ratios for the small size farm and the low profit farms indicate that these farms' long-term survival is questionable.

## Land Value and Cash Rents

Table 5 presents land prices for various representative farms in North Dakota.  Land values for both the medium size and average profit representative farms are shown in Figures 8 and 9, respectively.  The land prices differ over the regions; the highest in the Red River Valley and the lowest in the West region (Figures 11 and 12).  Land prices also change over the forecast period.  It is highest in 1998 due to the lagged impact of higher net farm income in 1995 and 1996.  The prices decrease gradually until 2002-2003, and they increased modestly until 2007.

In all regions under the optimistic scenario, land values rise substantially.  The state average land value increases from $447 in 1998 to $633 in 2008.  Under the pessimistic scenario, the state average land value decreases from $447 in 1998 to $247 in 2008.  The land values for the average profit farm also decrease for the period.  The model assumes that the rate of return on land that the farmer is willing to accept is constant.  Therefore, land values and cash rents increase or decrease more than in actual practice.  When return to land increases (optimistic scenario), farmers generally increase their rate of return on land and, likewise, when return to land decreases (pessimistic scenario), farmers generally decrease their rate of return on land.
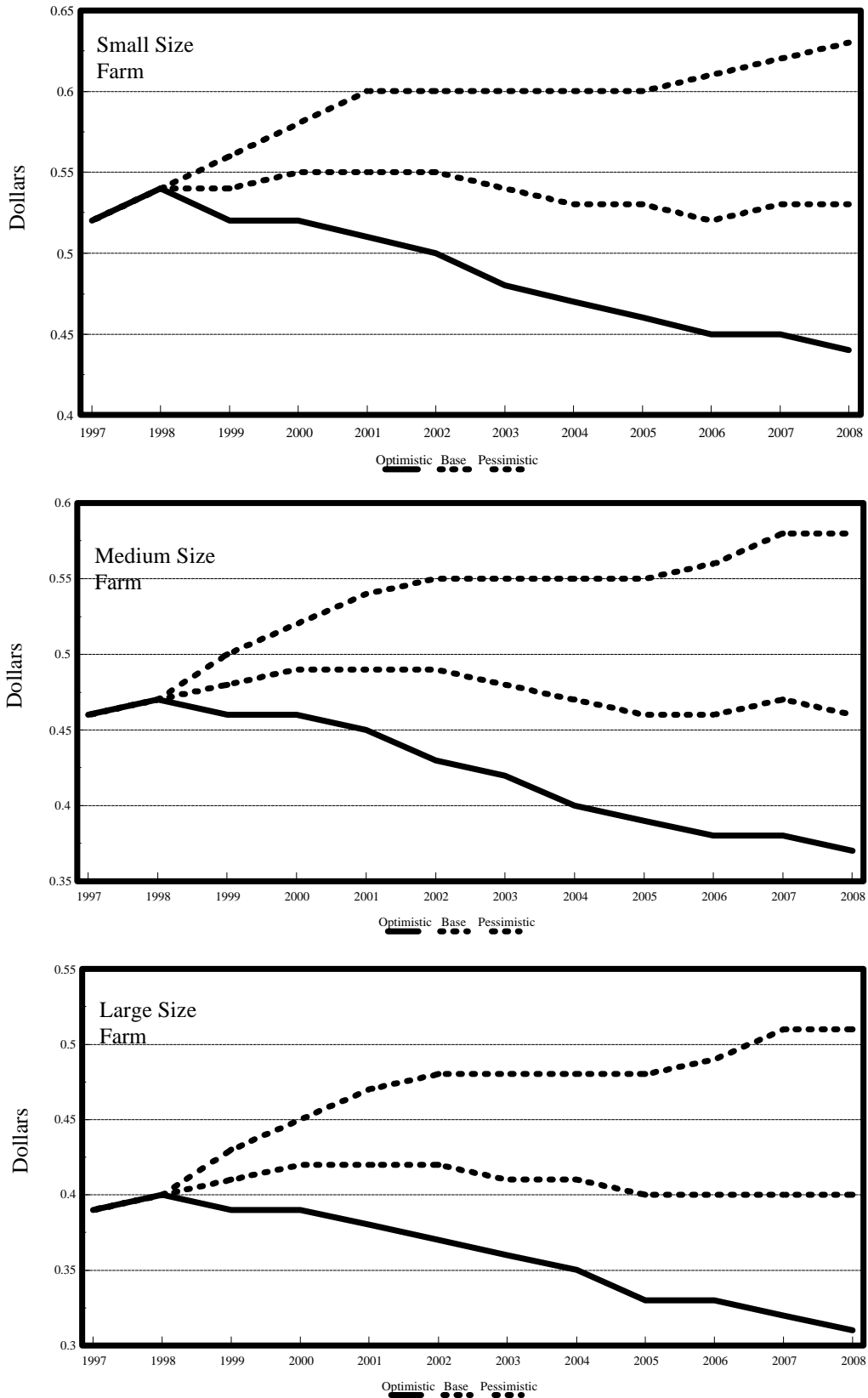
20

Figure 9. North Dakota Debt-to-Asset Ratio by Size under the
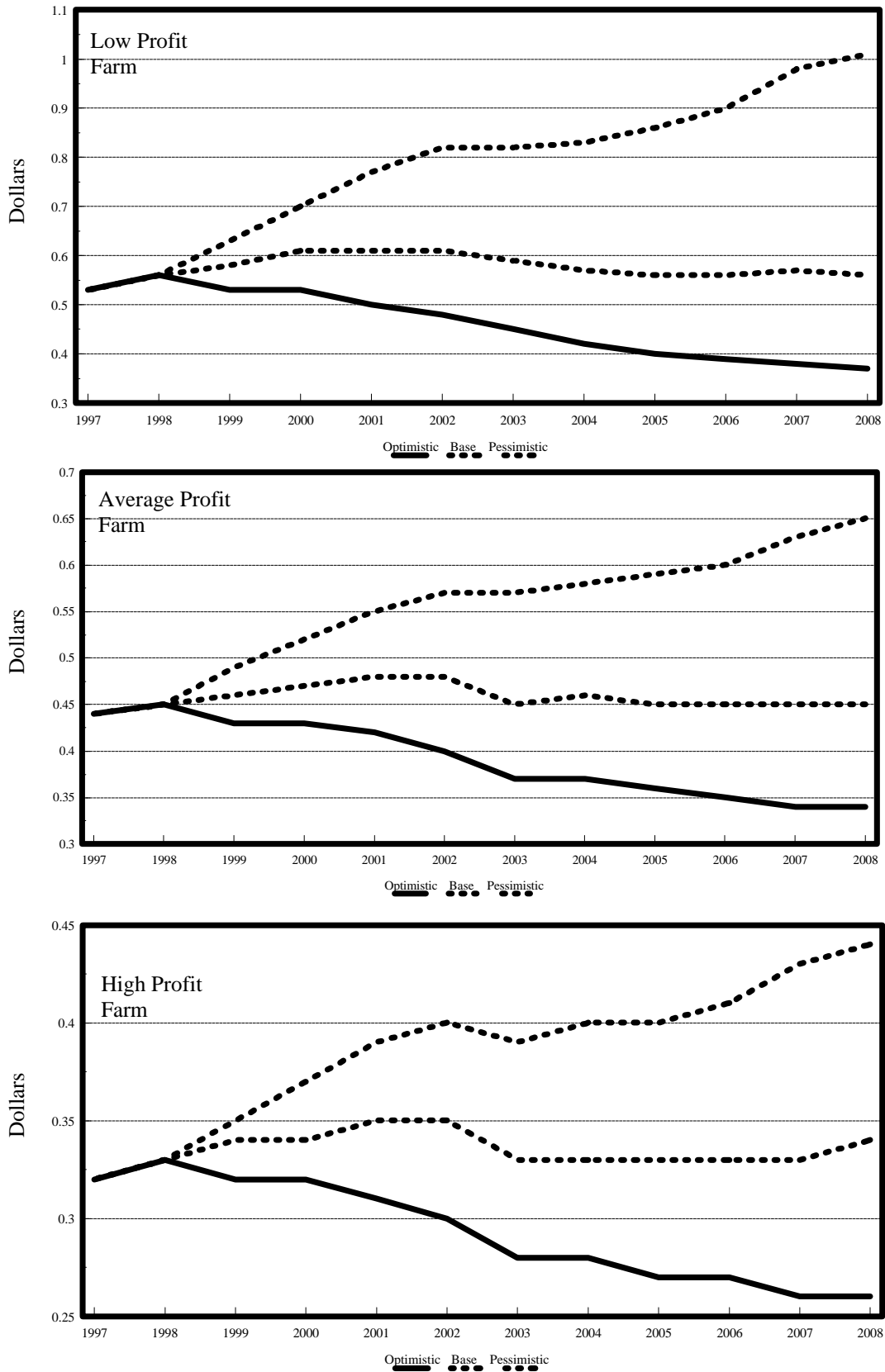Optimistic and Pessimistic Scenarios

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Figure 10.  North Dakota Debt-to-Asset Ratio by Profit under the
Optimistic and Pessimistic Scenarios

**Table 5. North Dakota Land Prices for Different Size and Profit Representative Farms Under Alternative Scenarios**

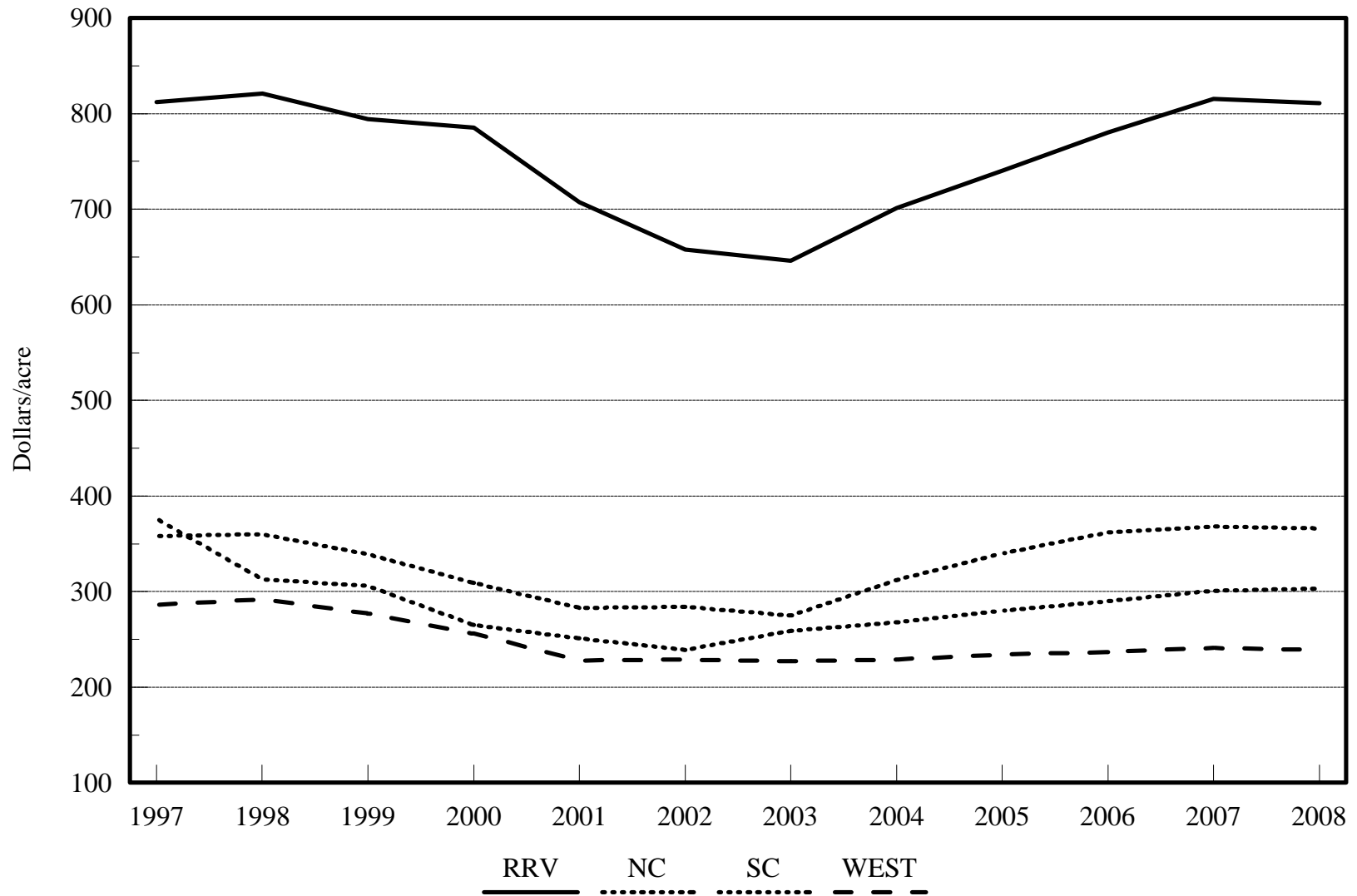| | Size | | | | | Profit | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | RRV | NC | SC | WEST | State | RRV | NC | SC | WEST | State |
| | -----------------------------------------$/acre----------------------------------------- | | | | | | | | | |
| **Base scenario** | | | | | | | | | | |
| 1997 | 812 | 376 | 358 | 286 | 458 | 812 | 376 | 358 | 286 | 458 |
| 1998 | 821 | 313 | 360 | 292 | 447 | 821 | 313 | 360 | 292 | 446 |
| 1999 | 796 | 309 | 343 | 281 | 432 | 794 | 306 | 339 | 277 | 429 |
| 2000 | 785 | 264 | 315 | 254 | 405 | 785 | 265 | 309 | 256 | 404 |
| 2001 | 703 | 254 | 294 | 220 | 368 | 707 | 251 | 283 | 228 | 367 |
| 2002 | 659 | 243 | 285 | 221 | 352 | 658 | 239 | 284 | 229 | 352 |
| 2003 | 647 | 262 | 280 | 225 | 353 | 646 | 259 | 275 | 227 | 352 |
| 2004 | 701 | 270 | 310 | 227 | 377 | 701 | 268 | 312 | 229 | 378 |
| 2005 | 739 | 281 | 335 | 235 | 397 | 740 | 280 | 340 | 234 | 398 |
| 2006 | 784 | 293 | 361 | 243 | 420 | 780 | 290 | 362 | 237 | 417 |
| 2007 | 815 | 301 | 369 | 245 | 432 | 815 | 301 | 368 | 241 | 431 |
| 2008 | 812 | 303 | 365 | 239 | 430 | 811 | 303 | 366 | 239 | 430 |
| 1999-2008 | | | | | | | | | | |
| Average | 744 | 278 | 326 | 239 | 397 | 744 | 276 | 324 | 240 | 396 |
| **Optimistic scenario** | | | | | | | | | | |
| 1997 | 812 | 376 | 358 | 286 | 458 | 812 | 376 | 358 | 286 | 458 |
| 1998 | 821 | 313 | 360 | 292 | 447 | 821 | 313 | 360 | 292 | 446 |
| 1999 | 796 | 309 | 343 | 281 | 432 | 794 | 306 | 339 | 277 | 429 |
| 2000 | 816 | 284 | 337 | 292 | 432 | 815 | 289 | 332 | 300 | 434 |
| 2001 | 759 | 290 | 334 | 284 | 417 | 762 | 294 | 330 | 301 | 422 |
| 2002 | 745 | 300 | 347 | 321 | 428 | 755 | 304 | 345 | 343 | 437 |
| 2003 | 764 | 337 | 363 | 357 | 455 | 770 | 344 | 362 | 378 | 463 |
| 2004 | 848 | 361 | 412 | 384 | 501 | 862 | 369 | 415 | 408 | 514 |
| 2005 | 911 | 385 | 453 | 412 | 540 | 919 | 395 | 461 | 437 | 553 |
| 2006 | 985 | 412 | 497 | 443 | 584 | 987 | 420 | 502 | 466 | 594 |
| 2007 | 1,042 | 435 | 522 | 462 | 615 | 1,051 | 445 | 519 | 496 | 628 |
| 2008 | 1,066 | 452 | 537 | 479 | 633 | 1,069 | 461 | 529 | 519 | 644 |
| 1999-2008 | | | | | | | | | | |
| Average | 873 | 356 | 414 | 371 | 504 | 878 | 363 | 413 | 392 | 512 |
| **Pessimistic scenario** | | | | | | | | | | |
| 1997 | 812 | 376 | 358 | 286 | 458 | 812 | 376 | 358 | 286 | 458 |
| 1998 | 821 | 313 | 360 | 292 | 447 | 821 | 313 | 360 | 292 | 446 |
| 1999 | 796 | 309 | 343 | 281 | 432 | 794 | 306 | 339 | 277 | 429 |
| 2000 | 758 | 245 | 295 | 220 | 379 | 754 | 244 | 285 | 218 | 375 |
| 2001 | 651 | 221 | 257 | 162 | 323 | 649 | 213 | 255 | 162 | 320 |
| 2002 | 580 | 192 | 228 | 132 | 283 | 576 | 181 | 219 | 128 | 276 |
| 2003 | 542 | 195 | 206 | 110 | 263 | 538 | 184 | 201 | 106 | 257 |
| 2004 | 548 | 191 | 221 | 92 | 263 | 537 | 181 | 216 | 89 | 256 |
| 2005 | 552 | 191 | 233 | 85 | 265 | 546 | 182 | 228 | 84 | 260 |
| 2006 | 559 | 192 | 244 | 76 | 268 | 548 | 181 | 241 | 74 | 261 |
| 2007 | 550 | 189 | 238 | 66 | 261 | 551 | 181 | 237 | 63 | 258 |
| 2008 | 546 | 180 | 220 | 43 | 247 | 541 | 117 | 219 | 45 | 244 |
| 1999-2008 | | | | | | | | | | |
| Average | 608 | 211 | 249 | 127 | 298 | 603 | 202 | 244 | 125 | 294 |

Figure 11.  Averages Prices of Cropland for Average Profit Representative Farms
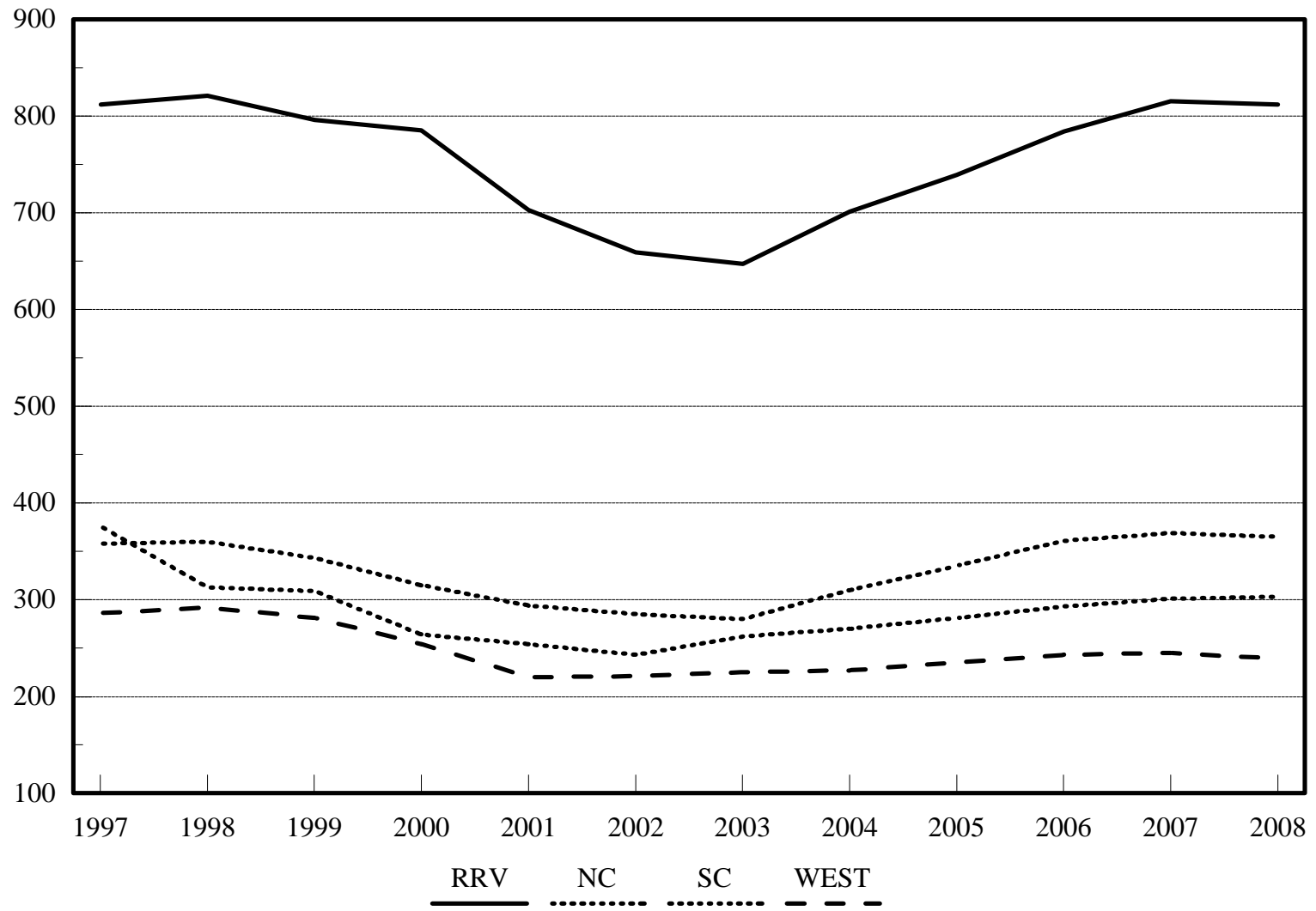under the Base Scenario

Figure 12. Average Prices of Cropland for Medium Size Representative Farms
under the Base Scenario

Cash rents for both the medium size and average profit farms are the highest in 1998 due to the higher land prices in 1996-1997, and then decrease until 2004, and then increase modestly over the remaining period (Table 6). It also differs over the regions; the highest in the Red River Valley and the lowest in the West (Figures 13 and 14).

For the medium size farm under the optimistic scenario, the state average cash rents increase from $35 in 1998 to $53 in 2008, while the state average cash rents decrease from $35 in 1998 to $17 in 2008 under the pessimistic scenario. For the average profit farm under the optimistic scenario, the state average cash rents increase from $35 in 1998 to $54 in 2008, but decrease from $35 in 1998 to $16 in 2008, under the pessimistic scenario (Figure 15).

## Concluding Remarks

The federal government no longer manages supplies of program crops through acreage bases and planting controls. Farm subsidy levels are fixed at a decreasing level through a 7-year contract, a sharp change from the entitlement nature of past programs in which government spending was a function of market price levels and farmer eligibility for program benefits. The largest annual decreases in subsidy levels come in the last 2 years of the 7-year contract. In the final year of the contract, the USDA is providing about $4 billion in annual farm subsidies. Emergency payments have been made in 1998 to offset the low commodity prices experienced in 1998. Further payments may be made for 1999.

Net farm income will increase gradually throughout the forecast period. Increases in net farm income from 1999 to 2008 are mainly due to strong import demand for agricultural crops from developing countries. Crop production in the United States and around the world is assumed to be normal with annual trend line increases.

The optimistic and pessimistic scenarios present totally different pictures for North Dakota agriculture. All farms do well under the optimistic scenario except for the low profit farm, while only the high profit farms do well under the pessimistic scenario.

Under the base scenario, land prices are predicted to fall through the middle of the forecast period and then increase modestly. Under the optimistic scenario, land prices rise substantially and but fall substantially under the pessimistic scenario.

Cash rent levels follow a pattern similar to land prices. Under the optimistic scenario, cash rents are predicted to rise but they are predicted to fall under the pessimistic scenario.

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

It is important to recognize the degree to which North Dakota farmers' fortunes have been integrated into a world marketplace. North Dakota farmers compete with producers of the same commodities in other parts of the world, such as in Brazil, EU, and Argentina or Eastern Europe. The optimistic and the pessimistic scenarios show how sensitive North Dakota agriculture is to small changes in commodity prices. Under the pessimistic scenario, all farms in North Dakota, except for high profit and large farms, may face significant financial problems. Under the given macroeconomic conditions in the rest of the world, the pessimistic scenario may prevail for the near future.

**Table 6. Cash Rent for Medium Size and Average Profit Representative Farms under Alternative Scenarios**

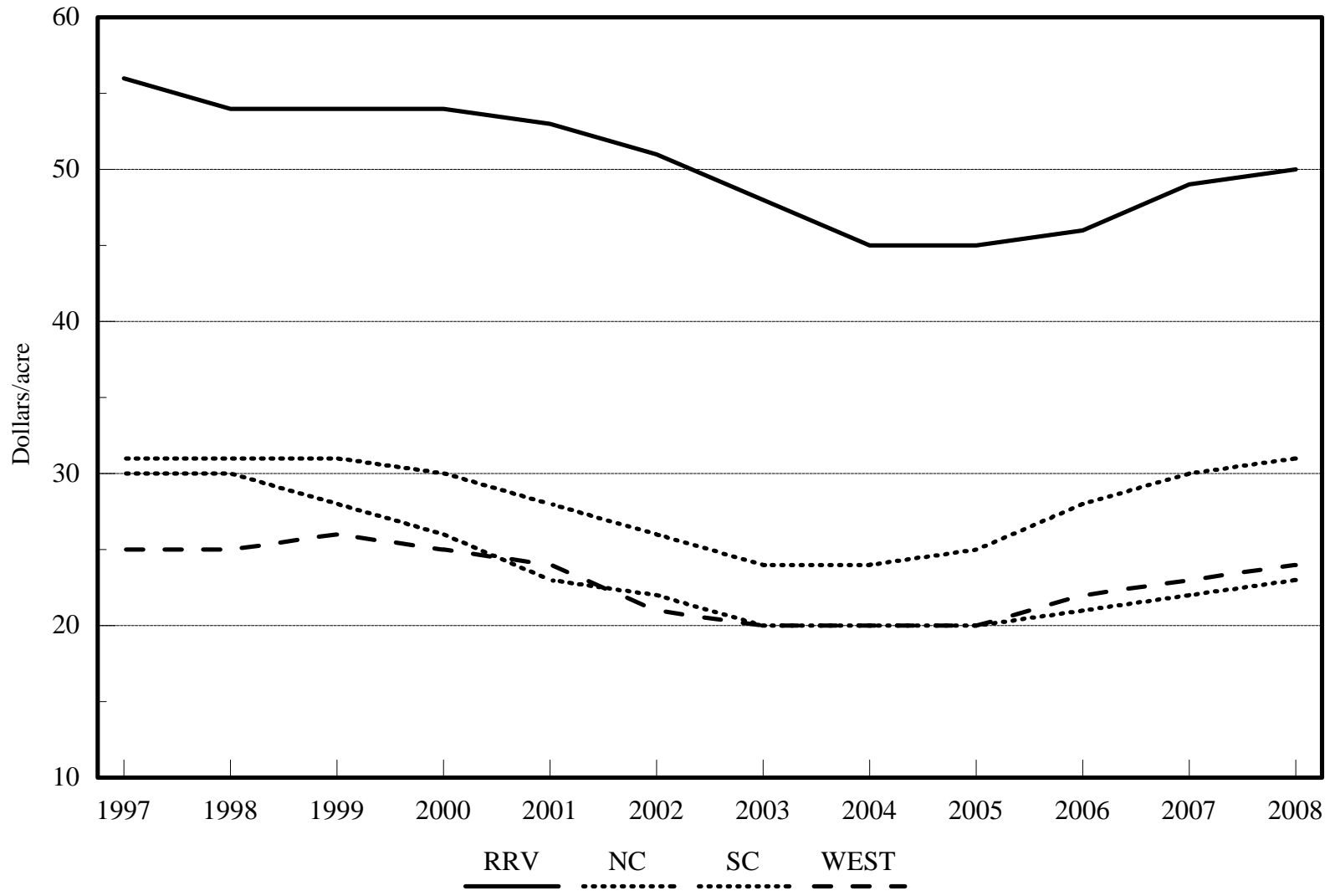| | Size | | | | | Profit | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | RRV | NC | SC | WEST | State | RRV | NC | SC | WEST | State |
| | ----------------------------------------------$/acre---------------------------------------------- | | | | | | | | | |
| Base scenario | | | | | | | | | | |
| 1997 | 56 | 30 | 31 | 25 | 35 | 56 | 30 | 31 | 25 | 35 |
| 1998 | 54 | 30 | 31 | 25 | 35 | 54 | 30 | 31 | 25 | 35 |
| 1999 | 54 | 28 | 31 | 26 | 35 | 54 | 28 | 31 | 26 | 35 |
| 2000 | 54 | 26 | 30 | 25 | 34 | 54 | 26 | 30 | 25 | 34 |
| 2001 | 53 | 23 | 28 | 23 | 32 | 53 | 23 | 28 | 24 | 32 |
| 2002 | 51 | 22 | 26 | 21 | 30 | 51 | 22 | 26 | 21 | 30 |
| 2003 | 48 | 20 | 25 | 20 | 28 | 48 | 20 | 24 | 20 | 28 |
| 2004 | 44 | 20 | 24 | 19 | 27 | 45 | 20 | 24 | 20 | 27 |
| 2005 | 45 | 20 | 25 | 21 | 28 | 45 | 20 | 25 | 20 | 28 |
| 2006 | 47 | 21 | 28 | 23 | 30 | 46 | 21 | 28 | 22 | 30 |
| 2007 | 49 | 22 | 30 | 24 | 31 | 49 | 22 | 30 | 23 | 31 |
| 2008 | 51 | 23 | 31 | 25 | 32 | 50 | 23 | 31 | 24 | 33 |
| 1999-2008 | | | | | | | | | | |
| Average | 50 | 23 | 28 | 23 | 31 | 50 | 23 | 28 | 22 | 31 |
| Optimistic scenario | | | | | | | | | | |
| 1997 | 56 | 30 | 31 | 25 | 36 | 56 | 30 | 31 | 25 | 35 |
| 1998 | 54 | 30 | 31 | 25 | 35 | 54 | 30 | 31 | 25 | 35 |
| 1999 | 54 | 28 | 31 | 26 | 35 | 54 | 28 | 31 | 26 | 35 |
| 2000 | 54 | 26 | 30 | 25 | 34 | 54 | 26 | 30 | 25 | 34 |
| 2001 | 55 | 24 | 30 | 24 | 33 | 55 | 24 | 30 | 26 | 34 |
| 2002 | 55 | 23 | 31 | 25 | 34 | 55 | 24 | 31 | 27 | 34 |
| 2003 | 56 | 23 | 33 | 27 | 35 | 56 | 24 | 34 | 29 | 36 |
| 2004 | 56 | 25 | 37 | 29 | 37 | 57 | 25 | 38 | 32 | 38 |
| 2005 | 61 | 24 | 41 | 33 | 40 | 62 | 27 | 42 | 34 | 41 |
| 2006 | 66 | 28 | 47 | 38 | 45 | 67 | 29 | 48 | 39 | 46 |
| 2007 | 72 | 31 | 52 | 43 | 49 | 74 | 31 | 53 | 44 | 51 |
| 2008 | 76 | 33 | 57 | 46 | 53 | 78 | 33 | 58 | 48 | 54 |
| 1999-2008 | | | | | | | | | | |
| Average | 60 | 27 | 33 | 32 | 39 | 61 | 27 | 40 | 33 | 40 |
| Pessimistic scenario | | | | | | | | | | |
| 1997 | 56 | 30 | 31 | 25 | 36 | 56 | 30 | 31 | 25 | 35 |
| 1998 | 54 | 30 | 31 | 25 | 35 | 54 | 30 | 31 | 25 | 35 |
| 1999 | 54 | 28 | 31 | 26 | 35 | 54 | 28 | 31 | 26 | 35 |
| 2000 | 54 | 26 | 30 | 25 | 34 | 54 | 26 | 30 | 25 | 34 |
| 2001 | 52 | 23 | 27 | 21 | 31 | 52 | 23 | 26 | 22 | 31 |
| 2002 | 47 | 21 | 23 | 18 | 27 | 47 | 20 | 22 | 17 | 27 |
| 2003 | 41 | 17 | 21 | 14 | 23 | 40 | 17 | 19 | 13 | 22 |
| 2004 | 34 | 16 | 18 | 10 | 20 | 33 | 15 | 17 | 10 | 19 |
| 2005 | 32 | 15 | 17 | 11 | 19 | 30 | 14 | 15 | 10 | 17 |
| 2006 | 29 | 15 | 17 | 9 | 18 | 28 | 15 | 15 | 9 | 17 |
| 2007 | 28 | 15 | 17 | 9 | 17 | 28 | 14 | 15 | 9 | 17 |
| 2008 | 27 | 15 | 16 | 8 | 17 | 27 | 14 | 14 | 8 | 16 |
| 1999-2008 | | | | | | | | | | |
| Average | 40 | 19 | 22 | 15 | 24 | 39 | 19 | 20 | 15 | 23 |

Figure 13. Cash Rent Paid by Average Profit Representative Farms
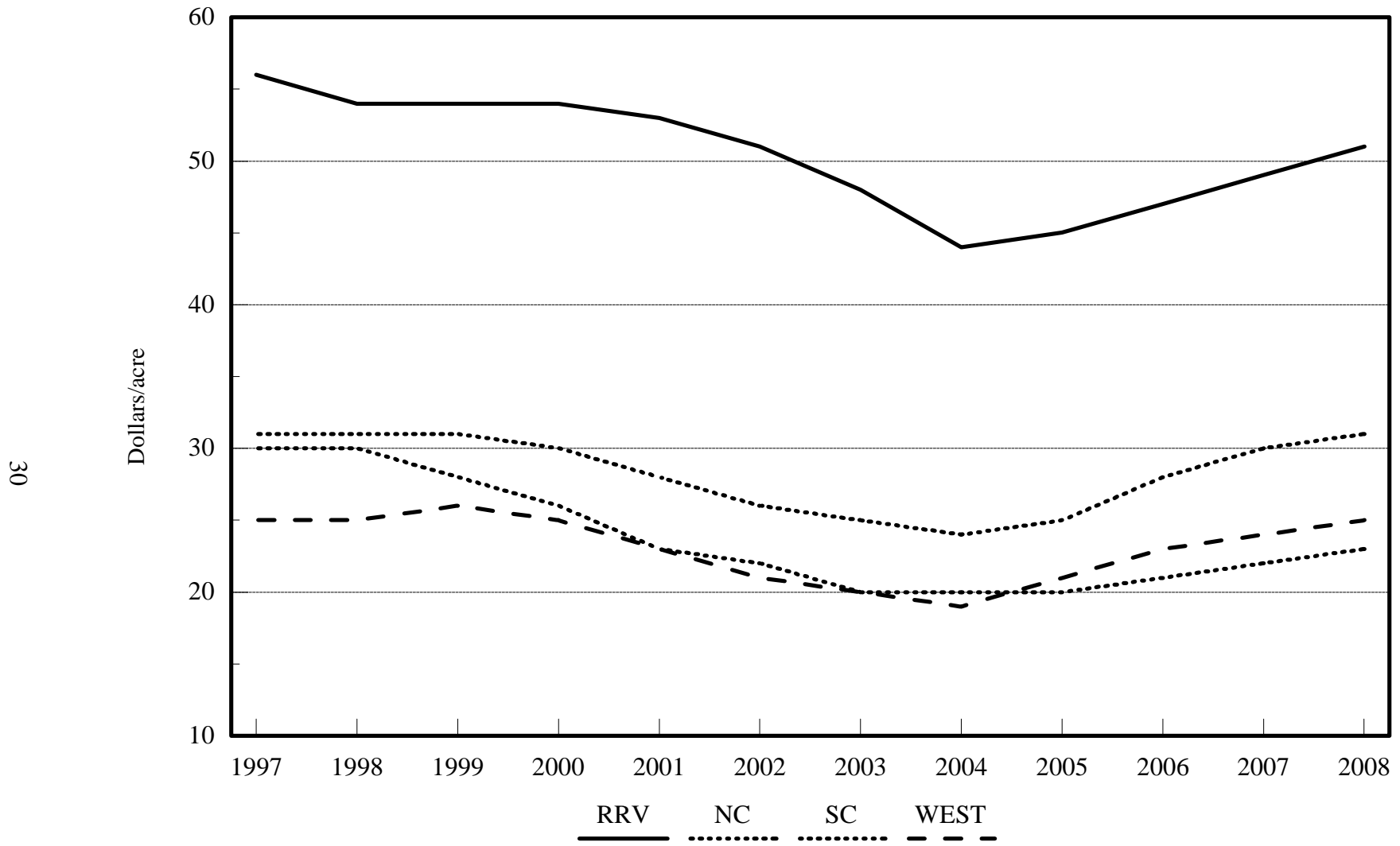under the Base Scenario

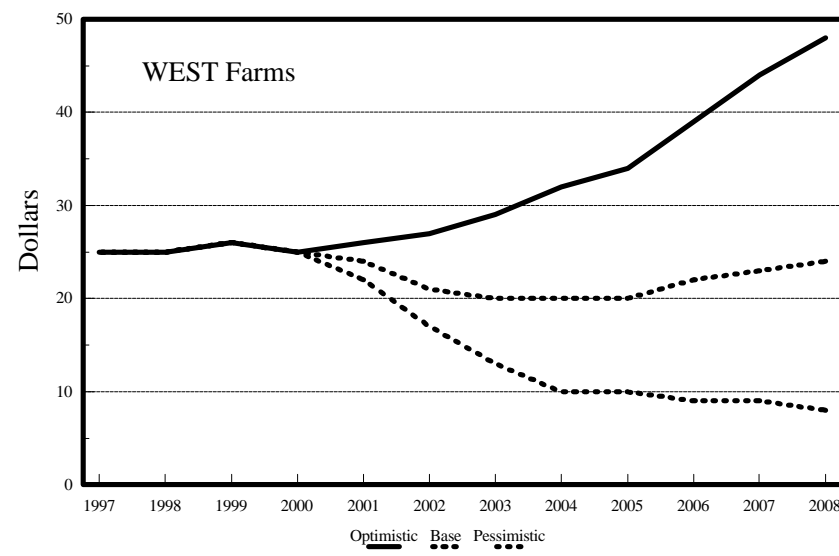Figure 14. Cash Rent Paid by Medium Size Representative Farms
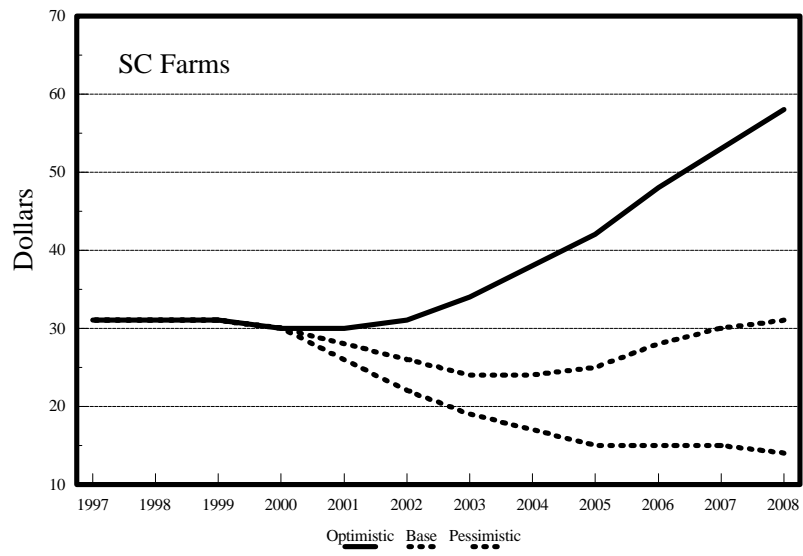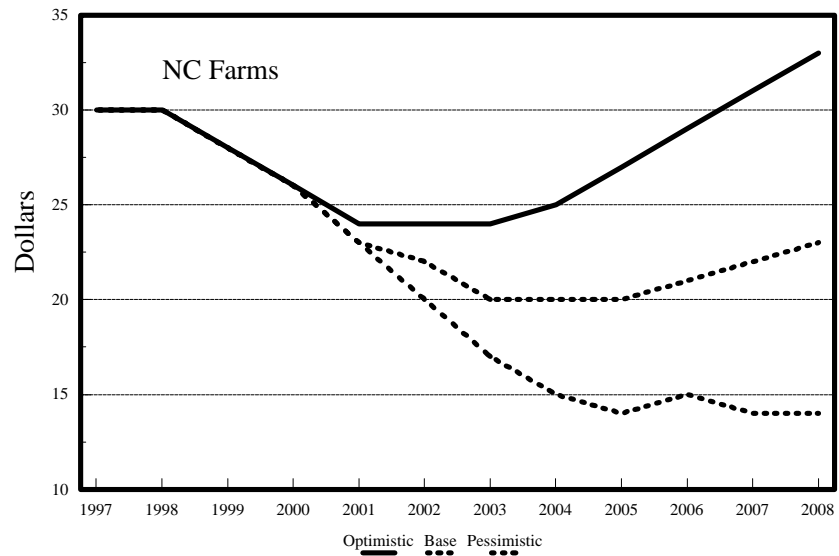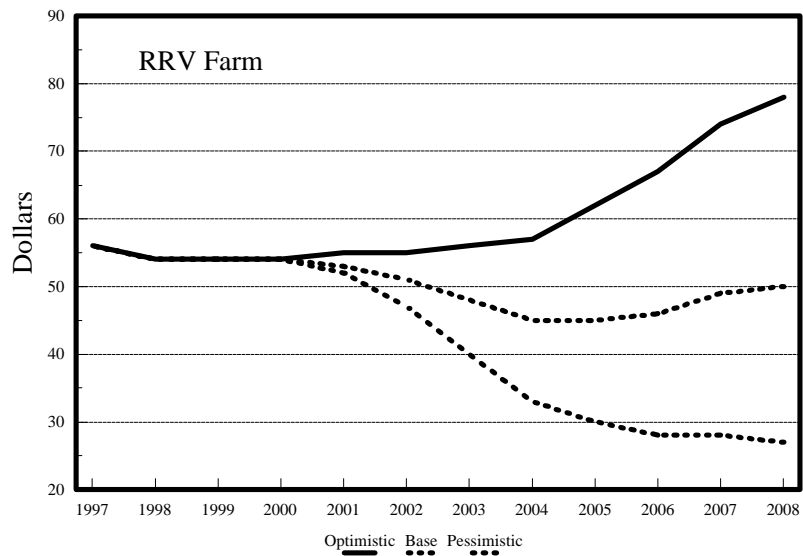under the Base Scenario

Figure 15. North Dakota Cash Rents under the Optimistic and
Pessimistic Scenarios

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