North Dakota Agricultural Land Valuation Model

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Highlights

The NDSU Department of Agribusiness and Applied Economics have been statutorily responsible for annually analyzing the value of agricultural land in North Dakota since the early 1980s. The North Dakota Legislature has refined the statutory model several times during those decades, but the fundamental principle that the value of agricultural land be calculated based on landowner share of gross returns divided by the capitalization rate has not been altered.

These values are calculated for each county for cropland and non-cropland, and provided to the North Dakota Office of State Tax Commissioner each December. These values are then used by the State and local governments as the foundation for assessing property taxes on agricultural land.

The process of collecting the data and performing the calculations has been refined over time, such as relying more heavily in recent years on USDA Risk Management Agency data rather than USDA National Agricltural Statistics data. Despite the several decades of experience and refinements, several issues continue to surface, such as the long-term impact of incorporating a cost of production index in the model; the percentages of gross revenue attributable to landowners; the impact of the capitalization rate; crop insurance; and the relationship among agricultural land values, values of other taxable properties, and local government need for revenue.

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From early statehood days, property in North Dakota has been assessed for tax purposes at values near market price. However, beginning in the 1940s, the assessed value of land and its market price began to diverge as a result of the depression of the 1930s. During the depression, market prices and assessed values declined sharply. In the 1940s, market prices began to recover, but assessors and equalization boards at all levels of government were reluctant to raise assessed values at the same rate. There was a concern that the rise in market price would be short-lived and declining prices would once again set in.

The difference between market price and value for tax purposes continued to widen until, in the 1970s, value for tax purposes was about 6 percent of market price for agricultural lands, 9 percent for residential properties, 12 percent for commercial properties, and more than 20 percent for centrally assessed properties (such as railroads and utilities). The railroads brought a lawsuit against the state in the 1970s because of this discrepancy. The North Dakota Supreme Court ruled for the railroads and ordered the state to tax all properties of the same class in a like manner. This ruling resulted in the state's establishing four classes of property for tax purposes: agricultural, commercial, residential and centrally assessed properties.

Commercial, residential, and centrally assessed properties are assessed on market price while agricultural land, since 1981, is valued based on crop and livestock production. State statutory law (N.D.C.C. §57-02-27.2) mandates that the Department of Agricultural Economics at NDSU (renamed Department of Agribusiness and Applied Economics) annually compute an estimate of 1) the average value per acre of agricultural lands on a statewide and countywide basis, and 2) the average agricultural value per acre for cropland and non-cropland (defined as agricultural land that is not being used as cropland). These estimates must be received by the State Tax Department by December 1 of each year. This paper provides an overview of how the model operates and discusses several related issues.

North Dakota property owners pay their property tax at the end of the year, that is, the tax owed in 2013 will be billed in late 2013 for payment in either late 2013 or early 2014, for example. About the same time that tax statements are being sent to landowners, the agricultural land value model is being run and the results are submitted to the Office of the State Tax Commissioner ; that is , December 1 annually. These calculated values will subsequently be used about a year later; for example, the land values calculated in December 2013 will be used in determining taxes for 2014. Those taxes will be billed in late 2014 to be paid in late 2014 or early 2015. It may be helpful to understand the time lag that occurs in the use of these values.

Overview of the Model

The model calculates agricultural land value as the landowner share of gross returns divided by the capitalization rate.

Landowner share of gross returns is the portion of revenue generated from agricultural land that is assumed to be received by the landowner, and is expected to reflect current rental rates. The assumption is that the remainder of the revenue from the land is used to pay operating expenses and provide a return for the farm operator's management and risk.

The Legislature specified the landowner share of gross returns is 20 percent of gross returns for sugar beets and potatoes, and 30 percent for all other crops. Production from irrigated land is reduced 50 percent before applying the landowner's percentage. The landowner's share of non-cropland revenue is 25 percent of the value of the beef produced from grazing.

Capitalization rate is an interest rate that reflects the general market rate of interest adjusted for the risk associated with a particular investment or asset (in this case, agricultural land in North Dakota).

The Legislature specified that the gross federal land bank (AgriBank, FCB) mortgage rate of interest for North Dakota be used as the basis for computing the capitalization rate.

The average interest rate information supplied by AgriBank, FCB represents the average retail bill rate of loans priced by Farm Credit Service Associations during the year to borrowers in North Dakota. The rate is the average of various loan products that range in rate duration from short (a loan that resets after 2 or 3 years) to long (fixed to maturity of 20 or 30 years). The average is weighted by loan amount, not maturity.

Capitalizing the income generated by an asset (that is, dividing the annual income by the capitalization rate) is a well-recognized procedure for estimating the value of the asset.

Results from the Model

The North Dakota Agricultural Land Value model estimates an average value for cropland and non-cropland in each county. In addition, a value for inundated acres is calculated for acreage that meets this criterion. An average value of all agricultural land is computed by weighting the average of the three categories by the acreage in each category. Appendix A lists the capitalized average annual values per acre by county for cropland, non-cropland, and all agricultural land for the 2013 tax year. For example, cropland values ranged from $297.87 for Billings County to $1,143.18 for Pembina County; and the average value for all agricultural land ranged from $170.23 in Billings County to $1,056.96 in Traill County. State average values are $662.65 for cropland, $128.85 for non-cropland, and $495.26 for all agricultural land.

Method of Calculation

The following discussion provides a more detailed description of the calculations in the model. Adams County is used for this illustration (Appendix B).

Available data from the ten most recent years are used in the calculations; current computations are based on data from 2002 to 2011. Section A of Appendix B (Annual Number of Acres) reports the number of acres in each category for each year. For example:

- In 2011, the Risk Management Agency, Billings Regional Office (RMA) reported no acres of sugar beets or potatoes in Adams County.
- 353,545 acres were planted in Adams County in 2011 to crops that RMA insures, along with fallow and prevented planted acres reported by the North Dakota Farm Service Agency (FSA).

Detailed acreage information for 2011 is shown in the first column of Appendix C. The total cropland acreage reported by RMA varies from year to year as a result of planting rotation and changes in the number of acres used to produce crops that RMA insures. Acreage planted to crops not insured by RMA is included in this number.

- Adams County also had 56,875 acres of CRP in 2011, as reported by the state office for the Farm Service Agency (FSA).
- Total reported cropland acres for Adams County in 2011 was 410,420 acres.
- Non-cropland acreage was 237,950, as reported by the state office of the Natural Resources and Conservation Service. The non-cropland consists of 224,750 acres of rangeland and 13,200 acres of pasture (Appendix D). These subcategories are used to reflect the difference in productivity between rangeland and pasture.
- Total agricultural land reported for Adams County was 648,370 acres in 2011.

Section B of the table (Appendix B) is the Annual Gross Returns. Revenue from production on cropland was $53,846,856 in 2011 (column 4). This is the total revenue for the crops produced in Adams County as reported by RMA and NASS. The data for calculating total revenue are shown in Appendix C. These include acres harvested, yield per harvested acre, and price for each commodity. Price for the commodity is either 1) the regional price reported by NASS or 2) the state price reported by NASS (if a regional price is not reported). Only one-half of the revenue from irrigated crops is included as revenue in recognition of the additional cost of irrigating (as required by state law). Revenue from crops not reported by NASS is not included in this calculation.

Column 5 in the Annual Gross Returns section of Appendix B lists government payments at $3,389,691 in 2011 for Adams County. This number was reported by FSA.

A separate column (6) is used to display CRP payments. Appendix B shows $733,391 for Adams County in 2011, which is one-half of the amount reported by FSA. The assumption is that the other one-half of the payment is for establishing and maintaining the CRP grass cover and is not revenue received by the landowner.

The sum of revenue from crops, government program payments, and CRP is $57,969,938 (column 7). This is the gross income from all reported cropland acres in Adams County in 2011.

Gross income from non-cropland is shown in column 8 (Appendix B). In 2011, Adams County's non-cropland revenue was $12,872,954 and is based on the carrying capacity of non-cropland in the county and the value of beef produced on these acres. The carrying capacity of the rangeland is 0.55 animal unit month (AUM) per acre and 0.60 AUM per acre for pasture (Appendix D), as estimated at the time the model was developed.

Revenue from non-cropland is estimated by calculating the value of beef produced per month of grazing. Basic assumptions are that

- the grazing season is six months,
- calf production during the grazing period is 316.5 pounds per cow, and
- one-sixth of the cow herd will be culled resulting in 150 pounds of cull beef cow sold per cow in the herd.

These weights are divided by six to determine the amount of production per month, that is, 52.75 pounds of calf weight and 25 pounds of cull cow weight per AUM. Calf weight per cow is adjusted to reflect death loss and heifer calves retained for herd replacements. Calf and cull cow weights have remained constant in the model since it was put in place in 1981.

Livestock prices for 2011 were $151.60 per cwt. for calves and $71.60 per cwt. for cull cows. These prices were based on national average prices reported by NASS and adjusted to North Dakota based on historical relationship. Thus, the value per AUM is $97.869 ((52.75 lbs. x $1.516) + (25 lbs. x $0.716)). Revenue from rangeland, as shown in Appendix D, was $12,097,832 (224,750 acres x 0.55 AUM x $97.869); revenue from pasture was $775,122 (13,200 acres x 0.60 AUM x $97,869); and total revenue for non-cropland was $12,872,954.

Total annual gross returns from agricultural land in Adams County for 2011 were $70,842,892 (column 9, Section B, Appendix B).

Section C lists the landowner share of returns, that is, the percent of each category of income that is designated as the landowner share. As specified in the statute, the landowner share of revenue from sugar beets and potatoes is 20 percent, 30 percent for all other crops, and 25 percent of non-cropland revenue.

The landowner share of cropland revenue from 2011 is $17,904,355 (column 7), as shown in Section D (Annual Landowner Share of Gross Returns). The landowner share for non-cropland is $3,218,239 (column 8); and for all agricultural land, the landowner's share is $21,122,594 (column 9).

In computing acreages, the most recent ten years of data are used with the high and low years dropped, as specified in state law. The next line (Section E) lists which eight years are used for each land category in developing this year's report (2011, 2009, 2008, 2007, 2006, 2005, 2004, and 2003 for cropland; and 2010, 2009, 2008, 2007, 2006, 2005, 2004, and 2003 for non-cropland). Line F is the average acres for the eight years included in the calculations.

The eight-year average annual landowner share of gross return is $11,459,100 for cropland, $2,438,952 for non-cropland, and $13,898,051 for all agricultural land (Section G).

The eight-year average annual landowner share of gross returns is adjusted for the change in production costs before this value is used to calculate the average return per acre (Section H). Changes in production costs are reflected by the cost of production index calculated annually by the Economic Research Service (ERS). The cost of production index used for the 2013 analysis was 155.27. This index is an Olympic average of the annual cost of production indices for 2002 through 2011, published by NASS. The ten-year average cost of items used for production has increased to 155.27 percent of the baseline value. The baseline index value was determined by calculating the Olympic average of the annual indices reported for 1989 through 1995. The result of this calculation is a base index of 102. Each year the Olympic average of the most recent ten years is divided by the base value of 102 to calculate the current year's cost of production index.

The landowner share of gross returns is divided by the number of acres to calculate the landowner share of gross returns per acre (Section I). For the 2013 tax year, this value is $19.37 ($7,380,130 / 380,919) per cropland acre, $6.60 ($1,570,785 / 237,950) per non-cropland acre, and $14.46 ($8,950,915 / 618,869) per acre of all agricultural land.

The value for cropland and non-cropland is divided by the capitalization rate of 5.488 percent to estimate an average value of $353.03 per acre for cropland and $120.29 per acre for non-cropland (Section J). This capitalization rate is the average gross mortgage rate for 10 of the last 12 years (disregarding the highest and lowest rates) on loans made by AgriBank, FCB in North Dakota, as specified by state law.

In 1999, the Legislature amended the statute to create a third land category, inundated land. This is acreage that is covered with water and no longer available for crop production or livestock grazing. These acres are valued at 10 percent of the non-cropland value for the county.

The line labeled "Acreage as provided by county" (Section K) is the number of acres the county director of tax equalization reported for cropland, non-cropland and inundated land on the county's tax rolls. These acreages are multiplied by their respective value per acre, summed, and divided by the total acres to determine the average value per acre of $264.71 for all agricultural land in Adams County (Section L).

This last step is significant if the proportion of cropland to non-cropland acres is different from what has been used in the preceding computations. This computation also is based on the assumption that the average landowner's share of revenue per acre for crops not reported by NASS or RMA is the same as the average for crops that are reported by NASS or RMA. Finally, this step addresses the concern that the number of reported acres of agricultural land fluctuates more than the number of cropland and non-cropland acres listed on the county's tax rolls.

How the Values Are Used

The results of the analysis are provided to the North Dakota Tax Department by December 1 of each year and are shared with the county directors of tax equalization. The county tax equalization boards use these results to assess agricultural land in the county. It is the responsibility of the local officials to determine the value of individual tracts based on their physical characteristics. The model does not consider the characteristics of individual land tracts; nor does it determine the value of individual tracts.

Any adjustments above or below the county average value when applied to individual tracts of land are made at the local level. Individual counties use different methods to make this adjustment. However, the average assessed value of agricultural land in the county must be within 5 percent of the county average value calculated in the model. It also is the local governments' responsibility to determine the mill levy and tax; the model does not address those issues.

Why the Model Was Developed

The model was developed in the early 1980s as an alternative method for estimating agricultural land values (Laws of North Dakota. 1981, ch.564). It is similar to a valuation method set forth in 1976 by Congress for establishing the value of agricultural land for federal estate tax purposes (26 U.S.C. §2032A). At that time, Congress was responding to concerns that the rapid increase in agricultural land values would lead to increased estate taxes for landowners and their families, even though the productivity of the land had not increased in the same proportion. The North Dakota model, like the

federal provision, bases land values for tax purposes on the revenue generated by the land, rather than its market price.

What Causes Values to Change

The three major factors influencing land values in the model are the gross returns the land generates, the capitalization rate and the cost of production index.

Gross Returns – The land valuation model is designed to reflect current production and, therefore, the revenue being generated by the land. However, since yields and prices of agricultural commodities vary considerably from year-to-year, multi-year averages are used to make the computations. Gross returns and the landowner share of gross returns are calculated based on the latest ten years of available data. The high and low years are dropped and the remaining eight years used to calculate average gross returns. Using an average reduces variability, but does not eliminate the possibility of a substantial change in value from one year to the next. Table 1 illustrates which years' gross return data were used to calculate the value of cropland in Adams County for 2012 and 2013.

Table 1. Annual Landowner Share of Gross Returns from Cropland, Adams County

Year	Landowners Share of Gross Returns $	Used for 2012	Used for 2013
2001	8,862,720	used	n/a
2002	3,640,556	low year	low year
2003	8,733,852	used	used
2004	6,731,110	used	used
2005	9,032,275	used	used
2006	6,089,625	used	used
2007	16,268,649	used	used
2008	11,897,314	used	used
2009	15,015,618	used	used
2010	21,252,672	high year	high year
2011	17,904,355	n/a	used
average (8-year)		$10,328,895	$11,459,100

Gross returns for 2001 through 2006 were significantly lower than 2007 through 2011. For both the 2012 and 2013 tax years, the same low year's data (2002) and the high year's data (2010) were dropped. The 2001 data are not included in the ten-year data set for the 2013 tax year and are replaced with the 2011 data. The years 2003 through 2009 are included in the average calculation for both years. Data from 2001 ($8,862,720) are replaced with data from 2011 ($17,904,355) for the 2013 tax year. This change alone increases the 8-year average by from $10.3 million to $11.4 million or approximately 10 percent. As the average gross returns increase, so does the value of land. Eliminating the lower production/price years from the first half of the decade will lead to higher average value for the next several years if productivity value remains at the higher level of the last half of the decade. This significantly impacts the land values as calculated by the model.

Data for the most recent year are not available until spring or summer of the following year. Consequently, information from the current year is not used in calculating the estimated land values.

For example, the 2011 data were unavailable for preparing the 2012 report that was completed in December, 2011. The result is a time lag in the data used to estimate the land values.

The combination of the time lag, dropping the high and low years, and using an eight-year average can lead to some unexpected results. For example, the state had a record number of prevented planted acres in 2011 resulting in significantly reduced crop sales in many counties, yet the estimated land value increased. An example is Renville County, where nearly 80 percent of the cropland did not get planted, yet the eight-year average value of production changed very little. Table 2 lists the landowners' share of gross revenue from cropland for 2001 through 2011 for Renville County, and the 8-year average revenue used to estimate cropland values for 2012 and 2013. 2012 was just the opposite, with the state and most counties experiencing record income that year. Even though 2012 may have been a record income year (the data are not shown in the table because they were unavailable at the time the 2012 and 2013 reports was prepared), it does not impact the estimated land value until 2014. Furthermore, once the data are available, they may be disregarded by the model if it is the low or high year. This situation illustrates that the most recent year is not an accurate indicator of the values that will be estimated by the model.

Table 2. Landowner Share of Gross Revenue from Cropland, Renville County

Year	Revenue	2012	2013
Date of Analysis		(Dec 2011)	(Dec 2012)
	$	$	$
2001	14,166,712	14,166,712	n/a
2002	14,097,650	14,097,650	14,097,650
2003	17,008,887	17,008,887	17,008,887
2004	12,412,580	low	12,412,580
2005	18,681,883	18,681,883	18,681,883
2006	21,033,496	21,033,496	21,033,496
2007	43,073,887	43,073,887	43,073,887
2008	47,156,639	high	high
2009	34,396,361	34,396,361	34,396,361
2010	42,603,012	42,603,012	42,603,012
2011	7,145,635	n/a	low
average (8-year)		25,631,651	25,413,469

Capitalization Rate – the eight-year average of the landowner share of gross returns per acre is divided by the capitalization rate to estimate the value per acre. Therefore, year-to-year fluctuations in the capitalization rate can result in substantial changes in the calculated land value. An average of the last 12 years (with the high and low years dropped) is used to reduce the variability resulting from fluctuating interest rates. Using averages reduces variability, yet allows the model to reflect a changing environment.

The average rate of interest provided by AgriBank, FCB, St. Paul represents the average retail bill rate of loans priced by local Associations of Agribank during the year to borrowers in North Dakota. The rate is the average of various loan products that range in rate duration from short (for example, a loan that resets after 2 or 3 years) to long (fixed to maturity of 20 or 30 years). The average is weighted by loan amount, not maturity. The annual interest rate fluctuated somewhat throughout the 1980s, but has

generally been declining since a peak of 12.50 percent in 1982. The capitalization rate (which is used in the land valuation model) increased steadily from 1983 through 1993, and has been declining since 1994 (Table 3). The following example demonstrates the impact a fluctuating capitalization rate has on land values even though the landowner's share of gross return is constant. Assuming a constant landowner share of gross return of $31 per acre for cropland and $10 per acre for non-cropland, Table 3 shows the calculated land values for each year.

In this example (Table 3), cropland value declines by $142 per acre from 1983 to 1993. As the capitalization rate declined from 1994 to 2014, cropland value increased $271.93 per acre to $597.30. Non-cropland value declined $45.61 per acre from 1981 to 1993, and has increased to $192.68 by 2014. As the interest rate declined over the past several years (especially since 1990), the capitalization rate decreased (but more slowly) resulting in higher land values.

The 2003 Legislature responded to constituents' complaints about rising land values by legislating a minimum capitalization rate to be used if the formula rate was below this minimum. The minimum was set at 9.50 percent. This rate was above the formula rate used the previous three years. The result was downward pressure on land values. In 2005 the Legislature amended the minimum value to 8.90 percent for 2005 and to 8.30 percent for subsequent years. The 2009 Legislature again amended the minimum capitalization rate to 8.0 percent for 2009, 7.70 percent for 2010, and 7.30 percent for 2011 and allowed the formula value to come back into effect for 2012 and beyond. This resulted in an abnormally large change in the capitalization rate from 2011 to 2012. The rate used for 2012 was 154 basis points below the previous year. This factor alone raised land values by 26 percent.

The change in land values may be inconsequential for years when gross returns and the capitalization rate move in the same direction. However during times when the two factors move in opposite directions, the impact on land values from one year to the next can be substantial. Likewise, the change in land value could be substantial if the gross return or interest rate for the most recent year differs considerably from that of 11 years ago for gross returns or 13 years ago for interest rates.

Table 3. Annual Interest Rate, Capitalization Rate, and Calculated Land Value by Year Assuming a Constant Landowner Share of Gross Return of $31 from Cropland and $10 from Non-cropland, 1980-2014.

Year	Annual Rate	Capitalization Rate	Minimum Capitalization Rate	Cropland Value	Non-Cropland Value
	%	%	%	$/ac	$/ac
1980	10.17				
1981	11.08	7.50		413.33	133.33
1982	12.50	7.50		413.33	133.33
1983	11.50	7.50		413.33	133.33
1984	11.63	7.80		397.44	128.21
1985	12.44	9.11		340.29	109.77
1986	12.01	9.56		324.27	104.60
1987	10.85	9.93		312.19	100.70
1988	10.95	10.31		300.68	96.99
1989	11.58	10.54		294.12	94.88
1990	11.25	10.79		287.30	92.68
1991	10.69	11.12		278.78	89.93
1992	8.19	11.35		273.13	88.11
1993	7.38	11.40		271.93	87.72
1994	8.98	11.40		271.93	87.72
1995	8.55	11.11		279.03	90.01
1996	8.36	10.76		288.10	92.94
1997	8.27	10.47		296.08	95.51
1998	8.43	10.14		305.72	98.62
1999	8.10	9.77		317.30	102.35
2000	8.32	9.45		328.04	105.82
2001	6.48	9.18		337.69	108.93
2002	5.25	8.91		347.92	112.23
2003	4.50	8.53	9.50	326.32	105.26
2004	5.12	8.11	9.50	326.32	105.26
2005	6.37	7.73	8.90	348.31	112.36
2006	7.08	7.43	8.30	373.49	120.48
2007	6.73	7.33	8.30	373.49	120.48
2008	4.55	7.18	8.30	373.49	120.48
2009	3.84	7.01	8.00	387.50	125.00
2010	4.46	6.63	7.70	402.60	129.87
2011	4.34	6.25	7.40	418.92	135.14
2012	4.10	5.86		528.65	170.53
2013	n/a	5.49		564.87	182.22
2014	n/a	5.19		597.30	192.68

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Cost of Production Index – was added to the model beginning with the 1999 assessment. This feature was added to the land valuation model in response to rising costs of production and perceived thinner operating margins. The index is calculated by the Economic Research Service annually and represents changes in the cost of production on a national basis. This index uses 1990-1992 as the base index of 100.

The index used in this model *is Items used for production, interest, taxes and wage rates*. Items used for production include feed, livestock and poultry, seeds, fertilizer, chemicals, fuels, supplies and repairs, autos and trucks, machinery, building materials, services and rents.

Issues

The use of the model occasionally raises some questions. For example, do the percentages of gross revenue attributable to landowners (as specified in the statute and used in the model) reflect the current situation? Do recent advances in production technology warrant adjusting these percentages? Is the method of analysis appropriate for irrigated land? If the answer to such questions is no, legislative action is necessary to amend the statute.

Likewise, the impact of changing the model to alter estimated land values does not alter the amount of revenue local governments need. Instead, it may lead to a change in the local levy. Changes in estimated land values can, however, shift the tax burden among property categories (for example, agricultural land and non-agricultural properties) if changes in the value of property among categories are not in equal proportions.

The cost of production index was added to the model by the State Legislature beginning with the 1999 assessment. This index has been increasing rapidly and is now significantly impacting land values. This index applies to all counties and to both cropland and non-cropland alike. For cropland, production has been increasing steadily as well and may be in part due to additional inputs which would be reflected in the cost of production. However, for non-cropland, production is held constant and value of production changes only with the price of calves and cull cows. Consequently the cost of production is pushing non-cropland values lower without any offsetting increases in production due to improved technology. This decline in land value will accelerate when the capitalization rate turns around and begins increasing. The capitalization rate likely will continue to decline for a couple more years, but will begin to increase with the 2017 analysis.

Crop insurance indemnity payments have never been included in the model. Crop insurance has had major revisions and improvements since this model was put in place. Today, crop insurance represents the major component of the farm financial safety net, much more significant than the traditional farm programs. In 2011, 5.6 million acres of North Dakota cropland was not planted and received prevented planting payments from multi-peril crop insurance policies. This was 5.6 million out of the normal annually planted acreage of about 25 million acres. Crop insurance indemnity payments in 2011 were equal to 26 percent of gross sales from crop production. During the previous 10-year period, insurance payments were between 4 and 9 percent of gross sales in 7 of those years. However in 2002, 2004 and 2008, insurance payments equaled 11, 15 and 12 percent of gross sales, respectively.

The capitalization rate has been the focal point of most of the criticism of the model, more specifically the changes in the rate from one year to the next. It is reasonable to question why the capitalization rate should change from year to year. The model is not intended to estimate market value,

therefore the need for a capitalization rate that reflects alternative uses of capital for potential buyers and sellers. Rather, this model is intended to capture the value of the land based on the value of the production. The model incorporates a rolling average of ten years of production data and 12 years of interest rates in order to smooth out the year-to-year volatility. Would it not be better to set the capitalization rate at some long term average and keep it the same from year to year?

Summary

The tax model estimates a value for North Dakota's agricultural lands by capitalizing the landowner's share of the revenue generated from the land. These computations rely on numerous data sources and assumptions (some of which have been specified by the legislature). The model will continue to be "fine-tuned" to reflect new legislation, concerns of local tax officials, changes in data sources, and trends in the agriculture industry.

For the first decade this model was in place, the legislature was reluctant to make changes to the model. That began to change in the mid-1990s and since then several legislative sessions have made changes to the model. In nearly all cases, the impact of these changes has been to lower calculated land values. Lowering the value of any one class of real property causes a shift in the tax burden to owners of the other three classes of property if values for those classes are not treated equitably. Push back from owners of residential and commercial property has been apparent in recent sessions of the Legislature. This should be heeded by those looking for more favorable assessment of agricultural land values.

North Dakota Capitalized Average Annual Values Per Acre by County for 2013 Assessments

County	Cropland	Noncropland	All Agricultural Land
Adams	353.03	120.29	264.71
Barnes	822.96	167.11	708.28
Benson	649.95	147.95	540.18
Billings	297.87	112.60	170.23
Bottineau	573.78	143.18	501.40
Bowman	372.90	99.37	238.29
Burke	498.54	131.66	387.22
Burleigh	474.97	132.07	318.95
Cass	1023.77	169.91	976.50
Cavalier	797.98	145.20	707.80
Dickey	858.03	166.70	706.03
Divide	471.68	130.91	388.09
Dunn	366.92	119.98	212.35
Eddy	576.16	148.58	447.55
Emmons	627.72	130.79	419.58
Foster	734.85	143.02	628.18
Golden Valley	386.31	98.57	224.69
Grand Forks	978.20	166.78	908.64
Grant	376.06	120.60	245.40
Griggs	713.54	145.74	587.82
Hettinger	508.53	119.68	411.94
Kidder	457.19	133.38	274.88
LaMoure	893.16	172.40	798.38
Logan	546.06	131.61	345.85
McHenry	461.53	142.23	364.07
McIntosh	586.95	130.87	410.13
McKenzie	404.03	120.48	234.41
McLean	594.52	131.22	523.57
Mercer	433.42	119.92	297.66
Morton	420.38	120.21	246.78
Mountrail	510.17	130.73	351.78
Nelson	599.81	144.95	520.12
Oliver	512.50	120.56	284.12
Pembina	1143.18	173.64	1018.37
Pierce	553.02	142.26	465.22
Ramsey	656.31	149.04	534.53
Ransom	839.82	164.19	637.62
Renville	622.65	142.67	585.67
Richland	1103.47	168.70	959.08
Rolette	569.08	144.71	502.55
Sargent	873.99	168.38	768.49
Sheridan	524.53	130.85	371.60
Sioux	388.71	120.31	172.61
Slope	428.95	109.62	260.34
Stark	428.80	120.84	314.25
Steele	942.55	148.09	832.92
Stutsman	699.33	164.68	551.01
Towner	670.47	148.63	645.57
Traill	1130.88	168.37	1056.96
Walsh	987.04	155.38	819.71
Ward	615.53	130.72	501.88
Wells	733.23	143.56	626.43
Williams	458.35	131.09	329.08
State	662.65	128.85	495.26

Adams County — Calculations for 2013 Assessments — Appendix B

	1	2	3	4	5	6	7	8	9
	Adams County		Calculations for 2013 Assessments						
A	Annual number of acres:	Sugarbeets		Govt			Reported	Reported	Reported
		& Potatoes	Cropland	Payments	CRP		Cropland	Non-cropland	Total
		Year							
		2002	275,100		93,903		369,003	237,950	606,953
		2003	302,600		93,903		396,503	237,950	634,453
		2004	284,111		72,255		356,366	237,950	594,316
		2005	316,639		72,255		388,894	237,950	626,844
		2006	291,342		73,802		365,144	237,950	603,094
		2007	291,980		69,585		361,565	237,950	599,515
		2008	326,410		65,574		391,984	237,950	629,934
		2009	312,046		64,433		376,479	237,950	614,429
		2010	302,250		60,466		362,716	237,950	600,666
		2011	353,545		56,875		410,420	237,950	648,370
B	Annual gross returns:	2002	0	7,056,900	2,174,835	871,036	10,102,771	7,410,410	17,513,181
	50% of return on irrigated	2003	0	20,628,463	5,718,144	829,870	27,176,477	8,748,555	35,925,032
	cropland is included in	2004	0	17,112,717	2,562,359	828,587	20,503,663	10,260,521	30,764,184
	cropland gross returns;	2005	0	21,619,793	5,735,299	825,747	28,180,839	11,152,312	39,333,151
	CRP returns are 50% of	2006	0	14,890,240	2,587,363	846,344	18,323,947	10,314,121	28,638,068
	payments reported by FSA	2007	0	49,661,267	1,695,910	861,496	52,218,673	9,676,518	61,895,191
		2008	0	33,041,310	3,875,840	822,169	37,739,319	8,886,336	46,625,655
		2009	0	44,837,637	2,490,742	817,105	48,145,484	8,685,419	56,830,903
		2010	0	57,056,511	11,161,394	787,301	69,005,206	10,322,671	79,327,877
		2011	0	53,846,856	3,389,691	733,391	57,969,938	12,872,954	70,842,892
C	Landowner share of returns	20.00%	30.00%	30.00%			30.00%	25.00%	28.93%
D	Annual landowner share	2002					3,640,556	1,852,603	5,493,159
	of gross returns	2003					8,733,852	2,187,139	10,920,991
		2004					6,731,110	2,565,130	9,296,240
		2005					9,032,275	2,788,078	11,820,353
		2006					6,089,625	2,578,530	8,668,155
		2007					16,268,649	2,419,130	18,687,779
		2008					11,897,314	2,221,584	14,118,898
		2009					15,015,618	2,171,355	17,186,973
		2010					21,252,672	2,580,668	23,833,340
		2011					17,904,355	3,218,239	21,122,594
E	These 8 years of data were used in the following calculations:						2011,2009,2008,2007, 2006, 2005, 2004, 2003	2010,2009,2008,2007, 2006, 2005, 2004, 2003	
F	Eight-year annual average acres:						380,919	237,950	618,869
G	Eight-year average annual landowner share of gross returns:						11,459,100	2,438,952	13,898,052
H	Adjusted for cost of production index @	155.27					7,380,112	1,570,781	8,950,893
I	Eight-year average landowner share of gross returns per acre:						19.37	6.60	14.46
						Inundated			
J	Capitalized average annual value per acre @	5.49%				12.03	353.03	120.29	
K	Acreage provided or reviewed by county:						376,431	230,221	606,652
	Inundated acres								0
L	Capitalized average value based on acreage provided or reviewed by county:								264.71

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Appendix B

Year: 2011   County: Adams

CROP	ACRES	YIELD	PRODUCTION	PRICE	TOTAL REVENUE
Spring Wheat (bu)	146,636	17.91	2,626,251	8.17	21,456,471
Durum (bu)	17,059	17.90	305,356	9.45	2,885,614
Winter Wheat (bu)	11,350	30.00	340,500	6.57	2,237,085
Barley (bu)	3,096	24.86	76,967	5.42	417,161
Oats (bu)	671	33.47	22,458	3.03	68,048
Sunflower Oil (lb)	17,431	1,507.32	26,274,095	0.2760	7,251,650
Sunflower Non-oil (lb)	0	0.00	0	0.3270	0
Canola (lb)	11,469	1,309.59	15,019,688	0.2400	3,604,725
Soybeans (bu)	0	0.00	0	11.90	0
Flaxseed (bu)	2,165	17.19	37,216	13.90	517,302
Corn Grain (bu)	155	93.24	14,452	5.81	83,966
Corn Silage (ton)	9,760	15.43	150,597	25.67	3,865,825
Dry Edible Beans (lb)	0	0.00	0	0.3990	0
Dry Edible Peas (lb)	1,904	1,292.17	2,460,292	0.1530	376,425
Lentils (lb)	260	1,188.39	308,981	0.2040	63,032
Alfalfa Hay (ton)	31,851	2.20	70,072	77.00	5,395,544
Other Hay (ton)	69,777	1.55	108,154	52.00	5,624,008
Other Crop 1	0	0.00	0	0.00	0
Other Crop 2	0	0.00	0	0.00	0
Other Crop 3	0	0.00	0	0.00	0
Other Crop 4	0	0.00	0	0.00	0
Other Crop 5	0	0.00	0	0.00	0
Potatoes (cwt)	0	0.00	0	9.20	0
Sugar Beets (ton)	0	0.00	0	55.68	0
Potatoes Irrigated (cwt) - 50%	0	0.00	0	9.20	0
Sugar Beets Irrigated (ton) - 50%	0	0.00	0	55.68	0
Spring Wheat Irrigated (bu) - 50%	0	0.00	0	8.17	0
Durum Irrigated (bu) - 50%	0	0.00	0	9.45	0
Corn Grain Irrigated (bu) - 50%	0	0.00	0	5.81	0
Corn Silage Irrigated (bu) - 50%	0	0.00	0	25.67	0
Prevented Planted	25,698				
Summer Fallow	4,263				
Subtotal Sugar Beets & Potatoes					0
Subtotal All Crops Except Sugar Beets & Potatoes					53,846,856
Total	353,545				53,846,856

Year: 2011 Calf Price($/cwt) 151.60 Cow Price($/cwt) 71.60

County	Range Acres	Pasture Acres	Total Acres	Range AUM	Pasture AUM	Range Revenue	Pasture Revenue	Total Revenue
Adams	224,750	13,200	237,950	0.55	0.60	12,097,832	775,122	12,872,954
Barnes	43,400	24,300	67,700	0.75	0.80	3,185,636	1,902,573	5,088,209
Benson	47,000	70,000	117,000	0.65	0.70	2,989,898	4,795,581	7,785,479
Billings	215,000	3,420	218,420	0.55	0.60	10,871,685	189,671	11,061,356
Bottineau	50,800	9,640	60,440	0.65	0.70	3,231,634	660,420	3,892,054
Bowman	306,000	46,800	352,800	0.45	0.50	13,476,561	2,290,135	15,766,696
Burke	131,600	14,700	146,300	0.60	0.65	7,727,736	935,138	8,662,874
Burleigh	353,600	56,700	410,300	0.60	0.65	20,763,887	3,606,962	24,370,849
Cass	11,200	18,000	29,200	0.75	0.80	822,100	1,409,314	2,231,414
Cavalier	33,700	17,800	51,500	0.65	0.70	2,143,820	1,219,448	3,363,268
Dickey	82,100	38,900	121,000	0.75	0.80	6,026,284	3,045,683	9,071,967
Divide	172,300	5,600	177,900	0.60	0.65	10,117,697	356,243	10,473,940
Dunn	714,600	19,900	734,500	0.55	0.60	38,465,453	1,168,556	39,634,009
Eddy	23,200	44,200	67,400	0.65	0.70	1,475,865	3,028,067	4,503,932
Emmons	308,300	6,600	314,900	0.60	0.65	18,103,808	419,858	18,523,666
Foster	42,800	7,250	50,050	0.65	0.70	2,722,716	496,685	3,219,401
Golden Valley	282,900	17,800	300,700	0.45	0.50	12,459,213	871,034	13,330,247
Grand Forks	39,600	19,400	59,000	0.75	0.80	2,906,709	1,518,927	4,425,636
Grant	504,600	46,300	550,900	0.55	0.60	27,161,584	2,718,801	29,880,385
Griggs	28,300	18,500	46,800	0.65	0.70	1,800,300	1,267,404	3,067,704
Hettinger	102,500	0	102,500	0.55	0.60	5,517,365	0	5,517,365
Kidder	265,600	92,640	358,240	0.60	0.65	15,596,404	5,893,280	21,489,684
LaMoure	5,250	28,640	33,890	0.75	0.80	385,359	2,242,375	2,627,734
Logan	216,600	23,000	239,600	0.60	0.65	12,719,055	1,463,142	14,182,197
McHenry	348,800	27,300	376,100	0.65	0.70	22,188,860	1,870,277	24,059,137
McIntosh	162,500	4,650	167,150	0.60	0.65	9,542,228	295,809	9,838,037
McKenzie	595,200	46,800	642,000	0.55	0.60	32,038,396	2,748,162	34,786,558
McLean	296,226	19,000	315,226	0.60	0.65	17,394,805	1,208,682	18,603,487
Mercer	295,686	6,580	302,266	0.55	0.60	15,916,171	386,387	16,302,558
Morton	561,130	28,300	589,430	0.55	0.60	30,204,478	1,661,816	31,866,294
Mountrail	522,200	7,900	530,100	0.60	0.65	30,664,315	502,557	31,166,872
Nelson	50,700	24,100	74,800	0.65	0.70	3,225,273	1,651,050	4,876,323
Oliver	194,100	17,000	211,100	0.55	0.60	10,448,005	998,264	11,446,269
Pembina	960	22,500	23,460	0.75	0.80	70,466	1,761,642	1,832,108
Pierce	118,600	9,600	128,200	0.65	0.70	7,544,721	657,680	8,202,401
Ramsey	12,100	28,000	40,100	0.65	0.70	769,740	1,918,232	2,687,972
Ransom	40,500	4,050	44,550	0.75	0.80	2,972,771	317,096	3,289,867
Renville	41,200	5,250	46,450	0.65	0.70	2,620,932	359,669	2,980,601
Richland	55,000	56,200	111,200	0.75	0.80	4,037,096	4,400,190	8,437,286
Rolette	51,700	22,200	73,900	0.65	0.70	3,288,888	1,520,884	4,809,772
Sargent	41,500	37,600	79,100	0.75	0.80	3,046,173	2,943,900	5,990,073
Sheridan	214,000	5,700	219,700	0.60	0.65	12,566,380	362,605	12,928,985
Sioux	475,000	28,850	503,850	0.55	0.60	25,568,276	1,694,112	27,262,388
Slope	261,000	21,300	282,300	0.55	0.60	12,771,905	1,146,535	13,918,440
Stark	242,200	28,720	270,920	0.55	0.60	13,037,129	1,686,479	14,723,608
Steele	11,300	17,720	29,020	0.65	0.70	718,848	1,213,967	1,932,815
Stutsman	275,000	43,300	318,300	0.75	0.80	20,185,481	3,390,182	23,575,663
Towner	7,300	14,200	21,500	0.65	0.70	464,388	972,818	1,437,206
Traill	15,900	14,400	30,300	0.75	0.80	1,167,088	1,127,451	2,294,539
Walsh	22,000	8,600	30,600	0.65	0.70	1,507,183	631,255	2,138,438
Ward	251,400	3,665	255,065	0.60	0.65	14,762,560	233,148	14,995,708
Wells	56,400	13,600	70,000	0.65	0.70	3,587,878	931,713	4,519,591
Williams	375,000	19,000	394,000	0.60	0.65	22,020,525	1,208,682	23,229,207
State	9,800,302	1,229,375	11,029,677			557,099,560	82,075,663	639,175,223