

# ESTIMATED TAX IMPACTS ON NORTH DAKOTA FARM OPERATORS

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Impacts of various taxes on farmers are not well understood by farm organizations or by those formulating tax laws. A partial remedy to this problem is to develop estimates of taxes paid by various tax paying entities. Several farm groups in North Dakota funded a study to focus on taxes paid by farm and ranch operators to ameliorate this situation.

The objectives were: 1) to estimate the level and distribution of federal, state, and local taxes paid by farm and ranch operators in North Dakota and 2) to measure tax impacts by type and size of farm operation. Impacts may be direct or indirect in nature and can be measured in numerous ways. This study assessed only direct impacts of taxes on farm and ranch businesses. Taxes included were federal (income, self-employment, and fuel), state (income, sales, and fuel), and real estate taxes collected by local governments. Real estate taxes levied directly on farm operators were included while those levied on landlords were not.

## Data

Three years of farm record summaries from the North Dakota Vocational Agricultural Farm Business Management Program (Gullickson and Holkup) were used to develop estimates of taxes paid by farm operators. Additional data were obtained through the North Dakota Farm Bureau and from the Farm Management Program at Moorhead Area Vocational Technical School (north-western Minnesota). Records from 231 farms were considered usable. All farms had records for 1981 and 1982; however, 33 farms did not have records for 1983.

Farms were classified as cash grain, specialty crop, dairy and beef according to the source of at least 50 percent of their sales. Mixed farms were those operations in which no single enterprise accounted for more than 50 percent of total annual sales. Cash grain farms were geographically subdivided into Northwest (NW), Southwest (SW), East Central (EC), and Red River Valley (Valley) farming regions as shown in Figure 1. Production of specialty crops (potatoes and sugarbeets) is confined to the Valley. Farms were separated into four size groups, based on sales of all

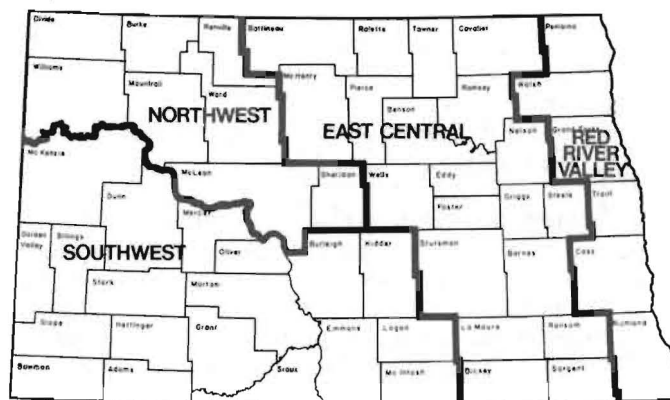


Figure 1. Four Farming Regions in North Dakota

agricultural products: small (\$10,000-39,999), medium (\$40,000-99,999), large (\$100,000-249,999), and very large (greater than \$250,000).

Farm records data were compared to the 1982 Census of Agriculture (U.S. Department of Commerce) to determine if farms used in this study were representative of all North Dakota farms (Pederson et al.). This study included relatively fewer small farm operations and cash grain farms but proportionately more livestock ranches than the 1982 Census of Agriculture.

## Tax Model and Assumptions

Farm records do not show individual taxes as line expense items, except for operators' real estate taxes. Therefore, a computer model was developed to estimate tax liabilities. The model required information on both farm and nonfarm income as well as household expenses and family size.

Determining taxable income was central to the estimation of federal and state income taxes and the federal self-employment tax. Taxable income was the sum of total farm income, nonfarm income, and capital gains less total farm expenses. Gross farm income equaled the sum of livestock and crop sales and other farm income during the calendar year. Nonfarm income included outside investment income and nonfarm employment earnings. Capital gains income was generated through sales of mature breeding livestock, machinery, buildings, and land. A

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simplifying assumption was that all cows sold had a zero basis (were raised on the farm). Gains from the sale of machinery, buildings, and land were estimated based upon assumptions concerning the turnover rate of these assets. Gains from the sale of buildings and machinery were apportioned between those taxed at capital gains rates and ordinary income rates (Pederson et al.).

Farm expenses included farm operating expenses and depreciation on machinery and buildings. No livestock depreciation was deducted because all beef and dairy cows were assumed to be raised on the farm. Net farm profit (or loss) equaled gross farm income minus operating expenses and depreciation.

The farm operator's federal income tax liability was estimated by subtracting the standard federal deduction per dependent from the taxable income estimate. Federal income tax liability was computed each year on a cash receipts and disbursements basis using federal tax tables for married individuals filing a joint return.

Investment tax credit (ITC) was subtracted from the estimated federal income tax liability to determine federal income tax due. ITC was computed at 10 percent of qualified purchases (assuming all purchases qualified for the maximum tax credit). Adjustments to federal income tax liability captured tax-reduction benefits of loss carry-forward, income averaging, investment tax credit carry-forward/carry-back, and tax sheltering which prudent farm operators would use as tax management strategies.

State income tax was estimated from the federal income tax liability each year (prior to deduction of the ITC). The state tax rate, a percentage of the federal tax liability, was 7.5 percent in 1981 and 1982 and 10.5 percent in 1983. State tax law provided a \$100 credit for 1981 and 1982 but not for 1983.

Federal self-employment (social security) taxes were based on farm and nonfarm earnings excluding capital gains income and other unearned (outside investment) income. Self-employment tax was 9.3 percent in 1981 for earnings less than \$29,700, and 9.35 percent in 1982 and 1983 for earnings less than \$32,400 (1982) and \$35,700 (1983).

The general sales tax rate on farm machinery, equipment, and building purchases was 2 percent in 1981 and 1982 but was raised to 3 percent in 1983. Other taxed purchases were subject to a general state sales tax of 3 percent in 1981 and 1982 and a 4 percent rate in 1983. Food (except meals purchased away from home), seed, fertilizer, and agricultural chemicals are exempt from sales tax. Although repair parts are taxed, the labor component of repair expenses is not subject to state sales tax.

Expenditures for fuel, oil, and grease were reported as a single item in the business summary. Expenditures for oil and grease were assumed to equal 15 percent of the total. Fuel expenditure was separated into diesel fuel (64 percent of total fuel cost), farm-use gasoline (5.6 percent), and road-use gasoline (30.4 percent) based on a recent study of farm fuel use (Tsigas).

Gasoline and diesel fuel are subject to state and federal fuel taxes. Diesel fuel was subject to a state fuel tax of 2 percent. Farm-use gasoline was subject to a state fuel tax at \$0.01125 per gallon. Road-use gasoline was subject to a state fuel tax of \$0.08 per gallon in 1981 and 1982, which was increased to \$0.13 per gallon in July 1983. The federal fuel tax on road-use gasoline was \$0.04 per gallon in 1981 and 1982 and increased to \$0.09 per gallon in April 1983.

Although real estate taxes paid by the farm operator were available from the record summaries, they were not used in this analysis because a significant portion of the farmers were delinquent in their payments. A few had paid two years' tax in one year for income tax management reasons. Therefore, real estate tax assessed a farm operator was used to more accurately reflect tax liability being incurred by the farmer. Taxes assessed were estimated using county-average agricultural land value estimates and the county-average mill rates applicable for farm real estate in 1981, 1982, and 1983.

### Estimated Taxes Paid by Year

Median characteristics and estimated taxes are reported for the individual years 1981, 1982, and 1983 in Table 1.<sup>1</sup> Median gross farm income and net farm profit increased in 1982 and again in 1983. Nonfarm income, total acres farmed, and acres owned were stable. Capital purchases declined in 1982 and 1983. The decline in total capital purchases from 1981 to 1983 was 57 percent.

**Table 1. Median Characteristics and Estimated Taxes of North Dakota Farm Operators by Year.**

Item	1981	1982	1983
Number of Farms	231	231	198
<b>Characteristics</b>			
Gross farm income	\$92,734	\$101,962	\$111,408
Net farm profit (loss)	2,425	4,349	7,309
Capital gains	1,870	1,943	1,350
Nonfarm income	4,447	4,381	4,239
Capital purchases	19,683	12,664	8,514
Acres in farm	1,170	1,220	1,214
Acres owned	606	640	635
<b>Taxes</b>			
Federal income	\$ 0	\$ 0	\$ 0
State income	0	5	46
Self-employment	462	808	1,171
State sales	811	715	908
Fuel - federal & state	379	394	531
Real estate	1,453	1,367	1,466
<b>Total taxes</b>	<b>\$ 3,105</b>	<b>\$ 3,289</b>	<b>\$ 4,122</b>

No federal income tax was paid by the median farm operator, even with improved income in 1983. This is the

<sup>1</sup> Income and estimated taxes do not represent normal distributions. The distributions are skewed to the right due to existence of some extremely high values. Therefore, the median is a better measure of central tendency than the mean. The median represents the value above (or below) which half the observations fall.

result of investment credit carryover from previous years and capital gains treatment of some sales. The median farmer paid some state income taxes mainly because ITC does not apply to state income taxes. The state income tax rate was increased in 1983 (7.5 to 10.5 percent), and the \$100 deduction for energy credit was discontinued. Self-employment tax was the most important federal tax and increased each year as both rates and farm earnings subject to the tax increased.

Although estimated median sales tax per farm was quite stable, it was lower in 1981 and 1982 than in 1983, partially due to a 1 percent rate increase. The state sales tax was the largest single state tax paid by farmers.

Fuel taxes (federal and state) were higher in 1983 than in 1981 or 1982. This is due to an increase in fuel tax rates at both federal and state levels. Real estate tax was stable across all three years.

### Estimated Taxes Paid by Type of Farm

A comparison of median farm characteristics and estimated taxes paid is shown in Table 2. Cash grain farmers were separated into four regions of the state and specialty crop farmers were all located in the Valley. Mixed, dairy, and beef farm operators are reported as statewide aggregates.

Cash grain farms in the Valley generated the most gross farm income and net farm profit as compared to cash grain farms in other areas of the state. Specialty crop farms had the highest gross farm income and profit of any farm type. Dairy farms generated higher gross farm income than either beef or mixed operations. Capital gains income, chiefly from sale of breeding livestock, was a significant source of earnings for livestock ranchers. Nonfarm income was typically a major source of revenue except for dairy farms.

Median estimated federal and state income taxes were low for all types of farms with the exception of specialty crop farms. Federal income taxes were low or zero because of low incomes and use of investment credit to offset a potential tax liability. State income taxes also were low since they were based on the federal tax liability before investment credit was deducted. Livestock ranchers paid less income taxes than crop farmers partly because only 40 percent of capital gains income is subject to income tax.

Self-employment tax (which excluded capital gains income) was the major federal tax for the farmers studied. Livestock farmers paid over \$1,000 a year less in self-employment tax than cash grain farmers, largely because a significant portion of their income was capital gains (from the sale of mature breeding livestock) and not subject to the tax.

Real estate tax liability depended upon land owned relative to amount rented.<sup>2</sup> Real estate assessments in a county are based on productivity value determined as a percent of the gross value of crop and pasture production (Pederson and Coon). Real estate taxes also are influenced by county mill rates. After real estate taxes were adjusted for percent ownership, there was a fairly close relationship between real estate taxes assessed and gross farm income among farm types, except for dairy farmers. Dairy farmers were assessed less real estate tax relative to gross farm income because they add more value to the feeds including pasture produced on an acre of land.

### Estimated Taxes Paid by Amount of Sales Groups

Median characteristics and estimated taxes paid by farm operators classified into four size groups are shown in

<sup>2</sup> Percent ownership (tenure) for the median farm ran from 35 to 52 percent for all farm types with the exception of livestock farms (beef and dairy) which were 71 to 73 percent tenure.

Table 2. Median Characteristics and Estimated Operators' Taxes by Farm Type in North Dakota, 1981-1983.

Item	Cash Grains				Specialty Crops	Dairy	Beef	Mixed
	NW	SW	EC	Valley				
Number of Farms	14	16	60	45	10	33	31	22
Characteristics								
Gross farm income	\$64,564	\$128,100	\$91,935	\$150,792	\$250,562	\$100,941	\$86,278	\$81,784
Net farm profit (loss)	4,245	4,282	8,485	10,982	26,963	(958)	(8,973)	685
Capital gains	613	1,141	831	78	168	7,663	8,543	3,542
Nonfarm income	4,680	14,109	4,900	7,422	4,567	1,931	6,783	5,114
Capital purchases	15,543	30,725	19,443	25,783	66,049	14,468	18,326	17,467
Acres in farm	1,362	2,032	1,224	880	1,011	1,120	2,131	1,295
Acres owned	589	757	637	320	358	820	1,510	593
Taxes								
Federal income	\$ 0	\$ 455	\$ 0	\$ 243	\$ 2,884	\$ 0	\$ 0	\$ 0
State income	65	239	102	176	560	0	0	27
Self-employment	942	1,472	1,260	1,286	2,156	207	115	864
State sales	644	1,241	783	992	1,827	807	776	757
Fuel - federal & state	362	483	456	484	782	362	395	463
Real estate	661	2,141	1,219	1,492	1,465	1,161	1,918	1,401
Total taxes	\$ 2,674	\$ 6,031	\$ 3,820	\$ 4,673	\$ 9,674	\$ 2,537	\$ 3,204	\$ 3,512

**Table 3. Median Characteristics and Estimated Taxes of North Dakota Farm Operators Based on Sale of Agricultural Products, 1981-1983.**

Item	Annual Sales of Agricultural Products			
	\$10,000-39,999	\$40,000-99,999	\$100,000-249,999	Greater Than \$250,000
Number of Farms	20	116	79	16
<b>Characteristics</b>				
Gross farm income	\$31,994	\$76,442	\$166,602	\$357,667
Net farm profit (loss)	(316)	2,985	9,143	23,182
Capital gains	778	2,416	2,017	5,991
Nonfarm income	7,592	3,993	5,287	5,885
Capital purchases	9,615	12,386	27,626	74,841
Acres in farm	958	1,051	1,645	1,685
Acres owned	138	530	790	777
<b>Taxes</b>				
Federal income	\$ 0	\$ 0	\$ 0	\$ 20
State income	18	33	160	405
Self-employment	454	807	1,282	1,589
State sales	449	718	1,187	2,067
Fuel - federal & state	263	378	562	958
Real estate	331	1,159	2,062	3,121
Total taxes	\$ 1,515	\$ 3,095	\$ 5,253	\$ 8,160

Table 3. The majority of small farms had net losses. Small farms showed higher nonfarm income than any other sales group. All other farm characteristics tended to increase with higher sales of agricultural products.

Due to investment credit, including carry-forward/carry-back, the median farm in each size group paid virtually no federal income tax. State income taxes increased faster than gross income. Self-employment tax also increased with farm size but did not increase proportionately with income. Many of the largest farms reached the maximum income subject to the tax.

Sales and fuel taxes increased with gross income level but at a less than proportionate rate. Clothing and telephone were not related to farm size but are subject to the general state sales tax. In addition, use of the family automobile and pickup truck tended to be related to off-farm work, family size, and distance to town rather than farm size.

The smallest farm size group owned only 14 percent of the land they farmed. Land ownership was nearly constant at 46 to 50 percent of total land farmed for the three largest farm size groups. Real estate taxes for the three largest farm size groups increased less rapidly than either gross or net income. Operators of larger farms apparently achieved a part of their higher gross incomes through higher yields, more intensive cropping practices, and livestock enterprises.

**Estimated Taxes Paid by Tax Group**

Farm characteristics and estimated taxes were averaged over the three-year period (1981-1983) and sorted into low and high tax groups according to total state taxes. Total

state taxes were used to sort farms into groups because a major focus of the study was to relate state taxes paid to selected farm characteristics. Farm operators were arrayed from low to high in total dollars of state taxes paid. They are separated into three groups consisting of the 25 percent paying least taxes, the 50 percent paying medium taxes, and the 25 percent paying most state taxes. Median characteristics and estimated taxes by tax group are given in Table 4.

**Table 4. Median Characteristics and Estimated Taxes of North Dakota Farm Operators Classified by Level of State Taxes Paid, 1981-1983.**

Item	Level of State Tax Paid		
	Low	Medium	High
Number of Farms	58	115	58
<b>Characteristics</b>			
Gross farm income	\$54,457	\$96,917	\$194,755
Net farm profit (loss)	118	1,162	20,852
Capital gains	2,934	2,501	620
Nonfarm income	3,116	4,474	8,296
Capital purchases	7,222	20,597	57,371
Acres in farm	869	1,232	1,625
Acres owned	479	604	709
<b>Taxes</b>			
Federal income	\$ 0	\$ 0	\$ 460
State income	5	52	371
Self-employment	398	979	1,982
State sales	446	865	1,784
Fuel - federal & state	303	440	668
Real estate	1,031	1,348	2,019
Total taxes	\$ 2,183	\$ 3,684	\$ 7,284

The high state tax group had more gross farm income and more nonfarm income than lower tax paying groups. These farm operators also paid significantly more self-employment, state sales, and real estate taxes. Capital gains income was less in the high tax group as compared with low or medium tax groups. This is chiefly because livestock ranchers tended to be in the lower tax paying groups.

#### Estimated Tax Impacts by Farm Type and Size

Ability to pay out of current income is often used as a criterion to evaluate the impacts of various taxes on different groups of taxpayers. Federal, state, and local taxes are compared with combined income in Tables 5 and 6 to evaluate tax impacts among groups of farmers. Combined income is the sum of net farm profit (loss), capital gains income, and nonfarm income. The tax ratio which results should be interpreted as a gross, average tax level, not as an effective tax rate. Because real estate taxes and business-related sales taxes reduce taxable income and income tax liability, the corresponding tax impact ratios will slightly overstate effective tax impacts. The reader also is cautioned against comparing the calculated tax ratios with federal and state marginal tax rates since the income base used in computing the ratios has not been adjusted downward for capital gains treatment, personal exemptions, or tax credits.

Tax impacts varied considerably by farm type. Federal taxes had much less impact on livestock farmers than on crop farmers (3.6 percent versus 9.3 percent of combined income), largely because capital gains from breeding livestock sales are not included in determining the self-employment tax. State taxes, on the other hand, tended to have a more severe impact on livestock farmers because of their low income and the fact that sales and fuel taxes tended to be only slightly related to net income.

The differential impact of real estate taxes can be explained partially by the higher percentage of land owned by the livestock operators compared to cash grain operators. Beef ranchers had a higher real estate tax ratio because of their low incomes. Although real estate taxes were related to gross income, they did not relate well to net income for beef ranches. Beef ranchers had a negative gross profit margin including capital gains while the dairy and cash grain farmers had positive gross profit margins ranging from 6.6 to 10 percent of gross farm income.

An examination of tax impacts by farm size groups (Table 6) reveals that both federal and state taxes tended to have the greatest influence on the two middle farm size groups. The relatively large nonfarm income of the small farm group indicated that their income tended to be large relative to self-employment, sales, and fuel taxes paid. Federal tax impacts for the largest farm size group

**Table 5. Taxes as a Percent of Combined Income for Federal, State, and Local Government by Farm Type, 1981-1983.**

Farm Type	Tax Category			Total	Combined Income <sup>a</sup>
	Federal	State	Local		
-----percent-----					
Cash Grain:					
Northwest	10.9	10.2	6.9	28.0	\$ 9,538
Southwest	10.6	9.3	11.0	30.9	19,532
East Central Valley	9.7	8.5	8.6	26.8	14,216
Valley	9.0	8.2	8.1	25.3	18,482
Specialty Crop	16.6	9.3	4.6	30.5	31,698
Dairy	3.6	12.3	13.4	29.3	8,636
Beef	3.6	16.6	30.2	50.4	6,356
Mixed	10.6	11.9	15.0	37.5	9,341

<sup>a</sup> Sum of net farm profit (loss), capital gains income, and nonfarm income.

**Table 6. Taxes as a Percent of Combined Income for Federal, State, and Local Government by Farm Size, 1981-1983.**

Farm Size <sup>a</sup>	Tax Category			Total	Combined Income <sup>b</sup>
	Federal	State	Local		
-----percent-----					
Small	6.6	8.1	4.1	18.8	\$ 8,054
Medium	9.7	10.9	12.3	32.9	9,394
Large	8.7	10.7	12.5	31.9	16,447
Very Large	5.3	9.0	8.9	23.2	35,058

<sup>a</sup> Based on sales of all agricultural products.

<sup>b</sup> Sum of net farm profit (loss), capital gains income, and nonfarm income.

benefited from the limit on income subject to self-employment tax. The largest farms had higher gross profit margins on their farming operations. This reduced the impact of sales and fuel taxes which were related to gross income levels.

Local real estate taxes paid by the smallest size group took a relatively smaller proportion of income because of low land ownership and high off-farm income. Real estate tax ratios were about the same for the two middle-sized groups but declined for the largest farms. The decline results from a higher gross income relative to real estate taxes plus a larger gross profit margin. Net farm income plus capital gains was 8.1 percent of gross farm income for the largest size group compared to 7.1 and 6.6 percent for the two middle-sized groups.

### Conclusions

Farm income was somewhat depressed for the three years analyzed; however, certain general conclusions can be drawn from the analysis. The major taxes are concentrated in the local real estate tax, federal self-employment tax, and the state sales tax. A comparison of those taxes indicated that on average the real estate tax accounted for 28 percent, the self-employment tax 24 percent, and state sales tax 21 percent of all taxes paid by farm operators.

Real estate taxes are paid in relation to size, location, land quality, and proportion of owned land. Sales taxes are closely related to the purchase of farm capital (machinery, equipment, buildings, parts, etc.). Farms with high capital purchases (e.g., Valley farms) paid relatively more state sales tax than other farms. Federal self-employment tax was considerably lower for livestock operations since breeding livestock sales are not subject to this tax. Farms with large off-farm income, on the other hand, tended to pay more self-employment tax.

Tax impacts varied by type and size of farm. Beef producers paid more taxes than cash grain or dairy farms per dollar of net income. Although total taxes increased with farm size, taxes paid per dollar of income declined for farms grossing over \$250,000. Operators of middle-sized farms had the greatest total burden of taxes per dollar of combined income. Small farm operators paid less taxes as a proportion of income due to lower land ownership levels and the tendency for nonfarm income to comprise a major part of their combined income.

Reforms in the taxing system to make it less biased would suggest taxing capital gains more heavily and including breeding livestock sales in self-employment income. Elimination or reduction of investment credit to make the income tax effective for farmers would tend to put more of the tax burden upon those with the ability to pay. At the state level, more reliance on the income tax relative to the sales tax also would shift the tax burden onto those with the most ability to pay.

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