9-3-2014

Economic Impact of Agriculture on South Dakota

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SDSU

ECONOMICS COMMENTATOR

South Dakota State University No. 550 September 3, 2014

ECONOMIC IMPACT OF AGRICULTURE ON SOUTH DAKOTA

by

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Agricultural production in South Dakota has traditionally played a major role in the prosperity of the state. In 2012, the sum of crop and livestock production in the state exceeded $10.66 billion (IMPLAN Pro3 database). This is a significant increase from the $8.33 billion produced in 2010. This increase was driven by a significant increase in livestock and crop prices. In addition to the impacts on the agricultural industry, agricultural production has effects that ripple through the entire South Dakota economy. There are three basic effects that can be identified: the direct, indirect, and induced effect. The direct effect is the actual value of the products produced and sold by the agricultural sector. The indirect effect is the business-to-business activity created through the production process and the induced effect is the additional consumer spending resulting from the increased economic activity in the state. Combined, these three effects provide an estimate of the total economic impact of agriculture on the state of South Dakota.

There are two parts to this analysis. Initially only the impact of production agriculture will be considered. Then, the effects of the agricultural processing and manufacturing sector (value added agriculture) will be included to more accurately represent the full impact of agriculture on the State.

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Methodology

The software package IMPLAN Pro3 was used to analyze the impact of agriculture on the State. This input-output modeling software was initially developed for use by the National Forest Service and later modified for commercial use. The economic relationships between the industries in South Dakota are represented as internal production functions embedded within the program. After constructing a baseline model of the State, the impact of agriculture is determined and next the impacts of the other industries that can be directly linked to agriculture are added.

The analysis utilized the 2012 data for South Dakota, and the industry outputs were those contained in the IMPLAN Pro3 database. These outputs are gross sales, not Gross Domestic Product (GDP) figures. Therefore, the costs of inputs are included, not excluded as they would be in a measure of GDP. The value of all industry output for IMPLAN Pro3 in 2012 was $82,434.2 million. This figure provides an estimate of the dollars flowing through the South Dakota economy and is significantly higher than the $67,276.1 million produced in 2010.[1] By comparison, the gross state product in South Dakota for 2012 was $42.464 billion (Bureau of Economic Analysis).

Industry Breakdown

Using the IMPLAN Pro3 division of industries by North American Industry Classification System (NAICS) code, 440 different industry classifications in the model are aggregated into 20 different categories. Agriculture, forestry, fishing, and

[1] This effort gives impact measures consistent with earlier studies by the Department of Economics. A similar effort was done with county adjustments as part of a larger project partially supported by the South Dakota Department of Agriculture.

hunting are combined into one category. The twenty categories with their impacts and multipliers are shown in Table 1.

Table 1. Output for South Dakota Industries, 2010.

Industry	Output (in million $)	Multiplier	2010 Multipliers+
Agriculture, Forestry, Fishing, and Hunting	10,661	1.83	1.61
Mining	404	1.63	1.35
Utilities	1,327	1.17	1.17
Construction	4,597	1.29	1.41
Manufacturing	16,508	1.45	1.34
Wholesale Trade	3,976	1.52	1.39
Transportation and Warehousing	2,084	1.58	1.49
Retail Trade	4,129	1.53	1.49
Information	2,183	1.56	1.37
Finance and Insurance	9,273	1.46	1.66
Real Estate and Rentals	5,788	1.28	1.17
Professional-Scientific and Technical Services	2,026	1.61	1.52
Management of Companies	827	1.67	1.52
Administrative and Waste Services	1,131	1.60	1.51
Educational Services	531	1.70	1.59
Health and Social Services	6,343	1.66	1.55
Arts-Entertainment and Recreation	807	1.52	1.46
Accommodation and Food Services	2,348	1.56	1.45
Other Services	1,635	1.65	1.59
Government and non-NAICS**	5,856	1.47	1.48
TOTAL	**82,434***		

Source: IMPLAN Pro3 2012 database
***Difference results from rounding errors
+Source: IMPLAN Pro3 2010 database
****The government and non-NAICS category is composed of industries that do not fit into any of the 440 North American Industry Classification System categories.

As we can observe from Table 1, the agricultural sector has a multiplier of 1.83, placing it 1st out of the twenty categories, followed by educational services in 2nd place with a multiplier of 1.70. Utilities and real estate and rentals have the lowest multiplier at 1.17. This would imply that investments in the industries with higher multipliers, such as agriculture, would have larger indirect and induced economic impacts than investments in industries with lower multipliers, such as utilities.

Production Agriculture Analysis

The direct effect of $10.661 billion represents the value of the output produced in the agricultural production sector of the South Dakota economy (Table 2). The indirect effect represents the economic activity that results from industries supplying inputs into the production agriculture sector (business-to-business activity). The induced effect is the increase in household spending resulting from the increased economic activity in the State. Out of the total economic impact of $82.4 billion, the direct economic impact of production agriculture of $10.661 billion comprises 12.9% of the total economic activity generated in the state. The total economic impact of production agriculture in South Dakota is $19.521 billion once we include the $5.057 billion in indirect and $3.803 billion in induced effects.

Table 2. Production Agriculture Impact

	Million $ *
Direct	10,661
Indirect	5,057
Induced	3,803
TOTAL	**19,521**

*In million nominal dollars

The employment effects are similar to the output effects (Table 3). In employment terms the direct effect represents the number of people employed in agricultural industries. The total employment in production agriculture is 42,664. This number is calculated internally by the IMPLAN program as approximately 4 jobs being created for every $1 million of agricultural output. The indirect and induced effects are calculated the same way with the factors of 2.2 for the indirect effect and 3.1 for the induced effect. The agricultural production sector accounted for 42,644 jobs, or 9.3% of the

employment in the state. The 23,277 indirect jobs are in industries related to, but not in the production agriculture sector. The 33,181 induced jobs are in various sectors of the economy and are a result of the consumer spending due to the increase in economic activity in the agricultural sector. In 2012, total employment in South Dakota was 426,835 with a labor force of 445,545 (South Dakota Department of Labor and Regulation).

Table 3. Other Production Agriculture Effects

	Employment	Indirect Business Taxes*
Direct	42,664	$ 66.247
Indirect	23,277	$ 129.765
Induced	33,181	$ 217.985
TOTAL	**99,122**	**$ 413.997**

*In million nominal dollars

Indirect business taxes are all of the taxes collected (sales, property, excise, etc.). The direct effect is the tax revenue generated by the production agriculture industries (Table 3). The indirect effect results from the increased business-to-business activity and the induced effect from the increased consumer activity associated with agricultural production in the State. It should be noted that property taxes are the majority of the indirect business tax revenue generated in production agriculture. In 2012, South Dakota business taxes (excise, sales, fees, licenses) totaled $1.18 billion while agricultural property taxes were $252,715,223 and commercial property taxes were $321,656,276 (South Dakota Department of Revenue).

Value Added Agriculture

To obtain a more accurate estimate of the full impact of agriculture on the state of South Dakota, it is necessary to include industries from the manufacturing/processing sector that can be clearly identified as being related to agriculture. For this analysis these industries include soybean processing, fluid milk and butter, dry milk, cheese, animal slaughter, meat processing, poultry processing, dry pasta, wineries, bread, cookies, crackers and pasta manufacturing, sawmills, frozen food manufacturing, fertilizer manufacturing, animal feed manufacturing, and ethanol industries.

Table 4. Output of the Value Added Agriculture Sector.

Industry	**Output in million $**
Frozen Food Manufacturing	62.437
Soybean Processing	223.629
Fluid Milk and Butter	191.875
Cheese	692.879
Dry Milk	28.170
Animal Slaughter	1,916.839
Animal Feed Manufacturing	315.836
Poultry Processing	36.526
Bread, cookies, crackers, pasta manufacturing	215.193
Wineries	26.093
Fertilizer Manufacturing	108.858
Sawmills	112.590
Ethanol	1,253.336
TOTAL	**5,158.909**

Source: IMPLAN Pro3 database

The $5.159 billion of direct economic activity in these thirteen industries generates an additional $2.447 billion in indirect and $1.841 billion in induced effects in the economy, which leads to $9.447 billion in total economic activity generated by the agribusiness sector. Approximately 61.4% of this direct impact, $3.17 billion, is from the animal slaughter and ethanol industries. Another 19.5% is added by the cheese and animal feed manufacturing industries. This means that approximately 81% of the agribusiness impact is from only four industries.

Table 5. Other Value Added Agriculture Effects

	Employment	Indirect Business Taxes
Direct	13,186	$19.202
Indirect	9,112	$68.831
Induced	6,744	$44.62
TOTAL	**29,042**	**$132.653**

In million nominal dollars

In addition, another 29,042 people are employed because these industries are operating in South Dakota and $132,653,000 in indirect business tax is generated by the value added agriculture sector.

Total Impact of Production and Value Added Agriculture

The addition of the agribusiness sector impacts would raise the total economic impact of the agricultural sector of the economy to $28.968 billion in 2010. The direct effect of the agricultural sector would be $15.82 billion, making it larger than the manufacturing sector after subtracting agricultural processing from its total. The agricultural sector would then account for 19.2% of the total direct economic output of $82.4 billion in South Dakota. The total employment number would increase to 128,164, and the indirect business tax total would increase to $546,650,000.

Concluding Remarks

Agriculture remains a significant contributor to the total economic activity generated in the state of South Dakota. The total direct impact of the agricultural sector of the economy in South Dakota was $15.82 billion and the total impact was $28.968 billion in 2012. This would still make the agricultural sector the largest single sector of the South Dakota economy, at approximately 19.2% of total output. In addition, approximately $546,650,000 in indirect business taxes and 128,164 jobs in the state are generated by agriculture. Each dollar of direct output in agriculture also generates an additional $0.83 of economic activity in the state. It should also be noted that due to the severe drought that occurred in 2012 there are some significant changes between the 2010 and the 2012 analyses. Part of this is due to structural change in the industry and part is due to the large crop insurance indemnity payments that offset some of the severe effects of the drought, especially in the hard-hit southeastern, south-central, and west-central parts of the state. It should also be noted that none of this analysis takes into account any of the information in the recently released 2012 Census of Agriculture.

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