DIRECT AND INDIRECT ECONOMIC CONTRIBUTIONS OF FARM LEVEL PRODUCTION TO AGRIBUSINESS SUPPLY CHAINS AND LOCAL COMMUNITIES

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Introduction

Studies have been conducted for local water conservation districts in the Texas High Plains (THP). These studies project the effects of aquifer decline on saturated thickness, irrigated acreage, producer income, and the regional economy through backward-linkages from input suppliers. Concern has been expressed by stakeholder groups that not all of the regional economic contributions are being counted due to the inability to capture the forward-linked effects occurring beyond the farm gate. The objective of this study was to develop the capacity to estimate the forward-linked economic contributions for agricultural commodities in response to changing water availability, Figure 1. In doing so, the economic contributions of crop production through value-added, forward-linked businesses such as animal feeding, processing, and storage are captured, thus, providing a more accurate estimate. This type of model would be useful in evaluating alternative scenarios including changes in energy costs, federal farm programs, and other potential policies.

Figure 1. Backward and Forward Regional Economic Linkages of Agricultural Crop Production

Data and Methods

The IMPLAN model uses multipliers to estimate the total economic effect of expenditures within an economy (MIG, 2009). These effects are referred to as direct, indirect, and induced. For example, consider when a producer pays to have his crop custom harvested (direct effect). The custom harvester pays for fuel, repairs, employee wages, and other operating expenses (indirect effect). The direct and indirect effects result in a change household income for the producer and custom harvester, and the spending of their income is the induced effect. The IMPLAN model estimates industry output (total economic activity), value added (the income/wealth portion of output), and employment.

The original studies conducted for the groundwater conservation districts in the THP (Amosson et al., 2011; Weinheimer et al., 2011; 2012) were used as the basis for generating forward-linked results. Forward-linked regional economic contributions were determined by identifying specific industries in the study area that have forward-linkages to local crops and estimating the amount of output from those industries that is attributable to local crops. Industry output, excluding the purchase of crops to avoid double counting the contributions of earlier stages of production, were then assessed using the IMPLAN model. Seed sales were included in estimates as a backward-link from local crop production. However, the higher-value contribution of commercial seed production, which is dependent on local water supplies, was not included in final estimates. The livestock sectors including beef, dairy, and swine were included only as forward-linkages to local crop production and the overall importance of livestock to the regional economy was not valued.

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[1] Texas A&M AgriLife Extension Service
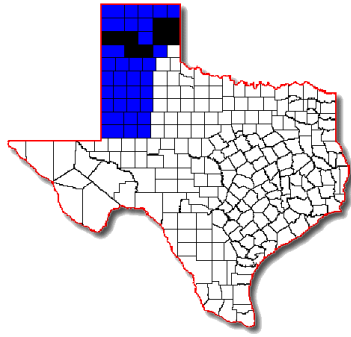[2] Texas Tech University

Figure 2. Study Area (shaded counties)

The study area is comprised of the 41 counties (Figure 2) in the THP of which data was available for the 33 counties shaded in blue from the original water analyses. Alfalfa, corn, corn silage, cotton, peanuts, sorghum, sorghum silage, and wheat were the crops analyzed. Forward-linked industries identified for analysis included; cattle production, dairy cattle and milk production, poultry production, swine production, animal food manufacturing, flour milling, wet corn milling, oilseed processing, peanut processing, food manufacturing, fiber, yarn, fabric, and thread mills, ethanol production, and wholesale trade through elevators, storage, and compress facilities.

Assessments reported in this study represent a baseline scenario which includes any water policies implemented at that point in time. The baseline year of 2010 includes a five year average (2006-2010) of irrigated and dryland acreage.

Results

The total, backward-linked and forward-linked, economic contributions of all crops grown within the region are presented in Table 1. Results of the baseline scenario indicate that crop production generates $12.24 billion in industry output and $4.66 billion in value added which supports 103,297 jobs. Accounting for the forward-linkages resulted in an additional contribution to the study area economy of $2.38 billion in industry output, $755 million in value added production, and 9,740 employees.

Table 1. Total, Backward and Forward-linked, Regional Economic Contribution of Crops, 2010.

	Direct	Indirect	Induced	Total
Backward-links				
Output*	$4,261	$4,103	$1,495	$9,858
Value Added*	$657	$2,395	$856	$3,907
Employment	31,449	48,408	13,699	93,556
Forward-links				
Output*	$1,626	$574	$177	$2,377
Value Added*	$424	$230	$101	$755
Employment	5,104	2,974	1,662	9,740
Total				
Output*	$5,887	$4,676	$1,672	$12,235
Value Added*	$1,081	$2,624	$957	$4,662
Employment	36,553	51,382	15,361	103,297

*Millions of dollars

References

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