Economic Considerations when Assessing Economic and Environmental Impacts of Arkansas Agriculture

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INTRODUCTION

Production practices used in agriculture can greatly impact soil and water resources. In determining best management practices for food production, environmental and economic impacts are two key considerations. To adequately inform decision-makers, it is important that best practices are also followed in measuring and evaluating these impacts.

Economic contribution studies are common practice, but variation in methods have confounded comparability, leading to questions regarding the accuracy and interpretation of results (English, Popp, and Miller, 2016; Watson et al., 2007). Most follow the ***Hypothetical Extraction Methodology*** (**HEM**), with contributions representing the value of final demand for the target industry (direct effect), as well as the indirect and induced contributions generated through economic linkages to other industries. Issues with HEM, including those related to lack of standardization and double-counting, have led researchers to investigate alternative methods to estimate ex-post economic contributions. In recent years, **Export Base Methodology** (**EBM**) has been offered as an alternative to HEM (Watson, et al., 2015). This approach eliminates the issue of double-counting while also providing additional information for analyzing the role played by an industry in growing the regional economy through the generation of exports.

Here we compare HEM and EBM approaches with the goal of: 1) investigating whether differences in results can be observed between approaches, and 2) explain any differences observed across approaches.

METHODS

Analyses were conducted using 2018 economic data for Arkansas obtained from IMPLAN, LLC.

IMPLAN software was used to perform a HEM analysis following IMPLAN's standard multi-industry contribution protocol (IMPLAN, 2020). Results are reported in terms of direct, indirect, and induced economic contributions.

Automated social accounting matrix (ASAM) software (Watson, 2010-2011) was used to perform an EBM analysis following protocols informed by Watson, et al., 2015. Results are reported as gross (direct), agricultural export, and export support and local consumption contributions.

RESULTS

Table 1 presents the economic values serving as the baseline for each analysis. In 2018, there were 145,623 jobs, providing nearly $5B in wages and generating $10.6B in value added. These estimates are expected to match as they represent the actual reported values for the agricultural sector.

In Table 2 we compare results from the EBM analysis to somewhat analogous results obtained using HEM. In this case the export base model showed lower overall contribution values. Contributions were 11% lower for total jobs, 11.9% lower for total wages and 9.4% lower for total value added.

Table 1: Jobs, Wages, and VA in Arkansas Agriculture Sector, 2018

	Jobs	Wages ($1,000)	Value Added ($1,000)
HEM (Direct Contributions)	145,622	$4,995,171	$10,646,790
EBM (Gross Contributions)	145,623	$4,995,171	$10,646,790

Table 2: HEM vs EBM Economic Contributions to Arkansas Agriculture Sector, 2018

	HEM Contributions	EBM Contributions	Difference
Direct Jobs	145,622	91,803	
Indirect Jobs	123,328	147,692	
Total Jobs	**268,950**	**239,495**	**-11.0%**
Direct Comp.	$4,995M	$3,757M	
Indirect Comp.	$5,421M	$5,420M	
Total Wages	**$10,416M**	**$9,177M**	**-11.9%**
Direct VA	$10,647M	$8,005M	
Indirect VA	$10,290M	$10,955M	
Value Added	**$20,937M**	**$18,960M**	**-9.4%**

DISCUSSION

Results indicate that the use of HEM and EBM methods for evaluating economic contributions can bring variable results. These differences may be explained by variation in how economic values are tracked and analyzed within each model.

Through the use of economic multipliers and stabilization of economic value to total final demand for the area of investigation, HEM contribution analysis answers the question: *What effect would we see across the economy if the value currently being produced by agriculture disappeared from the state?*

By contrast, EBM analysis examines how economic value is generated through the export of goods from a region. Here, an answer is provided to the question: *How much value is brought into the state as a result of either producing exports, or supporting the production of exports across other industries?*

CONCLUSION

This study compared the use of HEM and EBM methods for estimating economic contributions using the Arkansas agriculture industry as a case study. While each method appears to offer important insights into economic contributions of the Arkansas agriculture industry, the story told by each set of results differs. Differences in economic values can impact decisions made by agricultural and environmental managers. Taking this into account, researchers should carefully consider the question(s) being answered by each approach and choose their economic methodologies accordingly. Further, as it is often difficult to bring together economic and environmental analyses, future work may investigate how information gained through each approach may be used in conjunction with environmental impact assessments to most effectively evaluate economic and environmental outcomes of implemented practices.

RELEVANT LITERATURE

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