Do Contribution of Agriculture Procedures Differ Across States? A Survey of Methodological Approaches Used by Economists

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Abstract. Contribution analyses performed using IMPLAN data and software are an increasingly popular method for illustrating the importance of agriculture to state and local economies. Over the past decade, at least 24 states have used IMPLAN to conduct contribution of agriculture analyses at some level. In many cases, methods for conducting these analyses are described, however most descriptions aren't presented in sufficient detail to allow an effective comparison of procedures used between studies. To further analyze methodological variations between contribution of agriculture studies, an online survey was developed and distributed to agricultural economists across the country. Survey questions focused on respondents' choices related to trade flow models, multipliers, model customization procedures, and agricultural sector selection. Results of the survey show that, although there are general similarities in methodologies between researchers, no two agricultural economics researchers appear to perform contribution of agriculture analyses the same way. These results suggest a need for the development of standard procedures for use in conducting contribution of agriculture analyses, as this would function to increase transparency and comparability between studies.

1. Introduction

IMPLAN is a widely used tool for assessing the status of local, regional, or national economies. IMPLAN's datasets and software are primarily used by governments, universities and public/private sector organizations for conducting economic impact studies (IMPLAN, 2016a; USDA NRCS, 2016). Although IMPLAN is largely used for impact analysis, contribution analyses using the software are becoming increasingly popular, especially among agricultural economists across the United States. In fact, a recent online search for contribution of agriculture studies has revealed that, over the past decade, at least 24 states have used IMPLAN to conduct contribution of agriculture analyses at some level. Examination of these studies has revealed numerous variations in terms of: 1) terminology (contribution versus impact), 2) methodology, 3) defining agriculture through sector selection, and 3) reporting of results (output versus value added).

When comparing various contribution of agriculture reports, methods for conducting each analysis were described, however most descriptions weren't presented in sufficient detail to allow an effective comparison of procedures between studies. While IMPLAN provides an abundance of information concerning methods for using their software to conduct economic impact analyses, literature and reference materials for contribution analysis methodologies are sparse (Day, n.d.; Watson et al., 2007; IMPLAN, 2015). A paper by Watson et al. (2007) describes the differences between impact and contribution analysis, and discusses the appropriate use for each type of study. As the studies being discussed in this paper aim to examine the economic activity associated with agriculture ex-post, contribution methodology would be an appropriate choice for these types of analyses.

Guidelines for conducting a single, or multi-industry contribution analysis using IMPLAN can be found within IMPLAN's online knowledge base (IMPLAN, 2016b). These guidelines suggest first modifying commodity production so that each industry produces only its primary commodity, then customizing trade flows by setting the Local Use Ratios (or Regional Purchasing Coefficients if using RPC method) to zero for the sector(s) being analyzed. Although this provides a basic guideline for conducting a contribution analysis using the IMPLAN software, there are several other areas where modifications to the model could drastically effect analysis outcome. Examples include: selection of trade flow method (e.g. IMPLAN National Trade Flows, Econometric RPC, or Supply/Demand Pooling); and selection of spending to include in the calculation of model multipliers (e.g. households, state/local government, federal government, enterprises, and inventory).

Sector selection can also have a drastic effect on the overall outcome of a contribution of agriculture study. When conducting a multi-industry analysis, it is generally left up to the researcher to define the aggregate industry being analyzed. When comparing contribution of agriculture studies, there does not appear to be a clear definition of agriculture in terms of sector inclusion for analysis. Although crop and livestock production are generally included within each contribution of agriculture analysis, there appears to be some contention regarding additional sectors falling under the umbrella of agriculture. Therefore, it is the task of each economist to determine which sectors may provide a full contribution to agriculture, which sectors contribute partially, and how to properly split any partially contributing sectors.

To further assess variation in methodologies among researchers performing contribution of agriculture analyses, an online survey was developed and distributed to agricultural economists across the country. Methods for conducting this survey are described in the following section.

2. Methodology

An online survey was developed using Qualtrics survey software. An anonymous link to the survey was distributed via email to agricultural economists across the country during December 2015 and again in January 2016.

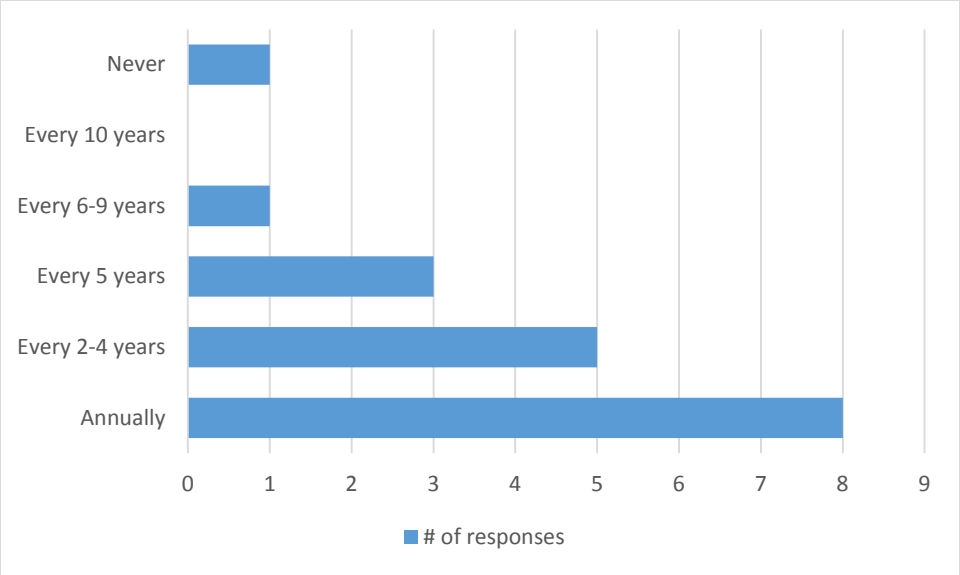
Initial survey questions were aimed at collecting background information such as the frequency of contribution studies conducted, level of analysis (e.g. state, county, multi-county, multi-state, etc.), primary audience, and result distribution methods (e.g. hard copy report, electronic report, presentations, etc.). The bulk of the survey focused on methodologies used when developing individual contribution of agriculture models using IMPLAN. In particular, we wanted to know if researchers were following the guidelines provided by IMPLAN, as well as to determine what additional methods were followed in relation to choice of trade flow models, multipliers, model customization procedures, and agricultural sector selection.

The results of the survey were aggregated and used to identify varying practices used by researchers conducting contribution of agriculture studies across the country.

3. Results

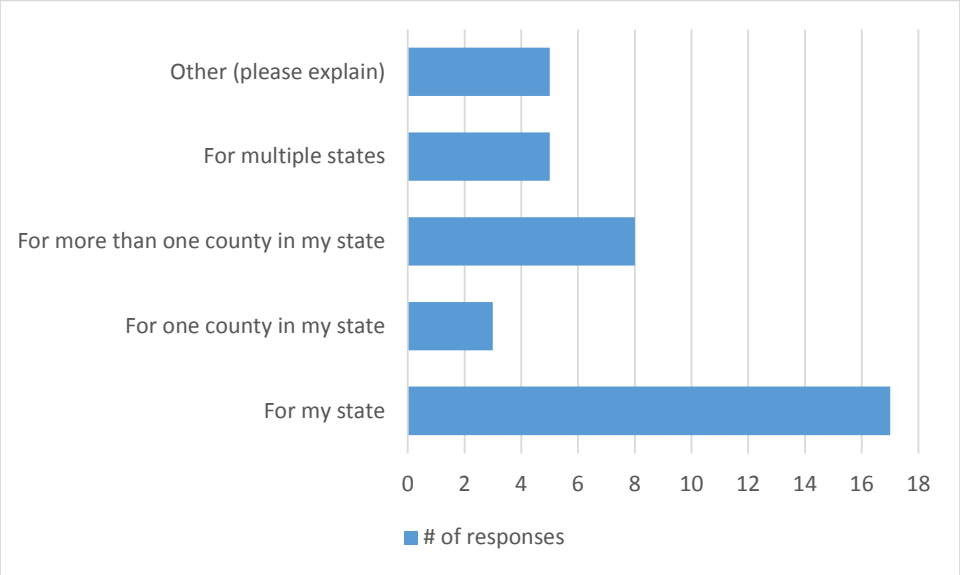
Results consist of responses obtained from 18 completed surveys, coming from researchers in at least nine different states. Questions concerning background information show that 44% of respondents perform contribution of agriculture analyses on an annual basis with an additional 45% stating that they conduct contribution analyses at least every 5 years (Figure 1).

Figure 1. Contribution of agriculture analysis frequency



While the majority of respondents (94%) perform contribution of agriculture analyses at the state level, many researchers reported conducting additional analyses at the multi-state, multi-county, county, legislative district, or national level (Figure 2).

Figure 2. Contribution of agriculture level of analysis

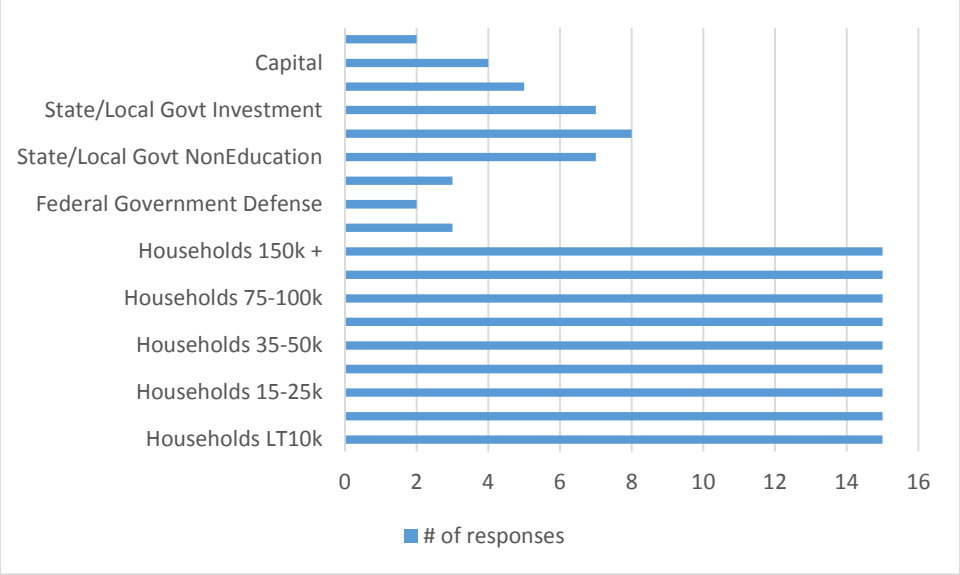


The primary audiences identified for contribution of agriculture studies were state legislatures, state level agricultural commodity groups, and state departments of agriculture. Additional audiences include university administrators, congressional delegations, and the general public. The results were primarily distributed to the various audiences through electronic reports including detailed methods and results, electronic reports containing result highlights only and through presentations to government officials and industry leaders. Results are additionally distributed through hard copy reports, presentations at professional meetings, and in the form of a pocket guide.

As far as building the economic contribution model, there are some similarities between researcher approaches. However, it appears that many use methods outside of IMPLAN's suggested guidelines for conducting contribution analyses. For example, IMPLAN suggests adjusting the commodity coefficients to one for each sector being analyzed, but only 50% of respondents reported making this adjustment. To avoid double counting, IMPLAN also instructs users to zero out specific trade flow coefficients for the analyzed sectors. The survey revealed that only 67% of respondents make adjustments to trade flow coefficients when building their contribution models. Additionally, 44% of researchers reported making adjustments to industry production coefficients within IMPLAN.

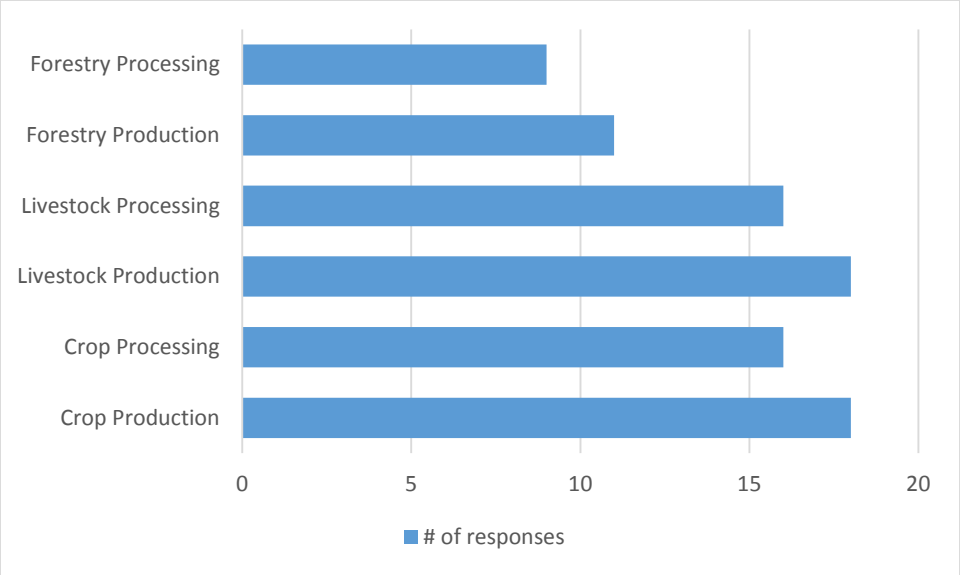
Outside of following guidelines provided by IMPLAN, there are several other areas where users may make adjustments to their contribution model. These areas include selections for the model's trade flow method, multipliers, and agricultural sectors. Results of the survey show variation between researchers in each of these areas. For example, when selecting the trade flow method researchers reported using all three with most (72%) using the recommended IMPLAN National Trade Flows method, a smaller number (17%) using Econometric RPC, and two reported using the Supply/Demand Pooling option. For multipliers, all researchers reported using the nine default household categories in calculating multipliers with some (44%) including state and local government spending in the multiplier calculation. Thirty one percent also included corporations, and two researchers reported using multipliers that included all household and state, local and federal government spending (Figure 3).

Figure 3. Selection of IMPLAN multiplier spending categories for contribution analysis.



In terms of selecting IMPLAN sectors to be included as part of agriculture, all agreed that crop and livestock production should be included within a state-level contribution of agriculture analysis. Almost all (89%) believe that crop and livestock processing should also be included with many (50% and 61%, respectively) adding forestry production and processing as well. Some researchers also include agriculture-related industries such as fishing, trapping, and hunting, as well as agriculture and forestry support and input sectors (Figure 4).

Figure 4. Aggregate sectors to be included in contribution of agriculture analysis.



Respondents were asked which of IMPLAN's 536 sectors should be included in a contribution of agriculture analysis (regardless of whether that activity took place in their state or not). When breaking down the aggregate agriculture sectors into the individual IMPLAN sectors, almost all (94%) agreed that IMPLAN sectors 1 thru 15 (crop and livestock production) and sector 19 (support activities for agriculture and forestry) should be fully included in a contribution of agriculture analysis. Although most researchers would include agricultural processing in their analyses, results show a wide variation regarding the selection of individual processing sectors for inclusion. For example, over 75% of respondents indicated that all industries classified under NAICS code 311 (Food Manufacturing) should be included in the contribution of agriculture analysis. A lower percentage felt that those falling under NAICS classification 312 (Beverage and Tobacco Product Manufacturing) should also be included. And less than 50% would include Textile Mills, Textile Product Mills, Apparel Manufacturing, Leather and Allied Product Manufacturing, Wood Product Manufacturing, and Paper Manufacturing. Forty one percent would include sector 262 (Farm Machinery and Equipment Manufacturing), with around a quarter adding sectors 263 (Lawn and Garden Equipment Manufacturing), 267 (Food Product Machinery Manufacturing), 269 (Sawmill, Woodworking, and Paper Machinery), 459 (Veterinary Services), 469 (Landscape and Horticulture Services), and 501-503 (Food and Drinking Places). There were several other sectors that a lesser percentage of respondents felt could contribute, either fully, or partially to agriculture. In total, 164 sectors were identified as being considerable for inclusion in a state-level contribution of agriculture analysis.

In addition to the previously discussed variations, several researchers described working outside of IMPLAN's software and datasets when conducting their analyses. For example, 67% reported customizing IMPLAN's study area data and 44% customized industry production coefficients using various sources and methods. When asked to explain any additional customization procedures being performed, some also reported building the social accounting matrix (SAM) within IMPLAN, then exporting those data into an Excel spreadsheet for their contribution analysis.

When asked about the importance of consistency in methodologies used by researchers to conduct contribution of agriculture analyses, most respondents felt that this was either extremely important (50%) or very important (44%).

4. Conclusion

Overall, results from the survey show that there is much variation in methodologies used to conduct contribution of agriculture studies across the United States. This may suggest a need for the development of standard procedures for use in conducting contribution analyses for agriculture. As these studies are distributed to a wide variety of audiences, such a protocol would function to increase reliability and transparency for stakeholders, while also increasing comparability and replicability for future research. Furthermore, recent literature has described methods for improving regional contribution studies (Watson et al., 2015). As several researchers were shown to conduct portions of their analyses outside of IMPLAN, it may be worthwhile to consider additional methods for enhancing the accuracy and reliability of results.

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