

Economic Contribution of the Agricultural Sector to the Arkansas Economy in 2011



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DIVISION OF AGRICULTURE

RESEARCH & EXTENSION

University of Arkansas System

ARKANSAS AGRICULTURAL EXPERIMENT STATION

October 2013

Research Report 992

Technical editing and cover design by Gail Halleck.

Arkansas Agricultural Experiment Station, University of Arkansas System Division of Agriculture, Fayetteville. Mark J. Cochran, Vice President for Agriculture; Clarence E. Watson, Associate Vice-President for Agriculture–Research and Director, AAES. WWW/InddCS6.

The University of Arkansas System Division of Agriculture follows a nondiscriminatory policy in programs and employment. ISSN: 1539-5944 CODEN: AKABA7

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ACKNOWLEDGEMENTS

We, the authors, would like to thank the Arkansas Division of Agriculture for funding this initiative. We also extend our appreciation to several individuals in the University of Arkansas, Fayetteville, Departments of Horticulture and Poultry Science; the Arkansas Forestry Commission; and the University of Arkansas Monticello School of Forest Resources, who offered their expertise for data collection and interpretation. We would like to thank our reviewers for their insightful input and suggestions. Finally, we sincerely appreciate Judy Howard's and Gail Halleck's publishing skills and attention to detail.

Executive Summary

Agriculture and associated agricultural activities are major contributors to the Arkansas economy. Agriculture is defined as the sum of agricultural production and processing activities, unless otherwise specified, and includes crop and animal production and processing, agricultural support industries, forestry and forest products, and textile goods. Agriculture contributes to the economy through direct agricultural production and value-added processing, and also leads to economic activity in other parts of the economy.

This report¹ is the eighth in a series of reports examining agriculture's economic contribution on the Arkansas economy. Utilizing data from the United States Bureau of Economic Analysis (BEA), USDA Economic Research Service (ERS), USDA National Agricultural Statistics Service (NASS), and Minnesota IMPLAN Group, Inc. (MIG), the economic contribution of agriculture on the Arkansas economy was estimated for the most recent year available, 2011. The total economic contribution of agriculture (direct, indirect, and induced effects) to value added, employment, and labor income was estimated using the Impact Analysis for Planning System (IMPLAN). The economic contributions of agricultural production and processing were estimated for agriculture as a whole and also separately for the Crops Sector, the Animal Agriculture Sector, and the Forestry Sector. Key findings of the IMPLAN analysis are as follows:

- Aggregate Agriculture contributed \$17.0B in total value added to the state economy; this is almost \$0.17 of every \$1 in value generated in the state.
- Aggregate Agriculture accounted for 259,243 jobs, which is almost 17% of all jobs in the state. Over one-half of these (150,419), or 10.3% of all state employment, are in the agriculture production, processing and agriculture-related industries.
- *Poultry and Egg Production* and *Poultry Processing* alone provided over one in four of the state's agricultural jobs, as in previous years.
- Aggregate Agriculture generated \$10.1B in labor income, or 15% of the state's total labor income, including agriculture payrolls, which totaled \$7.9B, or 15% of total state wages.
- Aggregate Agriculture generates value added, employment, and income in all 20 of the 2-digit NAICS aggregated industries in the state. Almost half of agriculture's contribution to value added occurs in industries closely tied to agriculture but not defined as part of the agriculture sector, such as *Real Estate and Rental*, *Wholesale Trade*, and *Transportation and Warehousing*.
- The direct contribution of the Crops Sector included \$3.1B in value added, 62,918 jobs and over \$1.6B in labor income. *Rice Farming* and *Rice Milling* accounted for 13% of jobs, 17% of labor income, and 18% of value added in the Crops Sector.
- In direct contributions, the Animal Agriculture Sector generated \$2.9B in value added, 52,000 jobs and \$1.7B in labor income. *Poultry and Egg Production* and *Poultry Processing* provided 74% of jobs, 82% of income, and 79% of value added in the Animal Agriculture Sector.
- The direct contribution of the Forestry Sector included \$2.9B in value added, 26,234 jobs, and \$1.9B in income. Within the Forestry Sector, *Paper Mills, Sawmills and Wood Preservation*, *Veneer and Plywood Manufacturing*, *Sanitary Paper Product Manufacturing*, and *Paperboard Container Manufacturing* contributed 52% of forestry jobs, almost two-thirds of forestry income, and 69% of value added.

Including direct, indirect and induced effects, agriculture generates over one in six jobs and almost 17% of value added in the state. The diversity of the state's agriculture helps mitigate the effects of low world market prices or trade embargoes on commodities. Crops, animal agriculture, and forestry production and processing are all major contributors to agriculture and to the state's economy. The large and diverse natural resource base of the state provides the opportunity for agriculture to change and develop new value added and bio-energy industries. The size and diversity of the state's agriculture contribute greatly to the well-being of Arkansans and to the stability of the state's economy.

Note: In some cases, numbers reported in this research report may differ from numbers reported in its companion documents, the pocket guide *Economic Contribution of Arkansas Agriculture* (McGraw, Popp and Miller 2013), due to rounding.

Definitions and Styles

Agricultural Sectors

Aggregate Agriculture consists of the Crops, Animal Agriculture, and Forestry Sectors' production and processing industries, plus the Agriculture-Related Sector. See Appendix A, Tables 1-4 for a complete listing of the sectors included.

Crops Sector comprises those industries directly involved in crop production and processing. See Appendix A, Table 1 for a complete listing of the industries included.

Animal Agriculture Sector comprises those industries directly involved in livestock production and processing. See Appendix A, Table 2 for a complete listing of the industries included.

Forestry Sector comprises those industries directly involved in forestry production and processing. See Appendix A Table 3, for a complete listing of the industries included.

Agriculture-Related Sector comprises those industries that support the Crops, Animal Agriculture, and Forestry Sectors. See Appendix A, Table 4 for a complete listing of the industries included.

Note: No input providers (fertilizer, pesticide and equipment manufacturers) or retail locations (restaurants, grocery stores, lawn and garden centers, etc.) are considered as direct contributors to the Aggregate Agriculture Sector in the contribution analysis. However, much or some of the economic activity in these firms is picked up as indirect and induced effects and reported as part of the total economic contribution.

Economic Contribution

The **total economic contribution** of the Aggregate Agriculture Sector includes three components of wealth and job generation:

1. **Direct Contributions** are the sum of the contributions of farm production and processing of farm and forestry products. Only direct contributions are reported in the Crops, Animal Agriculture and Forestry Sector discussions.
2. **Indirect Contributions** result when agricultural firms purchase raw materials and services from other Arkansas businesses to produce their products.
3. **Induced Contributions** result when employees of agricultural firms and employees of the raw material and service firms spend a portion of their income on local purchases.

These contributions are reported in terms of **Employment**, **Labor Income**, and **Value Added**:

1. **Employment** includes all wage and salary employees, as well as self-employed workers (owner-operators) in a given sector.
2. **Labor Income** consists of two parts: proprietary income and wages. Proprietary income includes all income received by self-employed individuals, such as private business owners, doctors, lawyers or other professionals. Wages include all worker salaries, payments, and fringe benefits paid by employers.
3. **Value Added** includes labor income plus indirect taxes and other property-type income such as payments for rents, royalties, and dividends. Value added and Gross Domestic Product (GDP) are equivalent measures in theory but are estimated using different methods and data sources.

Style Notes

Agricultural Sectors. These comprise the areas of focus in our study. The report refers to the four areas of analysis: Crops Sector, Animal Agriculture Sector, Forestry Sector, and Aggregate Agriculture Sector. The Agriculture-Related Sector is included in the analysis of the Aggregate Agriculture Sector, but is not presented individually. These terms are capitalized and underlined throughout the text.

NAICS Sectors. The North American Industry Classification Scheme (NAICS) is “...the standard for use by Federal statistical agencies in classifying business establishments for the collection, tabulation, presentation, and analysis of statistical data describing the U.S. economy....For statistical purposes, a business establishment is assigned one NAICS code, based on its primary business activity” (USCB, 2013). This report uses the 2007 NAICS sectoring scheme (USCB, 2006). Agricultural activities are classified under, or can impact, multiple sectors. Throughout the document, capitalization of sectors is used when referring to NAICS sectors. Examples include Food Manufacturing, Paper Manufacturing, and Wood Product Manufacturing.

Industries. These are defined as individual IMPLAN industries that are defined by aggregating NAICS sectors into the larger IMPLAN industries used in our analysis. These industries are capitalized and italicized. Examples include *Poultry and Egg Production* and *Paperboard Mills*.

General Descriptive Terms. These are terms used to describe agriculture throughout the text that are not related to established industry classification schemes or specific agricultural sector titles used in this analysis. These terms are presented in lowercase. Examples include agricultural production and agricultural processing.

1: Direct, Indirect, and Induced Contributions of the Aggregate Agriculture Sector

1.1: Introduction

The total economic contribution of Arkansas' Aggregate Agriculture Sector is much more than the direct contribution of agricultural production and processing. To measure agriculture's total economic contribution, the indirect and induced contributions of agriculture must also be taken into consideration. Indirect contributions occur when the Aggregate Agriculture Sector purchases goods and services from local businesses. The production of fertilizers and certain farm machinery and equipment, for example, are indirect contributions of agricultural production. Agriculture's induced contributions are measured by increases in economic activity due to personal consumption by employees of the Aggregate Agriculture Sector and by employees of firms that provide inputs to the Aggregate Agriculture Sector. The sum of direct, indirect, and induced agricultural effects provides a measure for the total economic contribution of agriculture. The report discusses the overall economic contribution of agriculture to Arkansas' economy, considering the direct, indirect, and induced effects of the Aggregate Agriculture Sector in 2011.

1.2: Methods

This report builds upon Part II of previous reports (Goodwin et al., 2002; Popp, Vickery and Miller, 2005; Popp, Kemper and Miller, 2007; Kemper, Popp and Miller, 2009; Popp et al., 2010; McGraw, Popp and Miller, 2011) and utilizes data for 2011, the most recent year that relevant GDP and IMPLAN data were available.

As in our previous reports, the economic contribution of Arkansas' Aggregate Agriculture Sector was computed using data and input-output (I-O) modeling software (IMPLAN version 3.0) from Minnesota IMPLAN Group, Inc. (MIG; Stillwater, Minn.). Data here are reported for 2011 (MIG, 2012). Contributions are reported in terms of employment, labor income, and value added (introduced previously and described in depth in section 1.3). The only sectors included as part of the agriculture sector in the analysis are those directly producing agricultural products, processing raw agricultural products, or providing agricultural services to producers. Any sector less than 100% tied to agriculture is not included as part of the Aggregate Agriculture Sector (such as restaurants, grocery stores, fertilizer manufacturers and distributors). The Aggregate Agriculture Sector is made up of three types of industries: agricultural production industries, agricultural processing industries, and agriculture-related industries. Definitions for these industries for this analysis are provided below and in Appendix A. Additionally, the indirect and induced contributions of the non-agricultural sectors are included in the total contribution of agriculture. The contribution includes the direct, indirect and induced effects of agricultural production and processing activities, and excludes the direct effect of the food services and drinking industry. "Contribution analysis" typically describes that portion of a region's economy that can be attributed to an existing industry, event, or policy by identifying all the direct and backward linkages in the study area (Alward, 2012).

The results of the economic contributions of agriculture are presented for the following sectors: Crops Sector, Animal Agriculture Sector, Forestry Sector, and Aggregate Agriculture Sector. For the first three sectors, agriculture is defined as those production and processing sectors in IMPLAN directly related to that sector (crops, animal, or forestry). Agricultural retail is not included as a component of Aggregate Agriculture, although some retail activity is captured in the indirect and induced effects. The IMPLAN industries used to create those sectors are presented in Appendix A, Tables 1-3. Aggregate Agriculture is defined as the sum of all four sectors: Crops, Animal Agriculture, Forestry, and the Agriculture-Related Sectors (presented in Appendix A, Table 4). Aggregate Agriculture includes all of the IMPLAN industries listed in Appendix A, Tables 1-4.² In some cases, results are presented as production and processing contributions instead of by Sector. The Aggregate Agriculture Sector's IMPLAN industries are presented grouped by production and processing in Appendix A, Tables 5-6. State level IMPLAN data for Arkansas for 2011 (the most recent data available) were used to calculate all contributions (MIG, 2012). The relevant employment, labor income, and value added contributions of agriculture are detailed in Appendix B and are summarized below. All labor income and value added figures are reported in current (nominal) 2011 dollars, unless otherwise noted.

1.2.1 General Procedures

For the economic contribution analysis of the agriculture sector, the entire measure of economic activity in the industries that make up the Aggregate Agriculture Sector (crop, livestock, and forestry production and processing industries, and ag-related activities) are considered to be 100% agriculture. There are several key considerations in the construction of the IMPLAN I-O models used to measure the economic contribution of the Aggregate Agriculture Sector. For each step of the analysis, careful consideration was taken to ensure that the analysis reflects accurately the Arkansas Aggregate Agriculture Sector. The main steps for constructing the model were data reconciliation, selection of multipliers, editing industry production, estimating trade flows, creating activities, and editing local purchase percentages (MIG, 2000).

The Aggregate Agriculture Sector is made up of three broad categories of agricultural industries: agricultural production industries, agricultural processing industries, and agricultural-related industries. The output data for the agricultural production industries (IMPLAN sectors 1-14)³ were checked for accuracy against the latest available estimates for the value of production from NASS and ERS. The agricultural production data in IMPLAN are sometimes unreliable for three reasons. First, output data for all industries outside of agriculture are estimated from a large number of sources, but data for agricultural production are derived entirely from NASS value of production data and the most recent U.S. Census of Agriculture. Due to NASS publication lags, IMPLAN data are often released using preliminary estimates for a given year. To check the accuracy of the IMPLAN data, the agricultural production industries are compared against finalized NASS/ERS data for the relevant year. Second, there are also non-disclosure problems, particularly at the county level (which is why analysis is done at the state level); this makes data reconciliation between IMPLAN and NASS data difficult at the county level. Third, employment and income data for the agriculture sectors are difficult to estimate since there are no employment and earnings data

collected on a commodity basis. The only farm employment and income data are derived from BEA's Regional Economic Information System (REIS) program but these are only single farm employment and income numbers for all agriculture sectors combined. MIG collects estimates of output and creates vectors of employment and income to allocate the single REIS value to the separate IMPLAN agricultural production sectors (Lindall, 1998). MIG encourages analysts with better agriculture data to use it when building models (Olson and Lindall, 2009).

The default IMPLAN data for IMPLAN agricultural production sectors 1-14 were updated with the most recent NASS/ERS output estimates for the state of Arkansas, collected from the USDA Economics, Statistics and Market Information System (ESMIS; USDA NASS, 2013). The default output data was changed to reflect the NASS/ERS output estimate. For Hogs and Pigs and for Cattle and Calves, gross income is used instead of value of production or cash receipts because it is defined as cash receipts plus on-farm or home consumption of slaughtered animals, which is most similar to other commodities' measurements. For *Grain Farming* (sector 2), the value of output was calculated as the sum of only wheat, corn for grain, oats, and grain sorghum. The value of rice farming was omitted from sector 2 in order to analyze the rice industry (*Rice Farming and Rice Milling*) using IMPLAN's analysis by parts (ABP) methods (section 1.2.2 and Appendix C). For any sector where a change was made to the value of output, a change corresponding to the percent change in output was also made to all four components of value added. This holds the relationship between Total Industry Output and Total Value Added (a fundamental relationship in I-O analysis) constant, and the model production functions are left unchanged. Additionally, for *Poultry and Egg Production* (sector 13), output per worker estimates are edited to reflect the 2011 poultry farm estimates from Arkansas Natural Resources Commission (ANRC, 2013). These numbers are newer and more accurate than those used by MIG to estimate poultry employment; this method allows for the number of jobs in sector 13 to be

changed to reflect the most recent output per worker. Output per worker is calculated by first estimating the total number of poultry production jobs and multiplying the number of farms by 2.49; this method presumes one operator per farm plus 1.49 additional workers per operator (USDA, 2007). Then, the data year output value divided by total poultry employment yields the updated estimate for output per worker for that year. Output and employment for *Flour Milling and Malt Manufacturing* (sector 43) were also edited to remove the value of rice milling so that the rice industry could be analyzed using IMPLAN's ABP methods.

Multipliers describe the response of the economy to a change in economic activity and estimate changes in output, employment, income and value added. When analyzing the economic contributions of the Aggregate Agriculture Sector, type SAM (Social Accounting Matrix) multipliers are used to incorporate household expenditures into the models and to calculate the indirect and induced contributions. Type SAM multipliers are the direct, indirect and induced effects where the induced effect is based on both study area data and additional information in the social account matrix. The SAM framework tracks both market and non-market flows. Non-market flows are transactions between non-industrial institutions such as households to government, government to households, and so on. These flows are called "inter-institutional transfers" (Alward and Lindall, 1996). The SAM multiplier approach enables the model to account for commuting, social security tax payments, household income tax payments, and savings; it accounts for income that is not normally re-spent immediately within the region, such as commuting workers who live outside the region and retirement benefits. I-O models built with Type SAM multipliers usually have results that are lower than an I-O model built with Type II multipliers (also available in IMPLAN). The Type SAM is the most appropriate choice for analyzing the contributions of the agriculture sector.

Estimating trade flows across regional boundaries is possibly the largest source of error in non-survey I-O models (Stevens and Trainor, 1980) and the se-

lection and use of the regional purchase coefficient (RPC) is one way to eliminate some of the errors. Because of the longitudinal nature of this research series, IMPLAN's Econometric RPC model was employed to make comparisons with previous years' results more compatible. The RPC represents the proportion of intermediate demands and local demands for a specific commodity that will be satisfied by local production (Olson and Lindall, 2009). For example, a RPC value of 0.80 means that 80% of the final demand for the industry is provided by local producers. The remainder (20%) is the portion imported from outside the region. To avoid overestimation of the Aggregate Agriculture Sector, the model RPCs must be set to zero for agricultural industries (see Appendix A), instructing the model not to purchase products and services from the Aggregate Agriculture Sector. This removes the agriculture sectors from the production function and eliminates multiple counting of economic activity in these sectors.

When conducting contribution analysis, IMPLAN allows the user to edit commodities produced by industries for the change in final demand. In the study, any byproduct commodity produced in a sector included in the Aggregate Agriculture Sector was set to zero so the industry production of the primary commodity is 100%. Therefore, the sector is solely responsible for the entire value of the product being sold (e.g., *Oilseed Farming* industry is solely responsible for the entire value of soybeans produced; soybeans are not produced in any other sector). By specifying that each agricultural industry only produce its primary commodity, no byproducts exist and therefore no indirect or induced effects are calculated in the defined agricultural sectors.

In order to measure the contribution of each industry, industry change activities for each industry in the Aggregate Agriculture Sector were created. The year of each event equaled the data year, and the output values for each event equaled the industry output value previously used in data reconciliation. This method allows IMPLAN to estimate the contribution of the industry to the local economy instead of an additional impact from an industry.

The final important procedure is to

estimate the portion of activity that accrues to the local (in this case the state) economy by editing the Local Purchase Percentages (LPPs) in the industry change activities for every IMPLAN agricultural industry. Only the portion of an industry's value that is produced locally should accrue to the local economy. For instance, output in the *Oilseed Farming* industry (sector 1) involved the LPP being set to 100%, which means the entire output value of the industry accrued to the region because the goods in the sector are produced within the study region. Alternately, an activity measuring spending by tourists on gasoline and oil would involve setting the LPPs to the SAM value, an estimate of the actual percent of expenditures made in the study area. Estimating the economic contribution of the Aggregate Agriculture Sector to the state involved setting each LPP to 100% for each industry considered part of the Aggregate Agriculture Sector.

1.2.2 Analysis by Parts

Arkansas's largest grains industry is rice, unlike all other U.S. States. Differences in the makeup of the output value of the grains industry, and therefore the industry spending patterns for grains production and processing, in Arkansas warranted changes in the contribution analysis methods. Richardson and Outlaw (2010) previously reported on the U.S. rice industry's contribution to the U.S. economy using IMPLAN's analysis by parts methods (Alward, 2012). ABP allows the IMPLAN user to account for industry activity outside of the 440 sectoring scheme. For example, ABP could be used in an impact analysis to estimate effects of a new industry in an economy (e.g., switchgrass production and processing into ethanol) or in a contribution analysis to estimate the effects of a piece of an existing industry separately (e.g., rice production independently instead of as a component of *Grains Farming* sector). In this study, *Rice Farming* and *Rice Milling* comprise the rice industry. *Rice Farming* was removed from *Grain Farming* (sector 2), and *Rice Milling* was removed from *Flour Milling and Malt Manufacturing* (sector 43). Appendix C presents additional technical details about ABP.

1.2.3 Measures of Economic Contribution

Total economic contributions are made up of three separate components: 1) direct contributions - generated by farm production and processing of crops, poultry, livestock and forest products; 2) indirect contributions - generated when agricultural firms purchase materials and services from other Arkansas businesses; and 3) induced contributions - result when employees of agricultural firms and their suppliers spend a portion of their income within Arkansas. Each of these contributions makes up an important part of the total economic contribution of the Arkansas agriculture sector. The overall definition of the Aggregate Agriculture Sector in this study is limited to only those sectors considered to be 100% tied to agriculture, as defined in section 1.2. However, the indirect and induced contributions measure the contributions of those industries that are linked to agriculture but may not be entirely defined as agriculture. These industries represent important economic bases of many communities across the state and contribute to the jobs, income and value added in these communities due to their relationships with agriculture. Because sectors are interlinked throughout the state, expansion in activities in one sector may result in expansion in other sectors. Therefore, the contributions accruing in other sectors as a result of agricultural production and processing are included in the total economic contribution.

Economic contributions are often measured in terms of: 1) total industry output, 2) wages and labor income (wages, salaries, and proprietor income), 3) total value added, and 4) employment. I-O analysis can be used to assess the economic contribution of an existing sector. These measures are thought of as a sector's gross contribution to the regional economy. This is accomplished by "removing" the sector of choice from the I-O model and examining how this removal affects the economic activity in the region. This provides an estimate of the contribution of the sector by looking at the losses experienced (or activity generated) by the sector of interest.

Employment includes all wage and salary employees, as well as self-employed jobs, in a given sector. All jobs are not equal; they pay different wages, require different skills and different work hours, etc., which makes aggregate estimates or comparisons across regions and industries problematic. However, jobs as a measure of economic contribution are easily understood and an important component of economic activity. Labor income consists of two parts: first is proprietary income, which includes all income received by self-employed individuals including private business owners, owner-operators, etc.; second is wages, which includes all worker salaries, payments, and fringe benefits paid by employers. Value added represents all payments to workers (labor income) plus indirect taxes and other property-type income, such as pay-

ments for rents, royalties, and dividends. Value added is comparable to GDP by State but is measured using different data sources and methods, so the data may not be precisely equal. Value added is the income and indirect business taxes generated by the activity and offers a more complete examination of the total economic contribution of an activity on a region; therefore, economists generally prefer value added to output as the measure for assessing the contribution of a given industry or activity to a region's economy (Olson and Lindall, 2009). Income and value added are also relatively clear measures of economic contribution that can be directly compared across industries and regions that contain a range of different economic activities.

Measuring the economic importance of an industry using output can be mis-

leading. Output represents the dollar value of an industry's total production, but can also be thought of as the sum of the goods and services used to provide a product. Economic contribution analyses estimate the contribution of production (output) by including purchases from other industries to produce the inputs required to create this output; therefore, output includes the production of intermediate goods which are included in another industry's output. Summing the output of all industries would include multiple counting of some goods and services. Gross sales receipts overestimate the economic size of an industry because the values of inputs are recounted at each succeeding stage of production. As a result, output should not be used as a measure of economic contribution and is not reported here.

1.3: The Aggregate Agriculture Sector

In 2011, agriculture made substantial contributions to the Arkansas economy in terms of employment, labor income, wages, and value added (see Box 1). The Aggregate Agriculture Sector provided 259,243 jobs, or almost 17%, of state employment (Table 1). That is, more than one in six Arkansas jobs can be attributed to agriculture. In that same year, agriculture paid \$10.1B, or 15% of state labor income. Wages accounted for \$7.9B, or 78% of total labor income generated by agriculture. Additionally, the Aggregate Agriculture Sector added \$17.0B of value to the state economy, or 17% of state value added. That is, more than \$1 out of every \$6 in value added can be attributed to agriculture. Details of these contributions are presented in Appendix B, Table 1 and are summarized in Tables 1 through 3 below.

Agriculture generates employment in all 20 of the 2-digit NAICS sectors. Almost three-quarters of all agriculture-generated jobs are in five sectors (Box 2). The poultry industry (comprised of *Poultry Processing* and *Poultry and Egg Produc-*

tion) alone provides 38,377 jobs, or one in four jobs generated by agriculture in Arkansas. *Poultry Processing* employed 28,881 of these workers. The remaining 9,496 workers were employed in *Poultry and Egg Production*.

The far-reaching contributions of agriculture are seen in the distribution of agriculture-generated value added throughout the economy. Box 3 shows the five sectors that benefit most from value added generated by agriculture. Note that three of those

sectors (*Wholesale Trade, Transportation and Warehousing, and Real Estate and Rental*) lie outside of the agriculture sector as defined here. Although almost half of all agriculture-generated value added accrues outside agricultural sectors, these sectors are closely tied to agriculture. For instance, *Wholesale Trade* contains businesses such as grain and livestock wholesalers as well as farm supply wholesalers.

| Box 1. Total Contribution of Arkansas Agriculture, 2011 | |
|--|--|
| Employment | 259,243 jobs (1 out of 6 Arkansas jobs) |
| Wages | \$7,872M (13% of Arkansas wages) |
| Labor Income | \$10,148M (15% of Arkansas labor income) |
| Value-Added | \$17,046M (\$1 out of \$6 Arkansas value added) |

Source: MIG (2012).
NOTE: Presented in current dollars.

| Box 2. Employment Generated by Agriculture, 2011 Top Five NAICS Industries^a | |
|---|---|
| Agriculture, Forestry, Fishing and Hunting | 78,700 jobs (88% of the jobs are in agricultural production) |
| Manufacturing | 75,644 jobs (95% of the jobs are in agricultural processing) |
| Transportation and Warehousing | 12,594 jobs |
| Health and Social Services | 12,011 jobs |
| Retail Trade | 11,292 jobs |
| Top Five Total | 190,240 jobs (73% of all jobs generated by Agriculture) |

^aBased on 2-Digit NAICS aggregation (USCB, 2006).
Source: MIG (2012).
Note: presented in current dollars.

Table 1. The Aggregate Agriculture Sector's Contribution to Arkansas' Economy, 2011.

| | Employment ^a | | | Labor Income ^b | | | Value Added ^c | | |
|---------------------------------------|-------------------------|--------------|-----------------------|---------------------------|--------------|-------------------------------|--------------------------|--------------|------------------------------|
| | Number of Jobs | % Total | % Total Arkansas Jobs | Million \$ | % Total | % Total Arkansas Labor Income | Million \$ | % Total | % Total Arkansas Value Added |
| Production ^d | 69,433 | 26.8 | 4.4 | 1,489 | 14.7 | 2.2 | 2,643 | 15.5 | 2.6 |
| Processing ^e | 71,719 | 27.7 | 4.6 | 3,805 | 37.5 | 5.7 | 6,173 | 36.2 | 6.0 |
| Ag-Related ^f | 9,267 | 3.6 | 0.6 | 234 | 2.3 | 0.4 | 193 | 1.1 | 0.2 |
| Direct Contribution | 150,419 | 58.0 | 9.6 | 5,527 | 54.5 | 8.3 | 9,008 | 52.8 | 8.7 |
| Indirect Effects | 60,552 | 23.4 | 3.9 | 2,965 | 29.2 | 4.4 | 4,980 | 29.2 | 4.8 |
| Direct + Indirect Contribution | 210,971 | 81.4 | 13.5 | 8,492 | 83.7 | 12.7 | 13,988 | 82.1 | 13.5 |
| Induced Effects | 48,272 | 18.6 | 3.1 | 1,656 | 16.3 | 2.5 | 3,058 | 17.9 | 3.0 |
| Total Contribution | 259,243 | 100.0 | 16.6 | 10,148 | 100.0 | 15.2 | 17,046 | 100.0 | 16.5 |

Source: Computed using the 2011 Arkansas database from MIG (2012).

Note: Presented in current dollars.

^a Equivalent to full- and part-time jobs (MIG, 2000).

^b Labor income represents all forms of employment income; it is the sum of employee compensation and proprietor income (MIG, 2000).

^c Value added is the sum of employee compensation, proprietary income, other property type income, and indirect business taxes.

^d Appendix A, Table 3 lists sectors of direct agricultural production in terms of IMPLAN sectors.

^e Appendix A, Table 3 lists sectors of direct agricultural processing in terms of IMPLAN sectors.

^f Ag-related sectors include agricultural sectors not categorized as agricultural production or processing. These sectors are Fishing, Hunting, and Trapping; Agriculture and Forestry Support Activities; and New Farm Housing Units and Additions and Alterations.

Within Crops Sector production industries, *Oilseed Farming*, *Rice Farming*, and *Cotton Farming* add the largest amount of value, while in the Animal Agriculture Sector, the poultry industry (*Poultry and Egg Production* and *Poultry Processing*) contributes the largest value. In the Forestry Sector, the top five contributors to value in the economy are *Paper Mills*, *Sawmills and Wood Preservation*, *Veneer and Plywood Manufacturing*, *Sanitary Paper Product Manufacturing*, and *Paperboard Container Manufacturing*. About 34% (\$3.1B) of direct value added by agriculture accrues in Crops, 32% (\$2.9B) in Animal Agriculture, and 32% (\$2.9B) in Forestry. The remaining 2% accrues in the Agriculture-Related Sector.

As with value added, much of the income attributable to agricultural activity is generated outside of agricultural sectors. Box 4 shows the five

sectors that generate the most income as the result of agricultural activity in Arkansas. In 2011, \$4.6B, or 45% of all labor income, went to workers in non-agricultural sectors. Within the agricultural sectors, the top three crops production sectors, the poultry industry, and the top five forestry sectors received \$3.0B, or 30% of all labor income generated by agriculture.

Agriculture's direct contribution to the state economy is measured by the sum of the contributions of farm production, processing of farm products, and agriculture related sectors. There were 150,419 workers employed by the agricultural production, processing and agriculture related sectors (Table 1). The owners, operators, and workers of these farms and businesses received over \$5.5B in labor

Box 3. Value Added Generated by Agriculture, 2011 Top Five NAICS Industries^a

| | |
|--|-----------|
| Manufacturing | \$6,616M |
| (93% of the value added is in agricultural processing) | |
| Agriculture, Forestry, Fishing and Hunting | \$2,835M |
| (93% of the value added is in agricultural production) | |
| Real Estate and Rental | \$1,073M |
| Wholesale Trade | \$1,002M |
| Transportation and Warehousing | \$867M |
| Top Five Total | \$12,393M |
| (73% of all value added generated by Agriculture) | |

^aBased on 2-Digit NAICS aggregation (USCB, 2006). Source: MIG (2012).

Note: Presented in current dollars.

Box 4. Labor Income Generated by Agriculture, 2011 Top Five NAICS Industries^a

| | |
|---|----------|
| Manufacturing | \$4,023M |
| (95% of labor income is in agricultural processing) | |
| Agriculture, Forestry, Fishing and Hunting | \$1,722M |
| (86% of labor income is in agricultural production) | |
| Transportation and Warehousing | \$656M |
| Wholesale Trade | \$574M |
| Health and Social Services | \$542M |
| Top Five Total | \$7,518M |
| (74% of all labor income generated by Agriculture) | |

^aBased on 2-Digit NAICS aggregation (USCB, 2006). Source: MIG (2012).

Note: Presented in current dollars.

income (Table 1); 69% of direct labor income went to workers and business owners in processing industries. Agricultural production, processing, and agriculture-related industries directly added value of \$9.0B to the Arkansas economy; 69% was from processing industries. The crops industries employed close to half (45%) of agricultural production and processing employees, while the animal agriculture industries employed 37% and the forestry industries 19% (Table 2).

Indirect contributions result when agricultural firms purchase raw materials and services from other Arkansas businesses to produce their products. In 2011, there were 60,552 workers employed by industries supplying goods and services to

the farm production and processing industries. The workers and owners of these establishments received \$3.0B in labor income and these industries added value of almost \$5.0B to the state economy (Table 1).

Induced contributions result when employees of agricultural firms and employees of the raw material and service firms spend a portion of their income on local purchases. There were 48,272 workers employed by businesses providing goods and services to the employees in agriculture and its supplying industries. These employees and the proprietors of these businesses received roughly \$1.7B in labor income and added value of almost \$3.1B to the Arkansas economy.

1.3.1 The Crops Sector

The Crops Sector includes all enterprises engaged in the production and processing of cotton, food and feed grains, oil bearing crops, fruits, nuts and vegetables, and hay and pasture (Appendix A, Table 1). The Crops Sector's direct contribution on the state economy is measured by the sum of the contributions of crop production and processing of crops products.

In 2011, the Crops Sector provided 62,918 jobs within the Aggregate Agriculture Sector, or 4% of state employment (Table 3 and Box 5). The workers and business owners received \$1.6B in labor income (\$828M of that in wages), or 3%

Table 2. The Contribution of Major Agricultural Sectors to Agricultural Production and Processing, 2011.

| | Employment ^a | | Labor Income ^b | | Value Added ^c | |
|----------------------------|-------------------------|--------------|---------------------------|--------------|--------------------------|--------------|
| | Number of Jobs | % Total | Million \$ | % Total | Million \$ | % Total |
| Production | | | | | | |
| <i>Crops</i> | 47,639 | 33.8 | 887 | 16.8 | 1,595 | 18.1 |
| <i>Animal Agriculture</i> | 17,597 | 12.5 | 481 | 9.1 | 923 | 10.5 |
| <i>Forestry</i> | 4,197 | 3.0 | 121 | 2.3 | 125 | 1.4 |
| Production Total | 69,433 | 49.2 | 1,489 | 28.1 | 2,643 | 30.0 |
| Processing | | | | | | |
| <i>Crops</i> | 15,279 | 10.8 | 753 | 14.2 | 1,467 | 16.6 |
| <i>Animal Agriculture</i> | 34,403 | 24.4 | 1,200 | 22.7 | 1,932 | 21.9 |
| <i>Forestry</i> | 22,037 | 15.6 | 1,851 | 35.0 | 2,774 | 31.5 |
| Processing Total | 71,719 | 50.8 | 3,805 | 71.9 | 6,173 | 70.0 |
| Prod. + Proc. Total | 141,152 | 100.0 | 5,293 | 100.0 | 8,815 | 100.0 |

Source: Computed using the 2011 Arkansas database from MIG (2012).

Note: Presented in current dollars.

^a Equivalent to full- and part-time jobs (MIG, 2000).

^b Labor income represents all forms of employment income; it is the sum of employee compensation and proprietor income (MIG, 2000).

^c Value added is the sum of employee compensation, proprietary income, other property type income, and indirect business taxes.

Table 3. The Crops Sector's Direct Contribution to Arkansas' Economy, 2011.

| | Employment ^a | | | Labor Income ^b | | | Value Added ^c | | |
|-------------------------|-------------------------|-----------------|-----------------------|---------------------------|-----------------|-------------------------------|--------------------------|-----------------|------------------------------|
| | Number of Jobs | % Direct Impact | % Total Arkansas Jobs | Million \$ | % Direct Impact | % Total Arkansas Labor Income | Million \$ | % Direct Impact | % Total Arkansas Value Added |
| Production ^d | 47,639 | 31.7 | 3.1 | 887 | 16.0 | 1.3 | 1,595 | 17.7 | 1.5 |
| Processing ^e | 15,279 | 10.2 | 1.0 | 753 | 13.6 | 1.1 | 1,467 | 16.3 | 1.4 |
| Direct Impact | 62,918 | 41.8 | 4.0 | 1,640 | 29.7 | 2.5 | 3,062 | 34.0 | 3.0 |

Source: Computed using the 2011 Arkansas database from MIG (2012).

Note: Presented in current dollars.

^a Equivalent to full- and part-time jobs (MIG, 2000).

^b Labor income represents all forms of employment income; it is the sum of employee compensation and proprietor income (MIG, 2000).

^c Value added is the sum of employee compensation, proprietary income, other property type income, and indirect business taxes.

^d Appendix A, Table 5 lists sectors of direct agricultural production in terms of IMPLAN sectors.

^e Appendix A, Table 6 lists sectors of direct agricultural processing in terms of IMPLAN sectors.

of state labor income. The Crops Sector added \$3.1B, or 3%, to state value-added. The rice industry (*Rice Farming*, and *Rice Milling*) represented 13% of jobs, 17% of labor income, and 18% of value added in the overall Crops Sector (Box 6). A summary is presented in Table 3. Details are provided in Appendix B, Table 2.

1.3.2 The Animal Agriculture Sector

The Animal Agriculture Sector includes all enterprises engaged in the production and processing of animals, including poultry and egg, cattle, dairy farm, hogs and pigs, other animal agriculture, processed meat, and dairy processing industries (Appendix A, Table 2). The Animal Agriculture Sector's direct contribution on the state economy is measured by the sum of the contributions of animal production and processing of animal products. This sector accounted for 52,000 jobs in 2011, or over 3% of state employment, and these workers and business owners received \$1.7B in labor income, or almost 3% of state labor in-

| Box 5. Direct Contribution of the Crops Sector, 2011 | |
|---|-------------|
| Employment | 62,918 jobs |
| Wages | \$828M |
| Labor Income | \$1,640M |
| Value-Added | \$3,062M |

Source: MIG (2012).
Note: Presented in current dollars.

come (Table 4). Of this labor income, 84% (\$1.4B) was attributable to wages. In 2011, the Animal Agriculture Sector added \$2.9B of value to the state economy, or almost 3% of state value added (Table 4 and Box 7). *Poultry and Egg Production* and *Poultry Processing*⁴ provided 74% of jobs, 82% of income and 79% of value added in the Animal Agriculture Sector in 2011 (Box 8). However, overall, the *Poultry and Egg Production* and *Poultry Processing* generated 1 out of 4 of all agricultural jobs, and \$1 out of every \$4 of agricultural value added. Table 4 provides a summary of the Animal Agriculture Sector's total contribution on Arkansas' economy; details can be found in Appendix B, Table 3.

1.3.3 The Forestry Sector

The Forestry Sector is primarily comprised of commercial logging, forest products, furniture and wood and paper

| Box 6. Direct Contribution of the Rice Industry (Rice Farming and Rice Milling) | |
|--|---------------------------------------|
| Employment | 7,957 jobs (13% of Crops jobs) |
| Wages | \$84M (10% of Crops wages) |
| Labor Income | \$280M (17% of Crops labor income) |
| Value-Added | \$543M (18% of Crops value added) |

Source: MIG (2012).
Note: Presented in current dollars.

processing enterprises (Appendix A, Table 3). The Forestry Sector's direct contribution to the state economy is measured by the sum of the contributions of forestry production and processing. Processed goods derived from forestry production are the third largest component of processed agricultural goods, in terms of employment, labor income, and value added. There were 26,234 jobs (almost 2% of state employment) in the Forestry Sector in 2011, and these workers and business owners received \$2.0B in labor income, or 3% of state labor income. The Forestry Sector added \$2.9B of value to the state economy, or almost 3% of total state value-added (Table 5 and Box 9). Within this sector, *Paper Mills, Sawmills and Wood Preservation, Veneer and Plywood Manufacturing, Sanitary Paper Product Manufacturing*, and *Paperboard Container Manufacturing* comprised 52% of forestry jobs, and 63% and 69% of forestry income and value added, respectively (Box 10). These contributions are summarized in Table 5. Details can be found in Appendix B, Table 4.

| Box 7. Direct Contribution of the Animal Agriculture Sector, 2011 | |
|--|-------------|
| Employment | 52,000 jobs |
| Wages | \$1,419M |
| Labor Income | \$1,681M |
| Value-Added | \$2,855M |

Source: MIG (2012).
Note: Presented in current dollars.

Table 4. The Animal Agriculture Sector's Direct Contribution to Arkansas' Economy, 2011.

| | Employment^a | | | Labor Income^b | | | Value Added^c | | |
|-------------------------|-------------------------------|-----------------|-----------------------|---------------------------------|-----------------|-------------------------------|--------------------------------|-----------------|------------------------------|
| | Number of Jobs | % Direct Impact | % Total Arkansas Jobs | Million \$ | % Direct Impact | % Total Arkansas Labor Income | Million \$ | % Direct Impact | % Total Arkansas Value Added |
| Production ^d | 17,597 | 11.7 | 1.1 | 481 | 8.7 | 0.7 | 923 | 10.2 | 0.9 |
| Processing ^e | 34,403 | 22.9 | 2.2 | 1,200 | 21.7 | 1.8 | 1,932 | 21.4 | 1.9 |
| Direct Impact | 52,000 | 34.6 | 3.3 | 1,681 | 30.4 | 2.5 | 2,855 | 31.7 | 2.8 |

Source: Computed using the 2011 Arkansas database from MIG (2012).

Note: Presented in current dollars.

^a Equivalent to full- and part-time jobs (MIG, 2000).

^b Labor income represents all forms of employment income; it is the sum of employee compensation and proprietor income (MIG, 2000).

^c Value added is the sum of employee compensation, proprietary income, other property type income, and indirect business taxes.

^d Appendix A, Table 5 lists sectors of direct agricultural production in terms of IMPLAN sectors.

^e Appendix A, Table 6 lists sectors of direct agricultural processing in terms of IMPLAN sectors.

Box 8. Direct Contribution of the Poultry Industry (Poultry and Egg Production and Poultry Processing)

| |
|--|
| Employment |
| 38,377 jobs (74% of Animal Agriculture jobs) (1 out of 4 agricultural jobs) |
| Wages |
| \$1,137M (80% of Animal Agriculture wages) (30% of agricultural wages) |
| Labor Income |
| \$1,385M (82% of Animal Agriculture labor income) (25% of agricultural labor income) |
| Value-Added |
| \$2,254M (79% of Animal Agriculture value added) (\$1 out of \$4 agricultural value added) |

Source: MIG (2012).
Note: Presented in current dollars.

Box 9. Direct Contribution of the Forestry Sector, 2011

| |
|---------------------|
| Employment |
| 26,234 jobs |
| Wages |
| \$1,393M |
| Labor Income |
| \$1,972M |
| Value-Added |
| \$2,899M |

Source: MIG (2012).
Note: Presented in current dollars.

Box 10. Direct Contribution of the Top Five Forestry Industries: Paper Mills, Sawmills and Wood Preservation, Veneer and Plywood Manufacturing, Sanitary Paper Product Manufacturing, and Paperboard Container Manufacturing

| |
|--|
| Employment |
| 13,544 jobs (52% of Forestry jobs) |
| Wages |
| \$882M (63% of Forestry wages) |
| Labor Income |
| \$1,250M (63% of Forestry labor income) |
| Value-Added |
| \$2,007M (69% of Forestry value added) |

Source: MIG (2012).
Note: Presented in current dollars.

Table 5. The Forestry Sector's Direct Contribution to Arkansas' Economy, 2011.

| | Employment ^a | | | Labor Income ^b | | | Value Added ^c | | |
|-------------------------|-------------------------|-----------------|-----------------------|---------------------------|-----------------|-------------------------------|--------------------------|-----------------|------------------------------|
| | Number of Jobs | % Direct Impact | % Total Arkansas Jobs | Million \$ | % Direct Impact | % Total Arkansas Labor Income | Million \$ | % Direct Impact | % Total Arkansas Value Added |
| Production ^d | 4,197 | 2.8 | 0.3 | 121 | 2.2 | 0.2 | 125 | 1.4 | 0.1 |
| Processing ^e | 22,037 | 14.7 | 1.4 | 1,851 | 33.5 | 2.8 | 2,774 | 30.8 | 2.7 |
| Direct Impact | 26,234 | 17.4 | 1.7 | 1,972 | 35.7 | 3.0 | 2,899 | 32.2 | 2.8 |

Source: Computed using the 2011 Arkansas database from MIG (2012).

Note: Presented in current dollars.

^a Equivalent to full- and part-time jobs (MIG, 2000).

^b Labor income represents all forms of employment income; it is the sum of employee compensation and proprietor income (MIG, 2000).

^c Value added is the sum of employee compensation, proprietary income, other property type income, and indirect business taxes.

^d Appendix A, Table 5 lists sectors of direct agricultural production in terms of IMPLAN sectors.

^e Appendix A, Table 6 lists sectors of direct agricultural processing in terms of IMPLAN sectors.

1.4: Summary of the Contribution of Agriculture in 2011

In 2011, the Aggregate Agriculture Sector contributed 150,419 direct jobs, or almost 10% of state employment. In addition, the Aggregate Agriculture Sector contributed 108,824 indirect and induced jobs, for a total contribution of almost 17% of state employment. Indirect and induced jobs were created in all 20 of the 2-digit NAICS aggregated industries. The largest production sector was the Crops Sector, accounting for two-thirds of direct employment and half of labor income and value added in agricultural production. The most

direct processing jobs were attributable to the Animal Agriculture Sector, which accounted for almost half of processing jobs. The Forestry Sector was the leader in agricultural processing direct labor income and value added, accounting for about \$2 in every \$5 of each. When production and processing are combined, the Crops Sector, Animal Agriculture Sector, and Forestry Sector each contributed almost equally to value added. Our analysis indicates that the Arkansas Aggregate Agriculture Sector plays a significant role in generating jobs, income,

and value added throughout the state's economy. World and domestic price stability and associated agricultural and food policies will continue to have a significant impact on Arkansas agriculture and its contribution to the Arkansas economy. Continued strength of agriculture is of paramount importance if the social and economic fabric of rural Arkansas communities is to be retained and if the essential infrastructure and services that translate into an acceptable quality of life for its residents are to be maintained.

End Notes

- ¹ This report presents two economic analyses of the agricultural sector in Arkansas. The analyses have separate and distinct scopes, definitions, and methodologies and the results of each analysis should not be compared as they are different measures of economic contribution. Please see the Definitions and Styles section for more.
- ² *Rice Farming* and *Rice Milling* comprise the rice industry. The two are not default IMPLAN sectors, but are presented as such for clarity of results. These industries were analyzed separately from their default IMPLAN sectors, *Grain Farming* and *Flour Milling and Malt Manufactur-*
- ing*, respectively, using IMPLAN's analysis by parts (ABP) methods. *Rice Farming* and *Rice Milling* are presented like IMPLAN sectors in Appendix A, Table 1; and Appendix B, Tables 1 and 2, but not in Appendix A, Tables 5 and 6. Any references to data for the Crops Sector include the value of both *Rice Farming* and *Rice Milling*, while any references to production (processing) include the value of *Rice Farming* (*Rice Milling*).
- ³ Although sectors 15 and 16 are also production sectors (forestry), no newer or more accurate data is available to update these sectors.
- ⁴ One important change in recent years occurred in the poultry production sector where large productivity gains have been experienced. The amount of labor required to produce the same output on poultry farms has decreased and the majority of poultry output is increasingly produced on fewer acres. This is reflected in the employment number associated with poultry production in this report which has decreased since the 2001 report. The reason for such a drop reflects productivity gains occurring over the past 10 or more years that were only recently adjusted for in the IMPLAN data set.

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- USDA ERS (U.S. Department of Agriculture Economic Research Service). 2013. Rice Yearbook 2011/12: Data files. Table 2: Rough and milled rice (rough equivalent): Marketing year supply, disappearance, and price; Table 3: Long grain rough and milled rice (rough equivalent): Marketing year supply, disappearance, and price; Table 4: Medium/short grain rough and milled rice (rough equivalent): Marketing year supply, disappearance, and price; Table 17: Milled rice: Average price, fob mills, at selected milling centers. usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1229. Accessed 9 Sept. 2013.
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Appendix A

Description of IMPLAN Sectors and Aggregation Schemes

Table 1. Components of the Crops Sector as Defined by IMPLAN Sectors, 2011.

| Aggregate Sector | Sector ID | IMPLAN Sector |
|------------------|--|--|
| CROPS PRODUCTION | 1 | Oilseed farming |
| | 2 | Grain farming |
| | N/A | Rice farming |
| | 3 | Vegetable and melon farming |
| | 4 | Fruit farming |
| | 5 | Tree nut farming |
| | 6 | Greenhouse, nursery, and floriculture production |
| | 7 | Tobacco farming |
| | 8 | Cotton farming |
| | 9 | Sugarcane and sugar beet farming |
| 10 | All other crop farming | |
| CROPS PROCESSING | 43 | Flour milling and malt manufacturing |
| | N/A | Rice milling |
| | 44 | Wet corn milling |
| | 45 | Soybean and other oilseed processing |
| | 46 | Fats and oils refining and blending |
| | 47 | Breakfast cereal manufacturing |
| | 48 | Sugar cane mills and refining |
| | 49 | Beet sugar manufacturing |
| | 50 | Chocolate and confectionery manufacturing from cacao beans |
| | 51 | Confectionery manufacturing from purchased chocolate |
| | 52 | Nonchocolate confectionery manufacturing |
| | 53 | Frozen food manufacturing |
| | 54 | Fruit and vegetable canning, pickling, and drying |
| | 62 | Bread and bakery product manufacturing |
| | 63 | Cookie, cracker, and pasta manufacturing |
| | 64 | Tortilla manufacturing |
| | 65 | Snack food manufacturing |
| | 66 | Coffee and tea manufacturing |
| | 67 | Flavoring syrup and concentrate manufacturing |
| | 68 | Seasoning and dressing manufacturing |
| | 69 | All other food manufacturing |
| | 70 | Soft drink and ice manufacturing |
| | 71 | Breweries |
| | 72 | Wineries |
| | 73 | Distilleries |
| | 74 | Tobacco product manufacturing |
| | 75 | Fiber, yarn, and thread mills |
| | 76 | Broadwoven fabric mills |
| | 77 | Narrow fabric mills and schiffli machine embroidery |
| | 78 | Nonwoven fabric mills |
| | 79 | Knit fabric mills |
| 80 | Textile and fabric finishing mills | |
| 81 | Fabric coating mills | |
| 82 | Carpet and rug mills | |
| 83 | Curtain and linen mills | |
| 84 | Textile bag and canvas mills | |
| 85 | All other textile product mills | |
| 86 | Apparel knitting mills | |
| 87 | Cut and sew apparel contractors | |
| 88 | Men's and boys' cut and sew apparel manufacturing | |
| 89 | Women's and girls' cut and sew apparel manufacturing | |
| 90 | Other cut and sew apparel manufacturing | |
| 91 | Apparel accessories and other apparel manufacturing | |

Note: Sector ID "N/A" indicates an industry not original to the IMPLAN 440 scheme.

Table 2. Components of the Animal Agriculture Sector, Defined by IMPLAN Sectors, 2011.

| Aggregated Sector | Sector ID | IMPLAN Sector |
|--------------------------|--|--|
| ANIMAL PRODUCTION | 11 | Cattle ranching and farming |
| | 12 | Dairy cattle and milk production |
| | 13 | Poultry and egg production |
| | 14 | Animal production, except cattle and poultry |
| ANIMAL PROCESSING | 41 | Dog and cat food manufacturing |
| | 42 | Other animal food manufacturing |
| | 55 | Fluid milk and butter manufacturing |
| | 56 | Cheese manufacturing |
| | 57 | Dry, condensed, and evaporated dairy product manf. |
| | 58 | Ice cream and frozen dessert manufacturing |
| | 59 | Animal (except poultry) slaughtering and rendering |
| | 60 | Poultry processing |
| | 61 | Seafood product preparation and packaging |
| | 92 | Leather and hide tanning and finishing |
| 93 | Footwear manufacturing | |
| 94 | Other leather and allied product manufacturing | |

Table 3. Components of the Forestry Sector as Defined by IMPLAN Sectors, 2011.

| Aggregated Sector | Sector ID | IMPLAN Sector |
|--------------------------|---|---|
| FORESTRY PRODUCTION | 15 | Forestry, forest products, and timber tract production |
| | 16 | Commercial logging |
| FORESTRY PROCESSING | 95 | Sawmills and wood preservation |
| | 96 | Veneer and plywood manufacturing |
| | 97 | Engineered wood member and truss manufacturing |
| | 98 | Reconstituted wood product manufacturing |
| | 99 | Wood windows and doors and millwork manufacturing |
| | 100 | Wood container and pallet manufacturing |
| | 101 | Manufactured home (mobile home) manufacturing |
| | 102 | Prefabricated wood building manufacturing |
| | 103 | All other miscellaneous wood product manufacturing |
| | 104 | Pulp mills |
| | 105 | Paper mills |
| | 106 | Paperboard mills |
| | 107 | Paperboard container manufacturing |
| | 108 | Coated and laminated paper, packaging paper and plastics film manf. |
| | 109 | All other paper bag and coated and treated paper manufacturing |
| | 110 | Stationery product manufacturing |
| | 111 | Sanitary paper product manufacturing |
| | 112 | All other converted paper product manufacturing |
| | 295 | Wood kitchen cabinet and countertop manufacturing |
| 296 | Upholstered household furniture manufacturing | |
| 297 | Nonupholstered wood household furniture manufacturing | |
| 300 | Office furniture manufacturing | |
| 301 | Custom architectural wood manufacturing | |

Table 4. Components of the Agriculture-Related Sector as Defined by IMPLAN Sectors, 2011.

| Aggregated Sector | Sector ID | IMPLAN Sector |
|---------------------|-----------|---|
| AGRICULTURE RELATED | 17 | Commercial fishing |
| | 18 | Commercial hunting and trapping |
| | 19 | Support activities for agriculture and forestry |

Table 5. Components of Agricultural Production as Defined by IMPLAN Sectors.

| Aggregated Sector | IMPLAN Sector |
|---------------------|--|
| CROPS PRODUCTION | Oilseed farming; Grain farming; Vegetable and melon farming; Tree nut farming; Fruit farming; Greenhouse and nursery production; Tobacco farming; Cotton farming; Sugarcane and sugar beet farming; All other crop farming |
| ANIMAL PRODUCTION | Cattle ranching and farming; Poultry and egg production; Animal production, except cattle and poultry |
| FORESTRY PRODUCTION | Forestry, forest products, and timber tract production; Commercial logging |

Table 6. Components of Agricultural Processing as Defined by IMPLAN Sectors.

| Aggregated Sector | IMPLAN Sector |
|---------------------|--|
| CROPS PROCESSING | Flour milling and malt manufacturing; Wet corn milling; Soybean and other oilseed processing; Fats and oils refining and blending; Breakfast cereal manufacturing; Sugar cane mills and refining; Beet sugar manufacturing; Chocolate and confectionery manufacturing from cacao beans; Confectionery manufacturing from purchased chocolate; Nonchocolate confectionery manufacturing; Frozen food manufacturing; Fruit and vegetable canning, pickling, and drying; Bread and bakery product manufacturing; Cookie, cracker, and pasta manufacturing; Tortilla manufacturing; Snack food manufacturing; Coffee and tea manufacturing; Flavoring syrup and concentrate manufacturing; Seasoning and dressing manufacturing; All other food manufacturing; Soft drink and ice manufacturing; Breweries; Wineries; Distilleries; Tobacco product manufacturing; Fiber, yarn, and thread mills; Broadwoven fabric mills; Narrow fabric mills and schiffli machine embroidery; Nonwoven fabric mills; Knit fabric mills; Textile and fabric mills; Fabric coating mills; Carpet and rug mills; Curtain and linen mills; Textile bag and canvas mills; All other textile product mills; Cut and sew apparel contractors; Men's and boys' cut and sew apparel manufacturing; Women's and girls' cut and sew apparel manufacturing; Other cut and sew apparel manufacturing; Apparel accessories and other apparel manufacturing |
| ANIMAL PROCESSING | Dog and cat food manufacturing; Other animal food manufacturing; Fluid milk and butter manufacturing; Cheese manufacturing; Dry- condensed- and evaporated dairy products; Ice cream and frozen dessert manufacturing; Animal (except poultry) slaughtering and rendering; Poultry processing; Seafood product preparation and packaging; Leather and hide tanning and finishing; Footwear manufacturing; Other leather and allied product manufacturing |
| FORESTRY PROCESSING | Sawmills and wood preservation; Veneer and plywood manufacturing; Engineered wood member and truss manufacturing; Reconstituted wood product manufacturing; Wood windows and doors and millwork manufacturing; Wood container and pallet manufacturing; Manufactured home (mobile home) manufacturing; Prefabricated wood building manufacturing; All other miscellaneous wood product manufacturing; Pulp mills; Paper mills; Paperboard mills; Paperboard container manufacturing; Coated and laminated paper, packaging paper and plastics film manufacturing; All other paper bag and coated and treated paper; Stationery product manufacturing; Sanitary paper product manufacturing; All other converted paper product manufacturing; Wood kitchen cabinet and countertop manufacturing; Upholstered household furniture manufacturing; Non-upholstered wood household furniture manufacturing; Office furniture manufacturing; Custom architectural wood manufacturing |

Appendix B

Agriculture-Generated Activity by Sector

Table 1. Agriculture-Generated Activity by Sector, 2011.

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|--|-------------------|---------------------|--------------------------|
| 60 | Poultry processing | 28,881 | 962.270 | 1,544.931 |
| 2 | Grain farming | 22,305 | 117.583 | 225.049 |
| 1 | Oilseed farming | 14,865 | 363.290 | 690.395 |
| 13 | Poultry and egg production | 9,496 | 423.034 | 708.948 |
| 319 | Wholesale trade businesses | 8,752 | 574.442 | 1,001.946 |
| 413 | Food services and drinking places | 8,681 | 150.515 | 219.813 |
| 19 | Support activities for agriculture and forestry | 8,471 | 231.924 | 187.097 |
| 335 | Transport by truck | 8,337 | 409.584 | 500.654 |
| N/A | Rice farming | 6,359 | 165.214 | 327.324 |
| 360 | Real estate establishments | 5,903 | 55.497 | 423.036 |
| 39 | Maintenance and repair construction of nonresidential structures | 5,111 | 204.197 | 218.244 |
| 95 | Sawmills and wood preservation | 4,313 | 443.586 | 505.272 |
| 14 | Animal production, except cattle and poultry | 4,096 | 28.131 | 99.199 |
| 381 | Management of companies and enterprises | 4,056 | 428.279 | 493.811 |
| 11 | Cattle ranching and farming | 3,832 | 28.559 | 103.865 |
| 16 | Commercial logging | 3,799 | 107.735 | 88.686 |
| 53 | Frozen food manufacturing | 3,798 | 168.165 | 230.204 |
| 105 | Paper mills | 3,326 | 316.764 | 658.467 |
| 394 | Offices of physicians, dentists, and other health practitioners | 3,144 | 224.020 | 231.020 |
| 397 | Private hospitals | 3,023 | 152.578 | 169.565 |
| 8 | Cotton farming | 2,591 | 119.124 | 227.856 |
| 382 | Employment services | 2,444 | 49.912 | 55.195 |
| 107 | Paperboard container manufacturing | 2,425 | 147.542 | 180.040 |
| 388 | Services to buildings and dwellings | 2,228 | 44.209 | 53.650 |
| 329 | Retail Stores - General merchandise | 2,185 | 52.833 | 90.240 |
| 354 | Monetary authorities and depository credit intermediation activities | 2,151 | 102.891 | 376.853 |
| 62 | Bread and bakery product manufacturing | 2,062 | 88.699 | 111.745 |
| 398 | Nursing and residential care facilities | 1,975 | 57.685 | 66.502 |
| 59 | Animal (except poultry) slaughtering, rendering, and processing | 1,829 | 81.091 | 58.744 |
| 96 | Veneer and plywood manufacturing | 1,780 | 228.215 | 338.223 |
| 340 | Warehousing and storage | 1,776 | 72.009 | 93.660 |
| 99 | Wood windows and doors and millwork manufacturing | 1,734 | 149.652 | 160.934 |
| 111 | Sanitary paper product manufacturing | 1,700 | 114.321 | 325.489 |
| 324 | Retail Stores - Food and beverage | 1,650 | 54.150 | 71.261 |
| N/A | Rice milling | 1,598 | 114.596 | 215.194 |
| 109 | All other paper bag and coated and treated paper manufacturing | 1,586 | 87.105 | 100.408 |
| 414 | Automotive repair and maintenance, except car washes | 1,584 | 50.230 | 58.770 |
| 356 | Securities, commodity contracts, investments, and related activities | 1,560 | 44.689 | 47.461 |
| 425 | Civic, social, professional, and similar organizations | 1,526 | 43.184 | 38.144 |
| 368 | Accounting, tax preparation, bookkeeping, and payroll services | 1,443 | 64.056 | 92.606 |
| 20 | Extraction of oil and natural gas | 1,369 | 38.691 | 155.137 |
| 320 | Retail Stores - Motor vehicle and parts | 1,358 | 62.966 | 78.587 |
| 400 | Individual and family services | 1,343 | 28.886 | 28.447 |
| 93 | Footwear manufacturing | 1,234 | 37.688 | 45.744 |
| 330 | Retail Stores - Miscellaneous | 1,227 | 20.972 | 37.005 |
| 333 | Transport by rail | 1,199 | 105.095 | 178.289 |
| 65 | Snack food manufacturing | 1,155 | 68.207 | 203.477 |
| 54 | Fruit and vegetable canning, pickling, and drying | 1,146 | 61.413 | 111.026 |
| 367 | Legal services | 1,093 | 59.973 | 94.018 |
| 432 | Other state and local government enterprises | 1,054 | 38.290 | 62.618 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|---|-------------------|---------------------|--------------------------|
| 31 | Electric power generation, transmission, and distribution | 1,032 | 117.797 | 479.626 |
| 399 | Child day care services | 1,028 | 20.589 | 26.010 |
| 369 | Architectural, engineering, and related services | 1,018 | 53.579 | 54.587 |
| 10 | All other crop farming | 939 | 60.935 | 63.402 |
| 411 | Hotels and motels, including casino hotels | 930 | 19.290 | 33.783 |
| 42 | Other animal food manufacturing | 914 | 48.968 | 99.083 |
| 106 | Paperboard mills | 846 | 83.389 | 162.995 |
| 296 | Upholstered household furniture manufacturing | 841 | 33.993 | 48.952 |
| 327 | Retail Stores - Clothing and clothing accessories | 825 | 14.576 | 24.234 |
| 149 | Other plastics product manufacturing | 819 | 34.310 | 54.461 |
| 331 | Retail Nonstores - Direct and electronic sales | 818 | 11.018 | 39.099 |
| 100 | Wood container and pallet manufacturing | 807 | 54.562 | 61.545 |
| 386 | Business support services | 785 | 19.824 | 20.762 |
| 85 | All other textile product mills | 775 | 42.261 | 54.891 |
| 325 | Retail Stores - Health and personal care | 754 | 29.435 | 36.673 |
| 86 | Apparel knitting mills | 747 | 19.977 | 25.304 |
| 41 | Dog and cat food manufacturing | 734 | 31.153 | 110.734 |
| 357 | Insurance carriers | 728 | 41.394 | 93.687 |
| 70 | Soft drink and ice manufacturing | 723 | 43.771 | 56.050 |
| 391 | Private elementary and secondary schools | 705 | 12.855 | 12.496 |
| 374 | Management, scientific, and technical consulting services | 703 | 42.186 | 44.860 |
| 295 | Wood kitchen cabinet and countertop manufacturing | 661 | 25.788 | 21.473 |
| 323 | Retail Stores - Building material and garden supply | 653 | 21.062 | 29.294 |
| 396 | Medical and diagnostic labs and outpatient and other ambulatory care services | 639 | 30.143 | 45.559 |
| 339 | Couriers and messengers | 626 | 21.106 | 37.199 |
| 142 | Plastics packaging materials and unlaminated film and sheet manufacturing | 618 | 35.493 | 66.995 |
| 426 | Private household operations | 617 | 7.703 | 7.703 |
| 326 | Retail Stores - Gasoline stations | 616 | 17.809 | 33.442 |
| 377 | Advertising and related services | 606 | 26.777 | 47.450 |
| 64 | Tortilla manufacturing | 590 | 27.476 | 39.782 |
| 379 | Veterinary services | 551 | 13.835 | 15.749 |
| 417 | Commercial and industrial machinery and equipment repair and maintenance | 540 | 27.075 | 33.456 |
| 387 | Investigation and security services | 538 | 11.675 | 12.390 |
| 98 | Reconstituted wood product manufacturing | 515 | 70.025 | 75.574 |
| 17 | Commercial Fishing | 514 | 1.565 | 3.340 |
| 351 | Telecommunications | 493 | 40.837 | 144.430 |
| 328 | Retail Stores - Sporting goods, hobby, book and music | 489 | 8.599 | 11.055 |
| 393 | Other private educational services | 471 | 12.706 | 17.414 |
| 401 | Community food, housing, and other relief services, including rehabilitation services | 470 | 12.380 | 12.376 |
| 97 | Engineered wood member and truss manufacturing | 468 | 40.791 | 62.034 |
| 380 | All other miscellaneous professional, scientific, and technical services | 431 | 16.617 | 48.008 |
| 427 | US Postal Service | 430 | 30.518 | 27.152 |
| 55 | Fluid milk and butter manufacturing | 412 | 22.004 | 49.940 |
| 419 | Personal care services | 411 | 13.487 | 14.665 |
| 341 | Newspaper publishers | 410 | 12.473 | 16.897 |
| 403 | Spectator sports companies | 408 | 5.366 | 4.823 |
| 15 | Forestry, forest products, and timber tract production | 398 | 13.487 | 36.036 |
| 395 | Home health care services | 389 | 15.254 | 16.283 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|---|-------------------|---------------------|--------------------------|
| 322 | Retail Stores - Electronics and appliances | 383 | 13.669 | 16.219 |
| 392 | Private junior colleges, colleges, universities, and professional schools | 379 | 10.133 | 11.050 |
| 424 | Grantmaking, giving, and social advocacy organizations | 378 | 12.461 | 11.376 |
| 372 | Computer systems design services | 376 | 25.110 | 18.686 |
| 32 | Natural gas distribution | 365 | 29.943 | 72.727 |
| 88 | Men's and boys' cut and sew apparel manufacturing | 339 | 9.418 | 12.443 |
| 321 | Retail Stores - Furniture and home furnishings | 335 | 10.472 | 13.691 |
| 410 | Other amusement and recreation industries | 316 | 5.962 | 8.774 |
| 421 | Dry-cleaning and laundry services | 315 | 10.931 | 10.804 |
| 338 | Scenic and sightseeing transportation and support activities for transportation | 307 | 7.691 | 7.777 |
| 390 | Waste management and remediation services | 305 | 15.507 | 26.475 |
| 409 | Amusement parks, arcades, and gambling industries | 305 | 5.422 | 6.860 |
| 376 | Scientific research and development services | 303 | 19.045 | 21.202 |
| 407 | Fitness and recreational sports centers | 296 | 4.337 | 5.513 |
| 45 | Soybean and other oilseed processing | 290 | 14.342 | 17.547 |
| 68 | Seasoning and dressing manufacturing | 287 | 9.492 | 12.728 |
| 18 | Commercial hunting and trapping | 281 | 0.194 | 2.104 |
| 348 | Radio and television broadcasting | 278 | 19.642 | 10.661 |
| 355 | Nondepository credit intermediation and related activities | 275 | 19.078 | 17.660 |
| 6 | Greenhouse, nursery, and floriculture production | 271 | 29.106 | 27.525 |
| 297 | Nonupholstered wood household furniture manufacturing | 271 | 10.197 | 13.877 |
| 358 | Insurance agencies, brokerages, and related activities | 269 | 11.899 | 16.919 |
| 73 | Distilleries | 268 | 19.310 | 212.107 |
| 384 | Office administrative services | 257 | 12.160 | 10.920 |
| 362 | Automotive equipment rental and leasing | 239 | 25.751 | 49.824 |
| 141 | All other chemical product and preparation manufacturing | 231 | 13.551 | 21.117 |
| 359 | Funds, trusts, and other financial vehicles | 223 | 4.633 | 12.446 |
| 404 | Promoters of performing arts and sports and agents for public figures | 220 | 2.426 | 3.516 |
| 113 | Printing | 217 | 9.670 | 11.090 |
| 108 | Coated and laminated paper, packaging paper and plastics film manufacturing | 212 | 14.828 | 20.931 |
| 3 | Vegetable and melon farming | 211 | 25.814 | 27.515 |
| 40 | Maintenance and repair construction of residential structures | 208 | 9.514 | 18.993 |
| 389 | Other support services | 199 | 6.608 | 12.343 |
| 91 | Apparel accessories and other apparel manufacturing | 196 | 6.024 | 6.299 |
| 63 | Cookie, cracker, and pasta manufacturing | 193 | 12.782 | 24.283 |
| 416 | Electronic and precision equipment repair and maintenance | 193 | 13.349 | 16.632 |
| 46 | Fats and oils refining and blending | 193 | 8.584 | 46.484 |
| 418 | Personal and household goods repair and maintenance | 188 | 12.264 | 13.860 |
| 69 | All other food manufacturing | 187 | 5.462 | 8.299 |
| 12 | Dairy cattle and milk production | 173 | 1.080 | 10.674 |
| 103 | All other miscellaneous wood product manufacturing | 164 | 11.071 | 14.483 |
| 336 | Transit and ground passenger transportation | 164 | 3.888 | 4.801 |
| 143 | Unlaminated plastics profile shape manufacturing | 161 | 8.911 | 14.234 |
| 402 | Performing arts companies | 160 | 1.268 | 1.482 |
| 110 | Stationery product manufacturing | 158 | 5.050 | 6.333 |
| 365 | Commercial and industrial machinery and equipment rental and leasing | 154 | 25.415 | 39.701 |
| 375 | Environmental and other technical consulting services | 151 | 8.591 | 9.393 |
| 47 | Breakfast cereal manufacturing | 145 | 6.910 | 24.948 |
| 373 | Other computer related services, including facilities management | 144 | 20.142 | 27.144 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|------------------|--|--------------------------|----------------------------|---------------------------------|
| 415 | Car washes | 144 | 2.721 | 3.032 |
| 58 | Ice cream and frozen dessert manufacturing | 142 | 6.142 | 8.948 |
| 33 | Water, sewage and other treatment and delivery systems | 137 | 6.414 | 12.807 |
| 420 | Death care services | 134 | 5.891 | 6.283 |
| 84 | Textile bag and canvas mills | 129 | 6.064 | 7.354 |
| 422 | Other personal services | 119 | 5.340 | 5.908 |
| 301 | Custom architectural wood manufacturing | 109 | 7.862 | 7.893 |
| 195 | Machine shops | 107 | 5.116 | 5.745 |
| 370 | Specialized design services | 106 | 5.435 | 8.606 |
| 412 | Other accommodations | 105 | 2.267 | 3.544 |
| 61 | Seafood product preparation and packaging | 102 | 2.487 | 2.949 |
| 423 | Religious organizations | 101 | 2.454 | 6.794 |
| 346 | Motion picture and video industries | 98 | 2.205 | 3.998 |
| 126 | Other basic organic chemical manufacturing | 94 | 8.114 | 13.612 |
| 115 | Petroleum refineries | 93 | 10.069 | 85.817 |
| 158 | Glass container manufacturing | 86 | 4.455 | 7.096 |
| 337 | Transport by pipeline | 85 | 30.581 | 33.167 |
| 29 | Support activities for oil and gas operations | 82 | 5.566 | 6.841 |
| 332 | Transport by air | 82 | 5.156 | 8.631 |
| 207 | Other industrial machinery manufacturing | 82 | 5.772 | 7.408 |
| 300 | Office furniture manufacturing | 81 | 3.202 | 5.462 |
| 283 | Motor vehicle parts manufacturing | 81 | 2.292 | 3.076 |
| 125 | All other basic inorganic chemical manufacturing | 80 | 6.713 | 11.639 |
| 352 | Data processing, hosting, ISP, web search portals and related services | 79 | 3.667 | 9.698 |
| 246 | Printed circuit assembly (electronic assembly) manufacturing | 78 | 3.081 | 4.166 |
| 363 | General and consumer goods rental except video tapes and discs | 74 | 8.411 | 6.819 |
| 148 | Plastics bottle manufacturing | 71 | 4.210 | 8.474 |
| 56 | Cheese manufacturing | 71 | 4.098 | 5.500 |
| 94 | Other leather and allied product manufacturing | 69 | 3.283 | 4.097 |
| 72 | Wineries | 67 | 4.187 | 6.910 |
| 429 | Other Federal Government enterprises | 66 | 6.578 | 7.747 |
| 344 | Directory, mailing list, and other publishers | 64 | 3.347 | 6.459 |
| 78 | Nonwoven fabric mills | 61 | 2.627 | 4.419 |
| 371 | Custom computer programming services | 61 | 3.477 | 3.675 |
| 147 | Urethane and other foam product (except polystyrene) manufacturing | 57 | 3.854 | 6.537 |
| 4 | Fruit farming | 55 | 3.993 | 3.804 |
| 190 | Metal can, box, and other metal container (light gauge) manufacturing | 55 | 3.457 | 6.470 |
| 203 | Farm machinery and equipment manufacturing | 54 | 3.351 | 7.344 |
| 247 | Other electronic component manufacturing | 54 | 2.930 | 3.483 |
| 130 | Fertilizer manufacturing | 52 | 4.178 | 7.079 |
| 5 | Tree nut farming | 43 | 1.623 | 2.594 |
| 342 | Periodical publishers | 42 | 1.780 | 2.542 |
| 52 | Nonchocolate confectionery manufacturing | 42 | 1.220 | 2.044 |
| 383 | Travel arrangement and reservation services | 41 | 1.516 | 2.552 |
| 44 | Wet corn milling | 41 | 2.796 | 6.424 |
| 197 | Coating, engraving, heat treating and allied activities | 40 | 1.702 | 2.361 |
| 131 | Pesticide and other agricultural chemical manufacturing | 38 | 2.675 | 9.826 |
| 146 | Polystyrene foam product manufacturing | 38 | 1.800 | 3.927 |
| 43 | Flour milling and malt manufacturing | 34 | 1.786 | 3.354 |
| 431 | State and local government electric utilities | 33 | 1.955 | 4.213 |
| 378 | Photographic services | 32 | 0.636 | 1.777 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|--|-------------------|---------------------|--------------------------|
| 309 | Dental laboratories manufacturing | 31 | 1.610 | 1.421 |
| 302 | Showcase, partition, shelving, and locker manufacturing | 30 | 1.810 | 2.521 |
| 405 | Independent artists, writers, and performers | 30 | 2.178 | 4.070 |
| 139 | Toilet preparation manufacturing | 30 | 1.951 | 5.777 |
| 81 | Fabric coating mills | 29 | 0.793 | 1.009 |
| 220 | Cutting tool and machine tool accessory manufacturing | 29 | 1.801 | 2.016 |
| 89 | Women's and girls' cut and sew apparel manufacturing | 28 | 1.016 | 1.330 |
| 145 | Laminated plastics plate, sheet (except packaging), and shape manufacturing | 27 | 2.334 | 3.886 |
| 90 | Other cut and sew apparel manufacturing | 25 | 0.620 | 0.692 |
| 385 | Facilities support services | 25 | 1.014 | 2.234 |
| 243 | Semiconductor and related device manufacturing | 25 | 1.162 | 4.097 |
| 308 | Ophthalmic goods manufacturing | 25 | 1.287 | 2.526 |
| 144 | Plastics pipe and pipe fitting manufacturing | 24 | 1.349 | 2.581 |
| 406 | Museums, historical sites, zoos, and parks | 24 | 0.808 | 1.777 |
| 228 | Material handling equipment manufacturing | 23 | 1.451 | 1.984 |
| 364 | Video tape and disc rental | 23 | 0.998 | 1.520 |
| 314 | Sign manufacturing | 22 | 0.980 | 0.813 |
| 185 | Handtool manufacturing | 21 | 0.962 | 1.345 |
| 71 | Breweries | 21 | 1.296 | 6.682 |
| 140 | Printing ink manufacturing | 20 | 1.579 | 1.653 |
| 80 | Textile and fabric finishing mills | 19 | 0.292 | 0.358 |
| 270 | Storage battery manufacturing | 19 | 1.276 | 1.640 |
| 334 | Transport by water | 18 | 1.241 | 2.729 |
| 112 | All other converted paper product manufacturing | 18 | 0.866 | 1.154 |
| 83 | Curtain and linen mills | 17 | 1.243 | 1.830 |
| 118 | Petroleum lubricating oil and grease manufacturing | 17 | 1.444 | 7.202 |
| 350 | Internet publishing and broadcasting | 17 | 0.798 | 0.665 |
| 101 | Manufactured home (mobile home) manufacturing | 17 | 1.838 | 1.704 |
| 366 | Lessors of nonfinancial intangible assets | 17 | 0.565 | 21.470 |
| 87 | Cut and sew apparel contractors | 16 | 0.269 | 0.321 |
| 67 | Flavoring syrup and concentrate manufacturing | 16 | 1.092 | 9.427 |
| 137 | Adhesive manufacturing | 15 | 1.426 | 2.010 |
| 82 | Carpet and rug mills | 15 | 0.477 | 0.702 |
| 267 | Motor and generator manufacturing | 15 | 1.167 | 1.718 |
| 222 | Turbine and turbine generator set units manufacturing | 15 | 1.066 | 2.431 |
| 21 | Mining coal | 14 | 0.844 | 1.765 |
| 57 | Dry, condensed, and evaporated dairy product manufacturing | 13 | 0.817 | 1.238 |
| 26 | Mining and quarrying sand, gravel, clay, and ceramic and refractory minerals | 13 | 0.699 | 1.101 |
| 117 | Asphalt shingle and coating materials manufacturing | 12 | 0.692 | 4.138 |
| 204 | Lawn and garden equipment manufacturing | 12 | 0.432 | 0.770 |
| 66 | Coffee and tea manufacturing | 11 | 0.254 | 0.495 |
| 198 | Valve and fittings other than plumbing manufacturing | 11 | 0.667 | 1.545 |
| 240 | Audio and video equipment manufacturing | 10 | 0.432 | 0.666 |
| 135 | Biological product (except diagnostic) manufacturing | 10 | 0.522 | 0.846 |
| 430 | State and local government passenger transit | 10 | 0.282 | - 0.381 |
| 306 | Surgical appliance and supplies manufacturing | 9 | 0.687 | 1.262 |
| 127 | Plastics material and resin manufacturing | 9 | 0.702 | 1.287 |
| 307 | Dental equipment and supplies manufacturing | 9 | 0.503 | 0.914 |
| 116 | Asphalt paving mixture and block manufacturing | 9 | 0.794 | 4.053 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|---|-------------------|---------------------|--------------------------|
| 266 | Power, distribution, and specialty transformer manufacturing | 8 | 0.485 | 0.671 |
| 25 | Mining and quarrying stone | 8 | 0.415 | 1.261 |
| 102 | Prefabricated wood building manufacturing | 8 | 0.598 | 0.616 |
| 219 | Special tool, die, jig, and fixture manufacturing | 7 | 0.420 | 0.403 |
| 199 | Plumbing fixture fitting and trim manufacturing | 7 | 0.365 | 0.533 |
| 193 | Hardware manufacturing | 7 | 0.382 | 0.595 |
| 303 | Mattress manufacturing | 7 | 0.287 | 0.590 |
| 345 | Software publishers | 7 | 0.479 | 1.001 |
| 196 | Turned product and screw, nut, and bolt manufacturing | 7 | 0.324 | 0.440 |
| 353 | Other information services | 7 | 0.239 | 0.451 |
| 151 | Rubber and plastics hoses and belting manufacturing | 7 | 0.393 | 0.638 |
| 343 | Book publishers | 7 | 0.311 | 0.681 |
| 27 | Mining and quarrying other nonmetallic minerals | 6 | 0.345 | 0.787 |
| 159 | Glass product manufacturing made of purchased glass | 6 | 0.304 | 0.405 |
| 408 | Bowling centers | 6 | 0.095 | 0.146 |
| 51 | Confectionery manufacturing from purchased chocolate | 6 | 0.150 | 0.307 |
| 187 | Ornamental and architectural metal products manufacturing | 5 | 0.294 | 0.346 |
| 133 | Pharmaceutical preparation manufacturing | 5 | 0.416 | 1.120 |
| 138 | Soap and cleaning compound manufacturing | 5 | 0.250 | 0.957 |
| 272 | Communication and energy wire and cable manufacturing | 5 | 0.419 | 0.610 |
| 349 | Cable and other subscription programming | 5 | 0.204 | 0.204 |
| 122 | Synthetic dye and pigment manufacturing | 5 | 0.313 | 0.488 |
| 174 | Aluminum product manufacturing from purchased aluminum | 5 | 0.224 | 0.367 |
| 24 | Mining gold, silver, and other metal ore | 5 | 0.339 | 1.445 |
| 76 | Broadwoven fabric mills | 5 | 0.149 | 0.194 |
| 317 | All other miscellaneous manufacturing | 5 | 0.156 | 0.204 |
| 194 | Spring and wire product manufacturing | 5 | 0.236 | 0.344 |
| 157 | Other pressed and blown glass and glassware manufacturing | 5 | 0.193 | 0.283 |
| 75 | Fiber, yarn, and thread mills | 5 | 0.079 | 0.104 |
| 231 | Packaging machinery manufacturing | 4 | 0.281 | 0.281 |
| 242 | Bare printed circuit board manufacturing | 4 | 0.206 | 0.248 |
| 202 | Other fabricated metal manufacturing | 4 | 0.223 | 0.326 |
| 273 | Wiring device manufacturing | 4 | 0.207 | 0.327 |
| 152 | Other rubber product manufacturing | 4 | 0.213 | 0.364 |
| 213 | Other commercial and service industry machinery manufacturing | 4 | 0.270 | 0.479 |
| 282 | Travel trailer and camper manufacturing | 4 | 0.084 | 0.094 |
| 171 | Steel product manufacturing from purchased steel | 4 | 0.189 | 0.309 |
| 208 | Plastics and rubber industry machinery manufacturing | 4 | 0.181 | 0.204 |
| 275 | All other miscellaneous electrical equipment and component manufacturing | 4 | 0.141 | 0.165 |
| 121 | Industrial gas manufacturing | 3 | 0.269 | 0.612 |
| 170 | Iron and steel mills and ferroalloy manufacturing | 3 | 0.259 | 0.560 |
| 347 | Sound recording industries | 3 | 0.143 | 0.412 |
| 244 | Electronic capacitor, resistor, coil, transformer, and other inductor manufacturing | 3 | 0.131 | 0.199 |
| 114 | Support activities for printing | 3 | 0.119 | 0.134 |
| 274 | Carbon and graphite product manufacturing | 3 | 0.235 | 0.366 |
| 184 | Cutlery, utensil, pot, and pan manufacturing | 3 | 0.215 | 0.338 |
| 263 | Household refrigerator and home freezer manufacturing | 3 | 0.171 | 0.231 |
| 260 | Lighting fixture manufacturing | 3 | 0.166 | 0.218 |
| 201 | Fabricated pipe and pipe fitting manufacturing | 3 | 0.128 | 0.162 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|--|-------------------|---------------------|--------------------------|
| 311 | Sporting and athletic goods manufacturing | 3 | 0.111 | 0.163 |
| 183 | Crown and closure manufacturing and metal stamping | 3 | 0.152 | 0.225 |
| 280 | Truck trailer manufacturing | 3 | 0.080 | 0.092 |
| 291 | Boat building | 2 | 0.085 | 0.119 |
| 245 | Electronic connector manufacturing | 2 | 0.114 | 0.151 |
| 186 | Plate work and fabricated structural product manufacturing | 2 | 0.143 | 0.182 |
| 225 | Other engine equipment manufacturing | 2 | 0.143 | 0.224 |
| 239 | Other communications equipment manufacturing | 2 | 0.137 | 0.193 |
| 252 | Totalizing fluid meters and counting devices manufacturing | 2 | 0.060 | 0.084 |
| 298 | Metal and other household furniture (except wood) manufacturing | 2 | 0.072 | 0.071 |
| 269 | Relay and industrial control manufacturing | 2 | 0.108 | 0.143 |
| 305 | Surgical and medical instrument, laboratory and medical instrument manufacturing | 2 | 0.152 | 0.226 |
| 278 | Heavy duty truck manufacturing | 2 | 0.088 | 0.111 |
| 256 | Watch, clock, and other measuring and controlling device manufacturing | 2 | 0.111 | 0.139 |
| 172 | Alumina refining and primary aluminum production | 2 | 0.101 | 0.189 |
| 134 | In-vitro diagnostic substance manufacturing | 2 | 0.084 | 0.102 |
| 224 | Mechanical power transmission equipment manufacturing | 2 | 0.074 | 0.097 |
| 279 | Motor vehicle body manufacturing | 2 | 0.053 | 0.065 |
| 289 | Railroad rolling stock manufacturing | 1 | 0.061 | 0.111 |
| 313 | Office supplies (except paper) manufacturing | 1 | 0.079 | 0.154 |
| 238 | Broadcast and wireless communications equipment manufacturing | 1 | 0.100 | 0.120 |
| 210 | Vending, commercial, industrial, and office machinery manufacturing | 1 | 0.074 | 0.082 |
| 132 | Medicinal and botanical manufacturing | 1 | 0.085 | 0.128 |
| 251 | Industrial process variable instruments manufacturing | 1 | 0.055 | 0.069 |
| 236 | Computer terminals and other computer peripheral equipment manufacturing | 1 | 0.046 | 0.064 |
| 206 | Mining and oil and gas field machinery manufacturing | 1 | 0.093 | 0.124 |
| 268 | Switchgear and switchboard apparatus manufacturing | 1 | 0.067 | 0.102 |
| 119 | All other petroleum and coal products manufacturing | 1 | 0.085 | 0.412 |
| 214 | Air purification and ventilation equipment manufacturing | 1 | 0.061 | 0.099 |
| 229 | Power-driven handtool manufacturing | 1 | 0.066 | 0.123 |
| 205 | Construction machinery manufacturing | 1 | 0.065 | 0.128 |
| 169 | Miscellaneous nonmetallic mineral product manufacturing | 1 | 0.061 | 0.101 |
| 299 | Institutional furniture manufacturing | 1 | 0.039 | 0.090 |
| 150 | Tire manufacturing | 1 | 0.055 | 0.093 |
| 192 | Arms, ordnance, and accessories manufacturing | 1 | 0.033 | 0.066 |
| 162 | Concrete pipe, brick, and block manufacturing | 1 | 0.033 | 0.052 |
| 286 | Other aircraft parts and auxiliary equipment manufacturing | 1 | 0.032 | 0.045 |
| 217 | Industrial mold manufacturing | 1 | 0.032 | 0.031 |
| 249 | Search, detection, and navigation instruments manufacturing | 1 | 0.035 | 0.049 |
| 254 | Analytical laboratory instrument manufacturing | 1 | 0.024 | 0.032 |
| 166 | Cut stone and stone product manufacturing | 1 | 0.016 | 0.019 |
| 221 | Rolling mill and other metalworking machinery manufacturing | 1 | 0.043 | 0.045 |
| 178 | Nonferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying | 1 | 0.021 | 0.048 |
| 200 | Ball and roller bearing manufacturing | 1 | 0.035 | 0.057 |
| 284 | Aircraft manufacturing | 1 | 0.030 | 0.050 |
| 92 | Leather and hide tanning and finishing | 1 | 0.029 | 0.039 |
| 211 | Optical instrument and lens manufacturing | 1 | 0.027 | 0.028 |
| 218 | Metal cutting and forming machine tool manufacturing | 0 | 0.025 | 0.025 |

Table 1. (Continued).

| Sector ID | Aggregate Agriculture Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|-----------|---|-------------------|---------------------|--------------------------|
| 285 | Aircraft engine and engine parts manufacturing | 0 | 0.026 | 0.041 |
| 180 | Nonferrous metal foundries | 0 | 0.015 | 0.020 |
| 177 | Copper rolling, drawing, extruding and alloying | 0 | 0.015 | 0.033 |
| 216 | Air conditioning, refrigeration, and warm air heating equipment manufacturing | 0 | 0.023 | 0.027 |
| 315 | Gasket, packing, and sealing device manufacturing | 0 | 0.021 | 0.023 |
| 318 | Broom, brush, and mop manufacturing | 0 | 0.017 | 0.034 |
| 50 | Chocolate and confectionery manufacturing from cacao beans | 0 | 0.015 | 0.024 |
| 191 | Ammunition manufacturing | 0 | 0.023 | 0.053 |
| 230 | Other general purpose machinery manufacturing | 0 | 0.020 | 0.024 |
| 163 | Other concrete product manufacturing | 0 | 0.015 | 0.019 |
| 161 | Ready-mix concrete manufacturing | 0 | 0.013 | 0.018 |
| 290 | Ship building and repairing | 0 | 0.010 | 0.014 |
| 227 | Air and gas compressor manufacturing | 0 | 0.019 | 0.023 |
| 153 | Pottery, ceramics, and plumbing fixture manufacturing | 0 | 0.011 | 0.014 |
| 165 | Abrasive product manufacturing | 0 | 0.014 | 0.027 |
| 237 | Telephone apparatus manufacturing | 0 | 0.019 | 0.034 |
| 233 | Fluid power process machinery manufacturing | 0 | 0.018 | 0.022 |
| 253 | Electricity and signal testing instruments manufacturing | 0 | 0.008 | 0.011 |
| 294 | All other transportation equipment manufacturing | 0 | 0.008 | 0.018 |
| 188 | Power boiler and heat exchanger manufacturing | 0 | 0.012 | 0.016 |
| 257 | Software, audio, and video media for reproduction | 0 | 0.004 | 0.005 |
| 189 | Metal tank (heavy gauge) manufacturing | 0 | 0.009 | 0.012 |
| 226 | Pump and pumping equipment manufacturing | 0 | 0.011 | 0.015 |
| 304 | Blind and shade manufacturing | 0 | 0.006 | 0.006 |
| 250 | Automatic environmental control manufacturing | 0 | 0.004 | 0.007 |
| 261 | Small electrical appliance manufacturing | 0 | 0.006 | 0.012 |
| 136 | Paint and coating manufacturing | 0 | 0.008 | 0.012 |
| 312 | Doll, toy, and game manufacturing | 0 | 0.005 | 0.009 |
| 154 | Brick, tile, and other structural clay product manufacturing | 0 | 0.004 | 0.006 |
| 310 | Jewelry and silverware manufacturing | 0 | 0.004 | 0.006 |
| 316 | Musical instrument manufacturing | 0 | 0.003 | 0.003 |
| 164 | Lime and gypsum product manufacturing | 0 | 0.004 | 0.007 |
| 168 | Mineral wool manufacturing | 0 | 0.002 | 0.003 |
| 287 | Guided missile and space vehicle manufacturing | 0 | 0.004 | 0.005 |
| 182 | Custom roll forming | 0 | 0.002 | 0.003 |
| 179 | Ferrous metal foundries | 0 | 0.001 | 0.002 |
| 181 | All other forging, stamping, and sintering | 0 | 0.001 | 0.001 |
| 129 | Artificial and synthetic fibers and filaments manufacturing | 0 | 0.001 | 0.002 |
| 160 | Cement manufacturing | 0 | 0.001 | 0.001 |
| 30 | Support activities for other mining | 0 | 0.000 | 0.001 |
| 292 | Motorcycle, bicycle, and parts manufacturing | 0 | 0.000 | 0.001 |
| 173 | Secondary smelting and alloying of aluminum | 0 | 0.000 | 0.000 |
| 167 | Ground or treated mineral and earth manufacturing | 0 | 0.001 | 0.001 |
| 259 | Electric lamp bulb and part manufacturing | 0 | 0.000 | 0.000 |
| 38 | Construction of other new residential structures | 0 | 0.000 | 0.000 |
| 7 | Tobacco farming | 0 | 0.000 | 0.000 |
| 9 | Sugarcane and sugar beet farming | 0 | 0.000 | 0.000 |
| 22 | Mining iron ore | 0 | 0.000 | 0.000 |
| 23 | Mining copper, nickel, lead, and zinc | 0 | 0.000 | 0.000 |
| 28 | Drilling oil and gas wells | 0 | 0.000 | 0.000 |

Table 2. Crops Contributions by Sector, 2011.

| Sector ID | Crops Sector Contribution to | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|--------------|--|----------------------|------------------------|-----------------------------|
| 2 | Grain farming | 22,305 | 117.583 | 225.049 |
| 1 | Oilseed farming | 14,865 | 363.290 | 690.395 |
| N/A | Rice farming | 6,359 | 165.214 | 327.324 |
| 53 | Frozen food manufacturing | 3,798 | 168.165 | 230.204 |
| 8 | Cotton farming | 2,591 | 119.124 | 227.856 |
| 62 | Bread and bakery product manufacturing | 2,062 | 88.699 | 111.745 |
| N/A | Rice milling | 1,598 | 114.596 | 215.194 |
| 65 | Snack food manufacturing | 1,155 | 68.207 | 203.477 |
| 54 | Fruit and vegetable canning, pickling, and drying | 1,146 | 61.413 | 111.026 |
| 10 | All other crop farming | 939 | 60.935 | 63.402 |
| 85 | All other textile product mills | 775 | 42.261 | 54.891 |
| 86 | Apparel knitting mills | 747 | 19.977 | 25.304 |
| 70 | Soft drink and ice manufacturing | 723 | 43.771 | 56.050 |
| 64 | Tortilla manufacturing | 590 | 27.476 | 39.782 |
| 88 | Men's and boys' cut and sew apparel manufacturing | 339 | 9.418 | 12.443 |
| 45 | Soybean and other oilseed processing | 290 | 14.342 | 17.547 |
| 68 | Seasoning and dressing manufacturing | 287 | 9.492 | 12.728 |
| 6 | Greenhouse, nursery, and floriculture production | 271 | 29.106 | 27.525 |
| 73 | Distilleries | 268 | 19.310 | 212.107 |
| 3 | Vegetable and melon farming | 211 | 25.814 | 27.515 |
| 91 | Apparel accessories and other apparel manufacturing | 196 | 6.024 | 6.299 |
| 63 | Cookie, cracker, and pasta manufacturing | 193 | 12.782 | 24.283 |
| 46 | Fats and oils refining and blending | 193 | 8.584 | 46.484 |
| 69 | All other food manufacturing | 187 | 5.462 | 8.299 |
| 47 | Breakfast cereal manufacturing | 145 | 6.910 | 24.948 |
| 84 | Textile bag and canvas mills | 129 | 6.064 | 7.354 |
| 72 | Wineries | 67 | 4.187 | 6.910 |
| 78 | Nonwoven fabric mills | 61 | 2.627 | 4.419 |
| 4 | Fruit farming | 55 | 3.993 | 3.804 |
| 5 | Tree nut farming | 43 | 1.623 | 2.594 |
| 52 | Nonchocolate confectionery manufacturing | 42 | 1.220 | 2.044 |
| 44 | Wet corn milling | 41 | 2.796 | 6.424 |
| 43 | Flour milling and malt manufacturing | 34 | 1.786 | 3.354 |
| 81 | Fabric coating mills | 29 | 0.793 | 1.009 |
| 89 | Women's and girls' cut and sew apparel manufacturing | 28 | 1.016 | 1.330 |
| 90 | Other cut and sew apparel manufacturing | 25 | 0.620 | 0.692 |
| 71 | Breweries | 21 | 1.296 | 6.682 |
| 80 | Textile and fabric finishing mills | 19 | 0.292 | 0.358 |
| 83 | Curtain and linen mills | 17 | 1.243 | 1.830 |
| 87 | Cut and sew apparel contractors | 16 | 0.269 | 0.321 |
| 67 | Flavoring syrup and concentrate manufacturing | 16 | 1.092 | 9.427 |
| 82 | Carpet and rug mills | 15 | 0.477 | 0.702 |
| 66 | Coffee and tea manufacturing | 11 | 0.254 | 0.495 |
| 51 | Confectionery manufacturing from purchased chocolate | 6 | 0.150 | 0.307 |
| 76 | Broadwoven fabric mills | 5 | 0.149 | 0.194 |
| 75 | Fiber, yarn, and thread mills | 5 | 0.079 | 0.104 |
| 50 | Chocolate and confectionery manufacturing from cacao beans | 0 | 0.015 | 0.024 |
| 7 | Tobacco farming | 0 | 0.000 | 0.000 |
| 9 | Sugarcane and sugar beet farming | 0 | 0.000 | 0.000 |
| 48 | Sugar cane mills and refining | 0 | 0.000 | 0.000 |
| 49 | Beet sugar manufacturing | 0 | 0.000 | 0.000 |
| 74 | Tobacco product manufacturing | 0 | 0.000 | 0.000 |
| 77 | Narrow fabric mills and schiffli machine embroidery | 0 | 0.000 | 0.000 |
| 79 | Knit fabric mills | 0 | 0.000 | 0.000 |
| Total | | 62,918 | 1,639.998 | 3,062.256 |

Note: Sorted by total number of jobs descending. Sector ID "N/A" indicates an industry not original to the IMPLAN 440 scheme.

Table 3. Animal Agriculture Contributions by Sector, 2011.

| Sector ID | Animal Agriculture Sector Contribution to: | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|------------------|---|------------------------------|--------------------------------|-------------------------------------|
| 60 | Poultry processing | 28,881 | 962.270 | 1,544.931 |
| 13 | Poultry and egg production | 9,496 | 423.034 | 708.948 |
| 14 | Animal production, except cattle and poultry | 4,096 | 28.131 | 99.199 |
| 11 | Cattle ranching and farming | 3,832 | 28.559 | 103.865 |
| 59 | Animal (except poultry) slaughtering, rendering, and processing | 1,829 | 81.091 | 58.744 |
| 93 | Footwear manufacturing | 1,234 | 37.688 | 45.744 |
| 42 | Other animal food manufacturing | 914 | 48.968 | 99.083 |
| 41 | Dog and cat food manufacturing | 734 | 31.153 | 110.734 |
| 55 | Fluid milk and butter manufacturing | 412 | 22.004 | 49.940 |
| 12 | Dairy cattle and milk production | 173 | 1.080 | 10.674 |
| 58 | Ice cream and frozen dessert manufacturing | 142 | 6.142 | 8.948 |
| 61 | Seafood product preparation and packaging | 102 | 2.487 | 2.949 |
| 56 | Cheese manufacturing | 71 | 4.098 | 5.500 |
| 94 | Other leather and allied product manufacturing | 69 | 3.283 | 4.097 |
| 57 | Dry, condensed, and evaporated dairy product manufacturing | 13 | 0.817 | 1.238 |
| 92 | Leather and hide tanning and finishing | 1 | 0.029 | 0.039 |
| Total | | 52,000 | 1,680.834 | 2,854.634 |

Note: Sorted by total number of jobs descending.

Table 4. Forestry Contributions by Sector, 2011.

| Sector ID | Forestry Sector Contribution to: | Employment (Jobs) | Income (Million \$) | Value Added (Million \$) |
|------------------|---|------------------------------|--------------------------------|-------------------------------------|
| 95 | Sawmills and wood preservation | 4,313 | 443.586 | 505.272 |
| 16 | Commercial logging | 3,799 | 107.735 | 88.686 |
| 105 | Paper mills | 3,326 | 316.764 | 658.467 |
| 107 | Paperboard container manufacturing | 2,425 | 147.542 | 180.040 |
| 96 | Veneer and plywood manufacturing | 1,780 | 228.215 | 338.223 |
| 99 | Wood windows and doors and millwork manufacturing | 1,734 | 149.652 | 160.934 |
| 111 | Sanitary paper product manufacturing | 1,700 | 114.321 | 325.489 |
| 109 | All other paper bag and coated and treated paper manufacturing | 1,586 | 87.105 | 100.408 |
| 106 | Paperboard mills | 846 | 83.389 | 162.995 |
| 296 | Upholstered household furniture manufacturing | 841 | 33.993 | 48.952 |
| 100 | Wood container and pallet manufacturing | 807 | 54.562 | 61.545 |
| 295 | Wood kitchen cabinet and countertop manufacturing | 661 | 25.788 | 21.473 |
| 98 | Reconstituted wood product manufacturing | 515 | 70.025 | 75.574 |
| 97 | Engineered wood member and truss manufacturing | 468 | 40.791 | 62.034 |
| 15 | Forestry, forest products, and timber tract production | 398 | 13.487 | 36.036 |
| 297 | Nonupholstered wood household furniture manufacturing | 271 | 10.197 | 13.877 |
| 108 | Coated and laminated paper, packaging paper and plastics film manufactu | 212 | 14.828 | 20.931 |
| 103 | All other miscellaneous wood product manufacturing | 164 | 11.071 | 14.483 |
| 110 | Stationery product manufacturing | 158 | 5.050 | 6.333 |
| 301 | Custom architectural wood manufacturing | 109 | 7.862 | 7.893 |
| 300 | Office furniture manufacturing | 81 | 3.202 | 5.462 |
| 112 | All other converted paper product manufacturing | 18 | 0.866 | 1.154 |
| 101 | Manufactured home (mobile home) manufacturing | 17 | 1.838 | 1.704 |
| 102 | Prefabricated wood building manufacturing | 8 | 0.598 | 0.616 |
| 104 | Pulp mills | 0 | 0.000 | 0.000 |
| Total | | 26,234 | 1,972.466 | 2,898.581 |

Note: Sorted by total number of jobs descending.

Appendix C

IMPLAN Analysis by Parts, Technical Details

The contribution of the two industries was estimated using ABP instead of traditional IMPLAN contribution methods (section 1.2.1). Using the direct effects as inputs, IMPLAN can estimate the indirect and induced effects attributable to the rice industry, instead of estimating the rice industry's contribution as a part of the *Grains Farming* and *Flour Milling and Malt Manufacturing* sectors. In order to measure the total contribution of agriculture when using these methods, the direct effects of an industry analyzed by parts must be manually added into the IMPLAN results at the end of the contribution analysis. The main steps in ABP within a contribution analysis for an industry were collection/estimation of direct effects of the industry, data reconciliation, and estimating the industry spending pattern of the industry.

The first step in ABP is the calculation of direct effects to be used as inputs and presented as the direct contributions in the study results. The optimal scenario to estimate direct effects for an industry is to collect data for each of the following measurements: employment, output, employee compensation and proprietor income, indirect business taxes, other property type income, intermediate expenditures, and an industry spending pattern (or production budget). In some cases, exact data may be unavailable and effects must be estimated using available measurements. The integral relationships between these measurements were used to maintain the IMPLAN definitions and assumptions: total value added plus intermediate expenditures equals output; employee compensation plus proprietor income equals labor income; and labor income plus other property type income plus indirect business taxes equals total value added.

Employment and employee compensation for *Rice Milling* were collected from the Arkansas Department of Workforce Services Labor Market Informa-

tion/BLS Programs (ADWS, 2013). *Rice Milling* output was calculated from the 2012 Rice Yearbook data for milling year 2011/12 as Arkansas rough rice total disappearance times the U.S. average milling rate times the weighted average of the Arkansas milled rice price (USDA ERS, 2013). This calculated output value times IMPLAN's intermediate expenditures absorption coefficient (0.880; MIG, 2012) from the 2007 IMPLAN 509 sectoring scheme that last included *Rice Milling* as a separate industry were used to calculate *Rice Milling's* intermediate expenditures and total value added (output times the valued added absorption coefficient). The 2010 sector 43, *Flour Milling and Malt Manufacturing*, ratio of labor income to total value added (0.423; MIG, 2012) was retained to estimate the value of labor income for *Rice Milling*: 0.423 times total value added. Any labor income not attributable to employee compensation was considered to be proprietor income. Similarly, the ratios from 2010 sector 43 for other property type income and indirect business taxes to total value added were used to estimate the values of *Rice Milling's* other property type income and indirect business taxes.

Rice Farming output was collected from NASS along with all other production data used in data reconciliation described in section 1.2.1 (USDA NASS, 2013). To estimate employment, 2009 Arkansas output per worker from Richardson and Outlaw (2010) was first adjusted for inflation using the IMPLAN output deflator (1.023; MIG, 2012) for sector 2, *Grain Farming*. Employment for *Rice Farming* was calculated by dividing 2010 output by the adjusted output per worker value. The value of employee compensation for *Rice Farming* was collected from a weighted average (conventional and hybrid varieties, flood irrigation) production budget for Arkansas rice in 2010 (Flanders, 2010). The output value times IMPLAN's 2010 in-

termediate expenditures absorption coefficient from sector 2, *Grain Farming*, were used to calculate *Rice Farming's* intermediate expenditures and total value added (output times valued added absorption coefficient). The 2010 sector 2, *Grain Farming*, ratio of proprietor income to total value added (0.749; MIG, 2012) was retained to estimate the value of proprietor income for *Rice Farming*: 0.749 times total value added. *Rice Farming's* labor income estimate was therefore reported as the sum of employee compensation collected from the production budget and the calculated proprietor income value. Similarly, the ratio from 2010 sector 2 for indirect business taxes to total value added was used to estimate the value of *Rice Farming's* indirect business taxes. IMPLAN considers other property type income to be a leakage, so any left-over total value added was attributed to other property type income.

Data reconciliation for ABP is applicable for contribution analysis, but is not necessary for impact analyses. In a contribution analysis, data reconciliation involves removing the value of the industries being analyzed from their original sectors to avoid double counting and overestimation. As stated in section 1.2.1, the value of output of sector 2, *Grain Farming*, was calculated as the sum of only wheat, corn for grain, oats, and grain sorghum, and employment and value added components were adjusted accordingly. Output, employment, and value added components for sector 43, *Flour Milling and Malt Manufacturing* were edited to remove the value of *Rice Milling* by subtracting the known employment of *Rice Milling* from IMPLAN's original employment estimate for sector 43 to calculate the new number of employees in sector 43. Sector 43 in Arkansas comprises rice milling and flour milling (a measurable malt manufacturing industry does not exist in Arkansas). However, editing this sector by using

output and adjusting components of value added was not possible because flour milling data could not be disclosed, and the output estimate for rice milling was greater than IMPLAN's original estimate for sector 43. These factors resulted in the estimated value of flour milling being zero, which was known to be inaccurate.

The industry spending pattern is the first of two activities required by ABP. Common sources for industry spending patterns are current IMPLAN sectors, the IMPLAN 509 sectoring scheme sectors, external production budgets, or data from other sources. The industry spend-

ing pattern is composed of events detailing the percent of each dollar of output attributable to intermediate expenditures in each sector. This activity generates the "first round" of spending due to industry activity: indirect effects due to industry purchases and the induced effects from those industries' proprietors' and employees' spending. The events were set to occur in 2010, LPPs were set to the SAM value, and the activity level was set to the industry output value. For *Rice Milling* the industry spending pattern from the 2007 IMPLAN 509 sectoring scheme that last included *Rice*

Milling as a separate industry was used. For *Rice Farming*, the current 2010 industry spending pattern for sector 2, *Grain Farming*, was used. The second type of activity required to complete the ABP is the labor income change activity. This activity simply has two events for 2010: employee compensation and proprietor income. Each event was set to each respective industry's values for employee compensation and proprietor income. This activity generates the "second round" of spending in the ABP: the induced effects due to the industry's proprietors' and employees' spending.

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