Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2012

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UofA
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

ARKANSAS AGRICULTURAL EXPERIMENT STATION
October 2014 Research Report 995

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.

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 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.

Definitions and Styles

Gross Domestic Product by State

Gross Domestic Product by State is the state equivalent of the national measure of Gross Domestic Product (GDP), the most comprehensive measure of U.S. economic activity. Gross Domestic Product by State is derived as the sum of the GDP originating in all the industries in a state (USDC BEA, 2014a). As described in Kemper, Popp and Miller (2009), the U.S. Department of Commerce Bureau of Economic Analysis's (USDC BEA) 2009 revisions to GDP by state made it necessary to include two additional industries to bring this study in line with that new methodology used by the U.S. Department of Agriculture, Economic Research Service (USDA ERS) to measure agriculture and food's contribution to GDP (Sundell, 2011). One North American Industry Classification Scheme (NAICS) industry was added to agricultural processing (Apparel, Leather, and Allied Products Manufacturing), and agricultural retail was newly added and consists of the NAICS industry Food Services and Drinking Places. **It is important to note that agricultural retail is included in this report as a direct effect in the GDP by State. However agricultural retail is not included in our companion document, "*The Economic Contribution of the Agricultural Sector to the Arkansas Economy in 2012*"** (English, Popp and Miller, 2014). Some retail activity is picked up as part of the indirect and induced effects and included in the total economic contribution in that report.

Style Notes

In this report, Arkansas agriculture is presented in a historical context. These data are available for 1997 through 2012. Throughout the report, agriculture is defined in terms of agricultural sectors, NAICS sectors, industries, and general descriptive terms that can be applied to agriculture. Different font styles are used throughout the text to distinguish these terms.

Agricultural Sectors. These comprise the areas of focus in our study. This report refers to the Agriculture and Food Sector. 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, 2014a). This report uses the 2007 NAICS sectoring scheme (USCB, 2013). 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.

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, agricultural processing, and agricultural retail.

1: Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product

1.1: Introduction

Agricultural production, processing, and retail industries are major contributors to the Arkansas economy in terms of GDP. Agriculture contributes to the economy through direct agricultural production, value-added processing, and agricultural retail activities, and it also plays an important role through its interactions with other sectors. The use of non-agricultural goods and services as inputs into the agricultural sector promotes diversified growth in Arkansas' economy; thus agriculture remains a vital part of Arkansas' economy. This report: 1) compares the relative size of the Agriculture and Food Sector in Arkansas with those of neighboring states, the Southeastern region of the United States, and the nation; 2) provides an overview of Arkansas' economy and discusses Arkansas' agricultural sector in relation to the state economy; and 3) examines components of agricultural production and processing, including a review of historical sales trends for raw and processed agricultural output.

1.2: Methods

The most recent estimates (2012 data) from BEA for agricultural production, processing, and retail are reported for the GDP by State portion of this report. The Agriculture and Food Sector is defined to include eight sectors of BEA's GDP by State data set: 1) Agriculture, Forestry, Fishing, and Hunting; 2) Wood Products Manufacturing; 3) Furniture and Related Products Manufacturing; 4) Food and Beverage and Tobacco Products Manufacturing; 5) Textile Mills and Textile Product Mills; 6) Apparel, Leather, and Allied Products Manufacturing; 7) Paper Products Manufacturing; and 8) Food Services and Drinking Places.

This report builds upon 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; McGraw, Popp and Miller, 2012; English, Popp and Miller, 2013) and utilizes data for 2012, the year that corresponds to the English, Popp and Miller (2014) study. All dollar values are expressed in 2012 constant dollar terms, unless otherwise noted. Constant dollar values were calculated using industry-specific deflators derived from BEA's chained 2009 dollar GDP by State series, except for the data presented in Figs. 6 and 7. For Figs. 6 and 7 data, deflators from NASS's data series "Index for Price Received, 1990-1992" are used to calculate constant dollar values (USDA NASS, 2014a).

Percentages presented are *percentage* changes, not *absolute* changes. Percentage changes quantify increases or decreases relative to the initial values and are appropriate for describing time series data, such as BEA's GDP by State data. For example, a change from 15% in 2004 to 11% in 2009 results in a 27% decrease, not a 4% decrease. Likewise, a change from $11M in 2004 to $15M in 2009 results in a 36% increase.

1.2.1: A Note Regarding Presentation of Gross Domestic Product by State (Formerly Gross State Product) Estimates

Gross Domestic Product by State is the state-level analog to national GDP. Early reports (Goodwin et al., 2002; Popp, Vickery and Miller, 2005) presented historical gross state product (GSP) data and trends from BEA using a starting year of 1986. However, there is a discontinuity in the GSP (now known as GDP by State) time series at 1997. This discontinuity results from the BEA's change in methods for classifying data from the Standard Industrial Classification (SIC) to the North American Industrial Classification System (NAICS) scheme. Gross Domestic Product by State data estimates for 1997 forward are now prepared for 81 NAICS industries. Estimates for earlier data years remain in only the 63 SIC industry format. The differences between SIC- and NAICS-based industries are many, including the facts that these estimates are based on different source data and different estimation methodologies.[1] Additionally, the NAICS-based GDP by State estimates are consistent with U.S. gross domestic product (GDP), while the SIC-based GSP estimates were consistent with U.S. gross domestic income (GDI). The data discontinuity affects the dollar values, industry categories—particularly with respect to manufacturing components—and growth rates of the GDP by State estimates. The BEA strongly cautions analysts using the GDP by State estimates against appending the SIC and NAICS data series in an attempt to construct a single time series of GDP by State estimates for 1977 to the present (USDC BEA, 2007a). Therefore, following Kemper, Popp and Miller (2009), this study reports only GDP by State estimates since 1997.

1.3: Agriculture and Food–The Regional Context

In the following GDP by State discussion, the Agriculture and Food Sector is defined as the sum of agricultural production, processing, and retail, unless otherwise stated.[2] Arkansas' Agriculture and Food Sector, expressed as a percentage of total GDP, has exceeded those of contiguous states since at least 1969, when the BEA began publishing regional GDP information. In 2012, this trend continued with the Agriculture and Food Sector accounting for almost 10% of Arkansas' GDP (Table 1). Arkansas agricultural retail however comprised a smaller percentage of GDP than the Southeast region and all neighboring states (excluding Louisiana), but was on par with national retail percentages. Agricultural production contributed 3.0% to Arkansas' GDP in 2012, which was slightly lower than Mississippi who showed just over 3.0%. Agricultural processing's contribution to GDP in Arkansas is 5.0%; whereas it is just over 4% in Tennessee, the southern state whose contribution comes closest to Arkansas' (Fig. 1).

Table 1. The Agriculture and Food Sector as a Percentage of Gross Domestic Product by State, 2012.

State/Region	Percent of GDP by State
Arkansas	9.82 %
Louisiana	4.65 %
Mississippi	8.82 %
Missouri	7.09 %
Oklahoma	5.37 %
Tennessee	7.08 %
Texas	3.84 %
Southeast [a]	6.97 %
U.S.	5.43 %

Source: USDC BEA, (2014b).

[a] The BEA includes Ala., Ark., Fla., Ga., Ky., La., Miss., N.C., S.C., Tenn., Va., and W. Va. in the Southeast region.

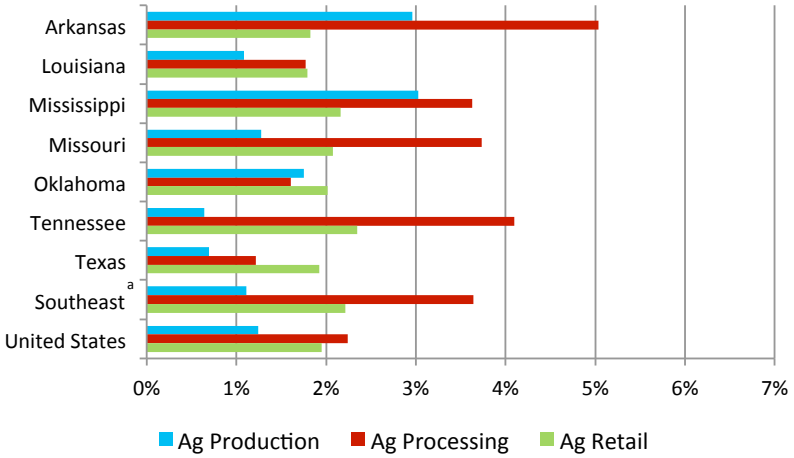
These comparisons can be stated another way. First when exampling only the agricultural production and processing contributions, it can be stated that the Agriculture Sector's share of the state economy in Arkansas is:

- 4.2 times greater than in Texas
- 2.8 times greater than in Louisiana
- 2.4 times greater than in Oklahoma
- 1.7 times greater than in Tennessee
- 1.6 times greater than in Missouri
- 1.2 times greater than in Mississippi
- 1.7 times greater than for the Southeast region
- 2.3 times greater than for the U.S. as a whole.

When retail is added, these numbers decrease slightly but still outpace the Agriculture and Food Sector's importance to these other economies. The Agriculture and Food Sector's share of the state economy in Arkansas is

- 2.6 times greater than in Texas
- 2.1 times greater than in Louisiana
- 1.8 times greater than in Oklahoma
- 1.4 times greater than in Tennessee
- 1.4 times greater than in Missouri
- 1.1 times greater than in Mississippi
- 1.4 times greater than for the Southeast region
- 1.8 times greater than for the U.S. as a whole.

Fig. 1. Production, Processing and Retail as a Percentage of Arkansas Gross Domestic Product, 2012.



Source: USDC BEA, (2014b).

Note: Calculated from current dollars.

[a] The BEA includes Ala., Ark., Fla., Ga., Ky., La., Miss., N.C., S.C., Tenn., Va., and W.V. in the Southeast region.

The percentage contribution of Arkansas's Agriculture and Food Sector to the state economy rose 0.26% in 2012 real dollars from 2011. This rise is likely due to an increase in the value of production of crops such as corn, soybeans and rice in 2012 (USDA NASS, 2014b). Mississippi reported the greatest increase in the share of Agriculture and Food Sector contribution to GDP from 2011 to 2012 with 0.40%. Louisiana, Oklahoma and the Southeast region also show increases of 0.16%, 0.03%, 0.04% respectively. While these areas show increases, Missouri, Texas, Tennessee and the overall U.S. reported losses of 0.03%, 0.17%, 0.12% and 0.11% respectively. In addition, Arkansas' agricultural production, processing, and retail is 1.8 times greater than that of the U.S. and 1.4 times greater than that of the Southeast agricultural sector as a percentage of their respective GDP's in 2012.

The diversity of Arkansas' Agriculture and Food Sector is the foundation of its strength. Arkansas' varied climate and terrain allows for row crops in the east, livestock and poultry in the west, and forestry in the south. Forestland comprised 57% of Arkansas' total land base in 2012 (USDA FS, 2014). Relatively low-valued timber is processed to produce higher-valued products (e.g., lumber, paper, and furniture).

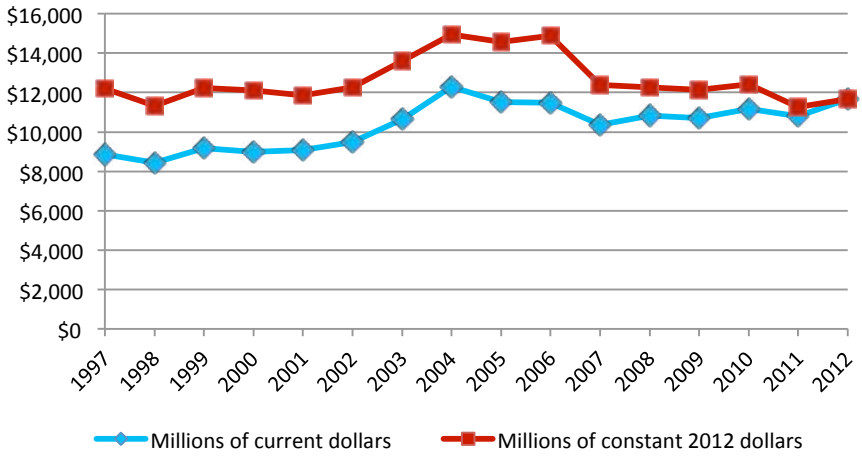
Arkansas remains number one of seven contiguous states in terms of the Agriculture and Food Sector as a percentage of GDP in 2012. While the value of the Agriculture and Food Sector GDP has decreased slightly (-1.10%) from 2010 to 2011, the sector rebounded in 2012 with a 0.26% increase in its share of Arkansas' GDP.

1.4: Agriculture and Food and the Arkansas Economy

In 2012, Arkansas' total GDP was $119.0B (constant 2012 dollars are used throughout this section, unless otherwise noted) with the Agriculture and Food Sector contributing $11.7B to the total (USDC BEA, 2014b). During the 1997 to 2012 period, the GDP of Agriculture and Food lost 4.3% of its value. However, the period was also marked by volatility. From 2001 to 2004, the GDP of Agriculture and Food increased 26% to its peak of $15.0B in 2004 and remained almost constant until 2007, when it declined sharply to $12.4B (Fig. 2). The value of the Agriculture and Food Sector declined 18.4% from 2006 to 2010 due predominantly to decreases in GDP of agricultural processing sectors. GDP declined sharply (-9.4%) from 2010 to 2011. This decline was followed by a recovery in 2012 resulting in a 3.8% increase in the Agriculture and Food Sector's GDP share from 2011 (Fig. 2). The recovery appears to be the result of increases in both the production and retail sectors. From 2011 to 2012 the value of Arkansas agricultural cash receipts for all commodities increased 13.7% (USDA ERS, 2014a).

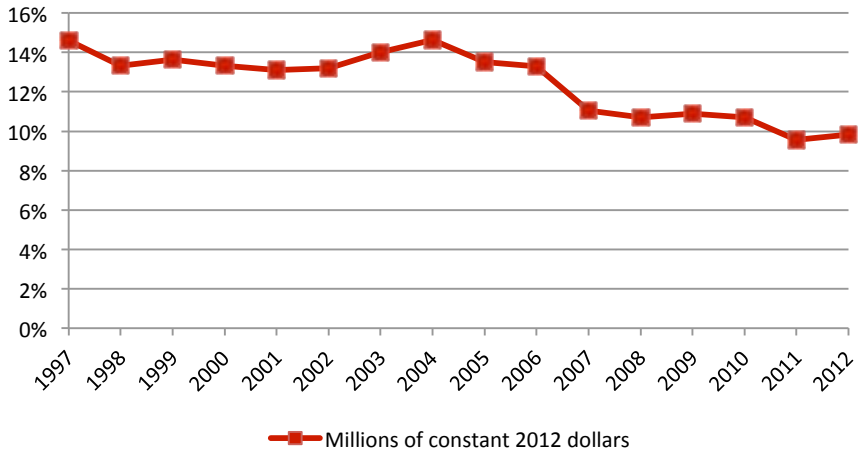
From 1997 to 2012, the percentage change in the percentage share of Arkansas GDP attributable to the Agriculture and Food Sector decreased 32.7%. In 1997, the Agriculture and Food Sector's contribution to GDP was approaching 15.0%, the highest share from 1997 to 2002. Much of the contraction through 2002 is explained by falling prices for agricultural products between 1997 and 2002 (USDA, ERS 2014b). The percent contribution of the Agriculture and Food Sector rebounded in 2004 to just above the 1997 level. After a period of rebound, the portion of state GDP attributed to Agriculture and Food fell sharply from 2004 (14.6%) to 2007 (11.0%), but remained fairly constant until 2010 (10.4%). In 2011, Agriculture and Food's contribution to Arkansas GDP dropped to a low of 9.6%. In 2012, the sector recovered with an increase of 0.26% over

Fig. 2. Arkansas' Agriculture and Food Sector Gross Domestic Product, 1997-2012.



Source: USDC BEA, (2014b).

Fig. 3. The Agriculture and Food Sector's Share of Arkansas Gross Domestic Product, 1997-2012.



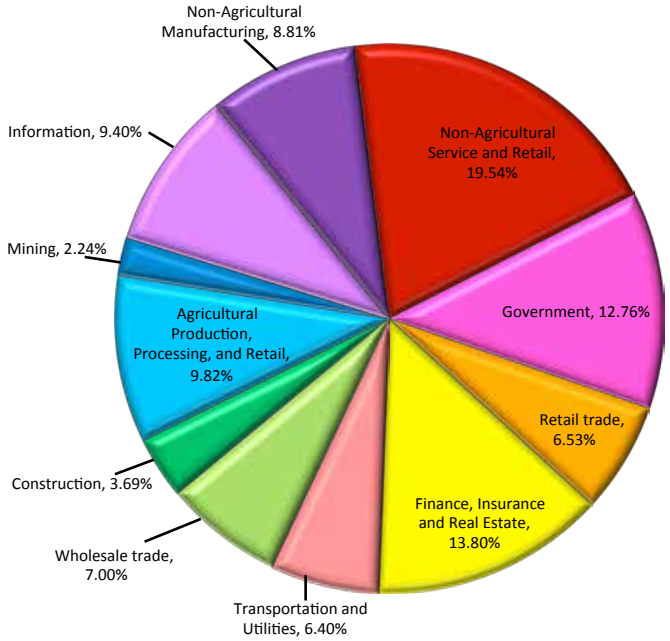
Source: USDC BEA, (2014b).

2011, resulting in a total contribution to Arkansas' GDP of 9.8% (Fig. 3; USDC BEA, 2014b).

Arkansas' total GDP only experienced a 0.9% decrease during the recession from 2007 to 2009. In fact, 2007 and 2008 were the first and second highest GDPs recorded for the state of Arkansas since 1997. As is reflected by its declining share of Arkansas GDP, Agriculture and Food lost 2.1% of its value from 2007 to 2009, pointing toward deeper recession effects for agriculture than the economy as a whole.

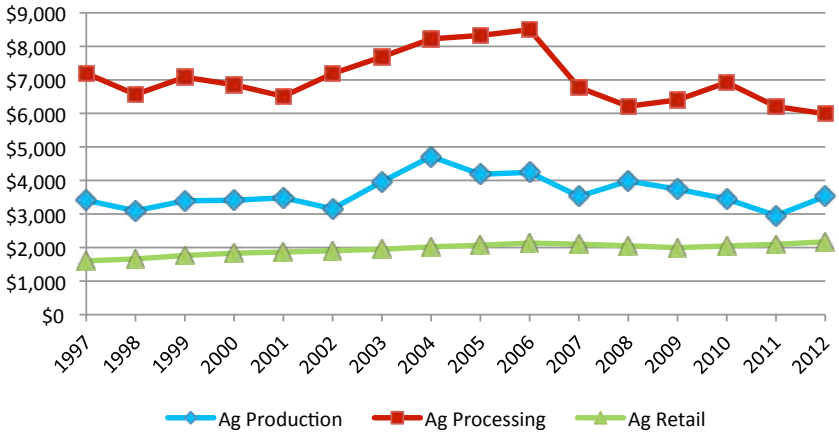
On a U.S. level, agriculture was supported through the 2007-2009 recession by a growing export market, a low real trade-weighted dollar exchange rate, a robust agricultural lending sector, strong farm real estate values, and a lower debt-to-asset ratio for many farms than many non-farm businesses. Although exports declined during the recession, they have begun to recover and are expected to continue to increase. Agricultural loans in the Farm Credit System, while still increasing in delinquency rate, have fared better than nonagricultural loans during and after the recession. After spiking in 2010, farm loan delinquencies began to decrease in 2011 with this decrease continuing throughout 2012 (FRS, 2014). In addition, farm income has once again increased during 2012, suggesting that the sector is continuing its' movement back toward long term trends (USDA ERS, 2014c). In 2012 Arkansas boasted an average value per acre of farm real estate of $2,620 (nominal dollars), an increase of 7.4% from 2011, which was 3.4% higher than the national average of $2,520 (nominal dollars). Of Arkansas's contiguous states, only Tennessee ($3,700, nominal dollars) and Missouri ($2,900, nominal dollars) claimed a higher per acre value of farm land than Arkansas in 2012. (USDA NASS, 2014c).

Fig. 4. Sector Components of Arkansas' Gross Domestic Product, 2012.



Source: USDC BEA, (2014b).
Note: Calculated from constant 2012 dollars.

Fig. 5. Gross Domestic Product for Arkansas' Agricultural Production, Processing, and Retail, 1997-2012.



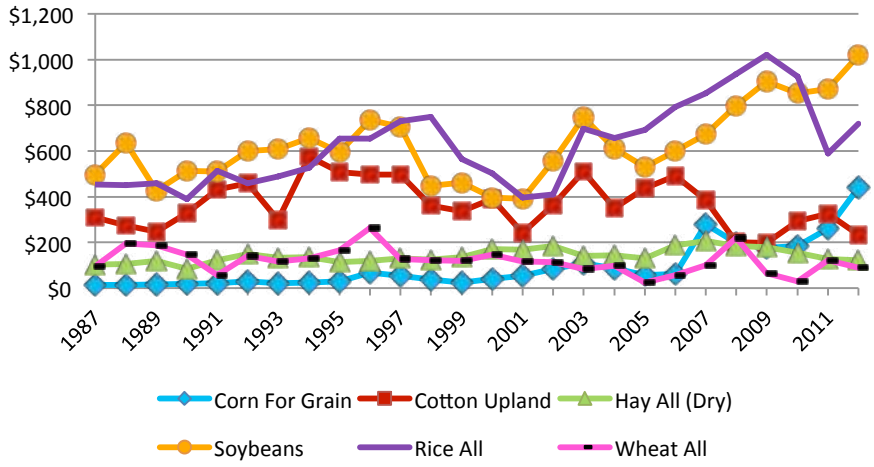
Source: USDC BEA, (2014b).
Note: Presented in millions of constant 2012 dollars.

The diversity of Arkansas's GDP components may provide additional partial insulation from recession effects. As in previous years, the Agriculture and Food Sector ranks as the fourth largest sector in the state (Fig. 4). The only sectors larger were Non-Agricultural Service and Retail (19.5%), Finance, Insurance, and Real Estate (13.8%) and Government (12.8%). The three major components of the Agriculture and Food Sector—agricultural production, agricultural processing and agricultural retail—totaled $3.5B, $6.0B, and $2.2B GDP, respectively (Fig. 5). Both agricultural production and retail showed an increase from 2011 (19.4% and 3.7%, respectively), but agricultural processing lost 3.5% of its GDP value. Each agricultural component of Arkansas's GDP will be discussed in the sections to follow.

1.4.1: Agricultural Production

Crop and animal production, forestry, aquaculture, and horticulture are the primary agricultural production industries found in Arkansas. Arkansas was ranked fifteenth is the U.S. for cash receipts of major commodities in 2012. Arkansas was ranked first in rice, second in broilers, and third in poultry and egg production for 2012 (USDA ERS, 2014a). Overall, agricultural production increased 19.4% between 2011 and 2012. During the fifteen year period of 1997 to 2012 agricultural production rose and fell several times (Fig. 5). From 1997

Fig. 6. Arkansas' Crops Value of Production, 1987 to 2012.



Source: USDA, NASS (2014b, 2014a).
Note: Presented in millions of constant 1990-1992 dollars.
For selected crops: rice, soybeans, cotton, hay, wheat, and corn.

to 2002, agricultural production was fairly constant with its lowest level being ($3.0B) in 1998. Following this period of stagnation, the GDP value of agricultural production rebounded in 2003 and reached a high of $4.7B in 2004. In 2003 and 2004, farmers experienced consecutive years of large harvests for major crops and unusually high prices for livestock and milk. These factors combined to yield record net farm income (NFI) of 3.4B (constant 2009 dollars) for Arkansas in 2004 (USDA ERS, 2014d). Although the value of animal agriculture production increased in 2005, these increases did not prevent a decrease in agricultural production GDP from 2004 to 2007, when GDP fell to $3.5B. Although, the value of the GDP of agricultural production increased in 2008, the rally was short-lived, as by 2011, agricultural production had lost 37.4% of its 2004 value and declined to $3.0B. Although agricultural production experienced a steady decline since 2008, in 2012 the sector recovered with a 19.3% increase over 2011. In 2012, total real cash receipts in Arkansas were up 13.7% from 2011, while U.S. total real cash receipts only increased 5.5%. Cash receipt values increased for both livestock and crop production (4.3% and 24.5% respectively) in 2012. Increases in livestock cash receipts were the result of increases for cattle and calves (10.4%), chicken eggs (6.1%), and broilers (5.4%) while increases in crop production were the result of increases in several commodities (sweet potatoes 114.2%, sorghum grain 87.1%, watermelon 80.7%, corn 71.2%, peaches 65.9%, soybeans 43.4%, hay 24.0%, tomatoes 21.8%, wheat 18.1% and cotton 12.5% (USDA ERS, 2014a).

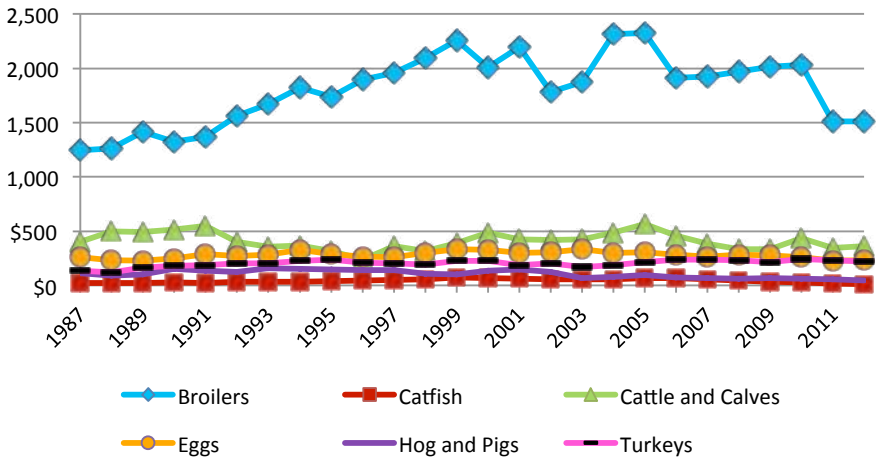
1.4.1.1: Crops Production

A time-series graph of major crops in Arkansas shows trends in value of production from 1987-2012 (Fig. 6). Despite volatility and a substantial decline of the value of field crop production from 1996 to 2001, the value of crop production increased overall by 76.5% from 1987 to 2012. Over this period, rice and soybean have consistently been the highest valued crops, with each representing an average of 30% of the total value of field and miscellaneous crops over the years. Third is upland cotton, representing 18.2% of field and miscellaneous crops on average (USDA NASS, 2014b). In 2001, total field crops value of production fell to the lowest level since 1987, down to $1.5B. This decrease was due mostly to the downward trends of the top three crops' values (rice, soybeans, and cotton) in Arkansas. From 1998 to 2001, rice lost 47.1% of its value, and from 1996 to 2001, soybeans and cotton lost 46.9% and 51.2%, respectively. However from 2001 to 2003, crops' prices and exports increased, and domestic and international demand for products was strong. As a result, the total value of crops production jumped 65.4% between 2001 and 2003. The gains were partly erased as the total market value (in constant 1990-1992 dollars) of crop production in Arkansas dropped in 2004 and again in 2005. During that time there was a general increase in output and prices for agricultural products in the U.S.; however in Arkansas, cotton, rice, and soybean output increased, but prices did not. In 2008, Arkansas' crop value of production increased to the highest level over the period to $2.6B. Much of the value can be attributed to record high global rice prices, due to export barriers from other rice-producing countries, record high prices for fuel and fertilizer, and a weak U.S. dollar. Additionally, soybeans, the second largest crop in Arkansas, also experienced record prices (Trostle, 2008). From the peak in 2008, the total field crops' value of production began declining, losing 9.2% of its value between 2008 and 2011. In 2012, however, crop production value increased 14.2% over 2011. With a total crop value of $2.7B, 2012 exhibits the highest value of the entire study period. (USDA NASS, 2014b; USDA ERS, 2014a).

1.4.1.2: Animal Production

Animal production is also a major component of Arkansas' agricultural production. In terms of constant 1990-1992 dollars, animal production cash receipts (which measure income and sales from marketing) in Arkansas saw an increase from $2.3B in 1987 to $3.1B in 2010, representing a 34.2% gain in value (USDA ERS, 2014a; USDA NASS, 2014b). However, from 2010 to 2012 cash receipts have decreased 22.5%. The 2007-2009 recession and its resulting high unemployment negatively affected domestic animal protein demand. Cash receipts for Arkansas' cattle and calves declined 27.6%, hogs and pigs fell 12.1%, and turkeys fell 8.1% from 2006 to 2009 (Fig. 7). However, cash receipts for broilers actually increased 5.4% over the same period (USDA ERS, 2014a), as consumers substituted lower-priced poultry products for pork and beef (Trostle, Marti, Rosen and Westcott, 2011). Since the official end of the recession in 2009, livestock cash receipts on the whole rallied in 2010, but experienced significant declines in 2011 in every major livestock product (Fig. 7). Catfish and broilers had the largest losses from 2010-2011: 34.5% and 25.6%,

Fig. 7. Arkansas' Livestock and Livestock Products Value of Cash Receipts, 1987 to 2012.



Source: USDA, ERS (2014a); USDA, NASS (2014a).
Note: Presented in millions of constant 1990-1992 dollars.
For selected products: broilers, cattle and calves, eggs, turkeys, hogs and pigs, and catfish.

respectively. The losses in broilers cash receipts explain much of the decrease in the value of animal production, as broilers have consistently been the largest portion of animal cash receipts in Arkansas. Broilers accounted for an average of 60% of animal production value over the 1987-2011 period; but in 2011, both the production and price of broilers decreased (Fig. 7). This trend continued into 2012 resulting in a loss of 1.1% in livestock cash receipts between 2011 and 2012. During this period catfish lost 36.8%, hogs and pigs 22.4%, milk 18.8%, farm chickens 12.5% and turkeys 6.4%. Cash receipts for broilers also declined during 2012, however this loss was minimal (0.1%) when compared to losses seen in 2011. The only area with a significant increase in cash receipt value for 2012 was cattle and calves with an increase of 4.7% over 2011 values. The value of animal production in Arkansas in 2012 was markedly lower than any year of the 2007-2009 recession and in fact, was the third lowest production year since 1987. The downturn may be a product of readjustment in livestock markets to the decreased demand experienced between 2007 and 2009. Biological lags prevented livestock producers and marketers from swiftly adjusting supply to meet decreased demand, resulting in a market surplus during the recession, thus lower prices more recently to adjust for the surplus (Trostle, Marti, Rosen and Westcott, 2011).

1.4.1.3: Forestry Production

Forestry production is integral to Arkansas' economy. Foresters supply wood product manufacturers with raw materials. Arkansas' timber is fundamental to such industries as paper, lumber and wood, and furniture and fixtures. Arkansas' land base was composed of approximately 18.9M acres of forest in 2012 (56.9% of total land base) (USDA FS, 2014). The state was ranked fourth in the production of saw-logs in the South[3] in 2011, the latest year for which data are available (Bentley, Cooper and Howell, 2014). There were 26.4M tons of timber (soft- and hardwood) removed from forests in Arkansas in 2012, valued at $383M. Data for 2012 shows a 35.3% increase of softwood production over 2011, as well as a 12.1% increase in hardwood production. The total value of timber increased 8.8% from 2011 to 2012. The five-year (2008 to 2012) high in production occurred in 2012 with 26.4M tons removed. Although 2012 showed higher production output, 2008 exhibited the greatest value over the five-year period with a value of $454M; AFC, 2013).

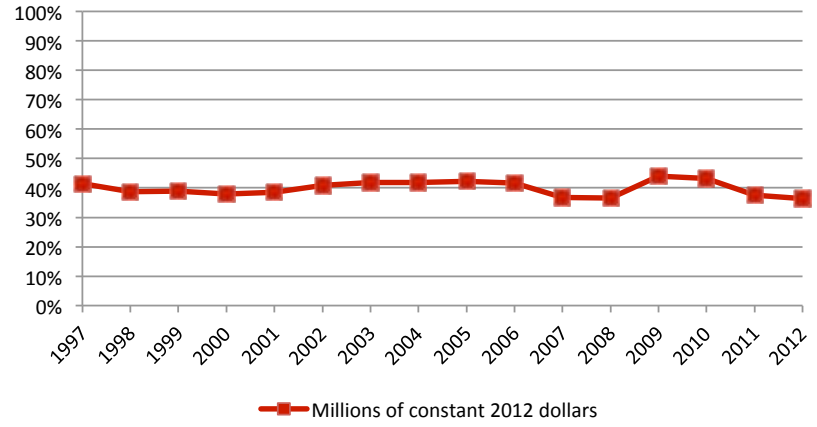
1.4.1.4: Agriculture-Related and Support Industries

Agriculture-related industries include commercial fishing, hunting and trapping from the natural environment (not farm-raised), and agriculture and forestry support activities. In pre-2007 reports, on-farm construction was also included; however, the data are no longer available and have been dropped from the analysis. The largest of these industries is agriculture and forestry support activities. These activities may be performed by an independent firm as an input required for the production process for a given crop, animal, or forestry industry. Typical activities include, but are not limited to, cotton ginning; soil preparation, planting, and cultivating; breeding services and livestock sprayers. A smaller portion of the sector is made up of commercial fishing, hunting, and trapping activities. For the 2012-2013 fiscal year, the total number of licenses issued was 1,220,909, a decrease of 3.2% from the 2011-2012 fiscal year. However, revenue from sales for this period generated $23,784,337.50, a 2.6% increase from the 2011-2012 fiscal year. Fishing license total revenue decreased 7.4% to $7,521,532 from $8,121,101 as the number of fishing licenses issued fell 7.5%. The total number of lifetime licenses sold decreased 4.7% to 29,380 from 30,483 in fiscal year 2012-2013 and revenue from these sales fell 1.9%. The only category to exhibit an increase in the number of licenses sold during this period was hunting licenses which increased 4.2% to 488,217 from 468,755 (AGFC, 2014). Meanwhile, revenue from those hunting license sales increased 3.0%.

1.4.2: Agricultural Processing

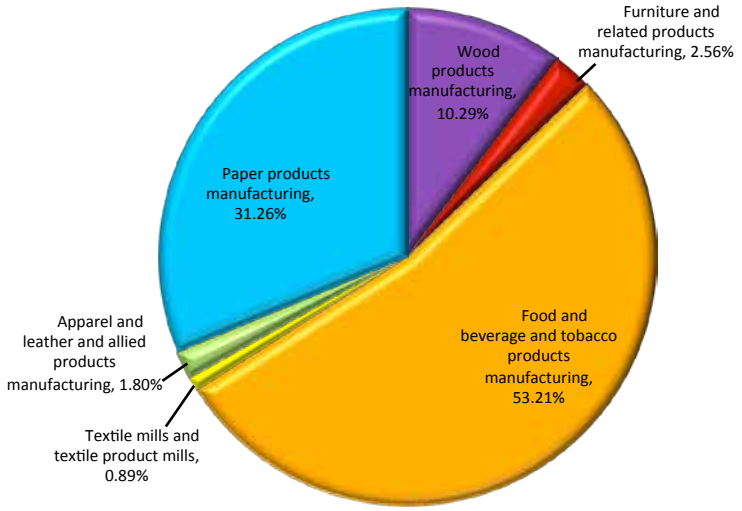
Processed crop, livestock, and forestry products are an integral part of agriculture in Arkansas. Arkansas' manufacturing sector depends upon raw materials from the crops, animal agriculture, and forestry sectors for use in many of its largest industries. Poultry production and processing, for example, may lead to such processed goods as frozen chicken, eggs, animal feed, and animal oils; cotton production may lead to ginning and processing of materials to be used in the textile industry. Figure 5 details the trend of agricultural processing in Arkansas from 1997 to 2012. Over the fifteen year period, the value of agricultural processing has declined by 16.8%. From 2001 to 2006, agricultural processing was on an upward trend, peaking at $8.5B in 2006. Since 2006, agricultural processing de-

Fig. 8. Agricultural Processing's Share of Arkansas' Manufacturing Gross Domestic Product, 1997-2012.



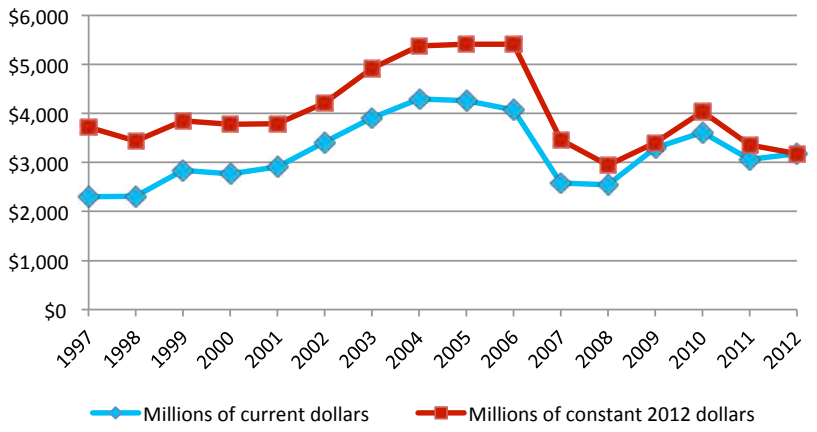
Source: USDC BEA, (2014b).

Fig. 9. Components of Arkansas' Agricultural Processing Sector Gross Domestic Product, 2012.



Source: USDC BEA, (2014b).
Note: Calculated from constant 2012 dollars.

Fig. 10. The Gross Domestic Product of Arkansas Food, Beverage and Tobacco Products Manufacturing, 1997-2012.



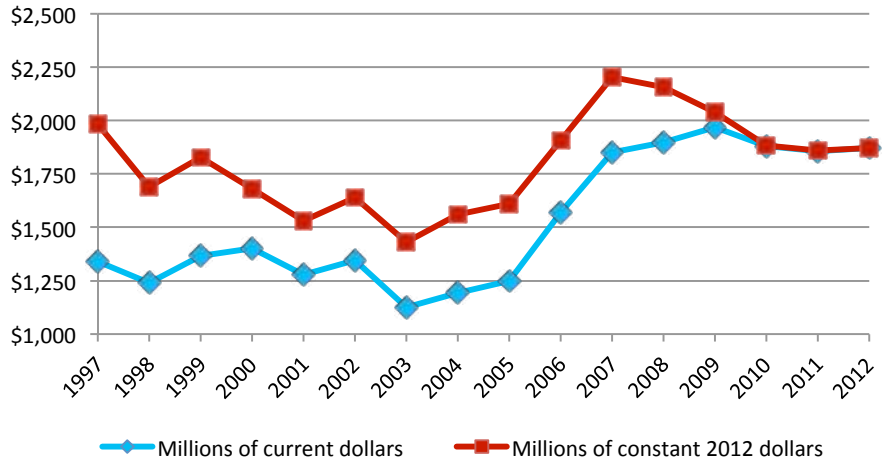
Source: USDC BEA, (2014b).

creased 26.9% to $6.2B in 2008. The value of processing rebounded in 2009 reaching a peak of $6.9B in 2010 before dropping 10.3% to $6.2B in 2011. In 2012 agricultural processing continued to fall, dropping another 3.5% to a value of $6.0B, the lowest value seen during the fifteen year period. Since 1997, agricultural processing's share of manufacturing GDP has ranged from a low of 36.3% in 2012 to a high of 44.1% in 2009. Agricultural processing's share of manufacturing declined from 41.6% in 1997 to 36.3% in 2007, except for the steady years between 2003 and 2006 when its share was slightly higher than the 1997 level. Since reaching its period low in 2007, agricultural processing rebounded to its highest share in 2009 (Fig. 8). Agricultural processing's average share over the fifteen year period was 39.9%, suggesting that it continues to be important to the value of manufacturing. In 2012 agricultural processing accounted for about $2 of every $5 of manufacturing in Arkansas. Food and Beverage and Tobacco Products Manufacturing, Paper Products Manufacturing, and Wood Products Manufacturing accounted for 94.8% of Arkansas' processed agricultural goods in 2012. The contribution of individual agricultural processing industries to agricultural processing in 2012 is shown in Fig. 9. Three of six agricultural processing sectors declined from 2011 to 2012, and although three sectors increased the net effect on processing was negative for the second straight year (USDC BEA, 2014b). A discussion of each industry's percentage of GDP over time follows.

1.4.2.1: Food, Beverage and Tobacco Products Manufacturing

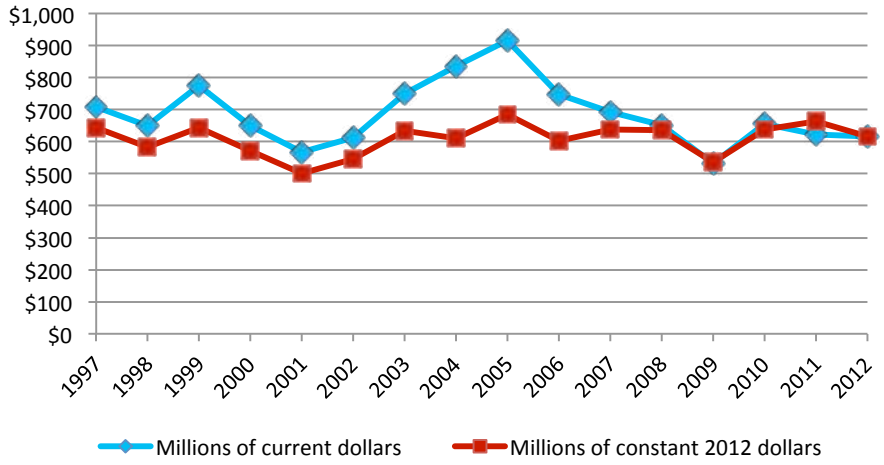
The Food, Beverage and Tobacco Products Manufacturing Sector has consistently been the largest agricultural processing sector in Arkansas since 1997, accounting for 53.2% of agricultural processing's GDP in 2012. This sector decreased 14.4% over the 1997 to 2012 period. The decelerating global economic growth from 1997 to 2003, attributable to the Asian financial crisis, significantly impacted the industry in the 2001-2004 period due to a combination of record high levels of production and lower commod-

Fig. 11. The Gross Domestic Product of Arkansas Paper Manufacturing, 1997-2012.



Source: USDC BEA, (2014b).

Fig. 12. The Gross Domestic Product of Arkansas Wood Manufacturing, 1997-2012.



Source: USDC BEA, (2014b).

ities. The Food, Beverage and Tobacco Products Manufacturing Sector experienced rapid growth from 2001 to 2005, when it increased 42.6% from $3.8B to $5.4B, the period high (Fig. 10). The sector declined from 2005 to 2008, dropping 45.7% (Fig. 10; USDC BEA, 2014b). The sector experienced its lowest value during the fifteen year period in 2008, in the midst of the 2007 to 2009 recession period. These losses may be attributable to national adjustments in household food spending trends. The recession period resulted in a decrease in food expenditures, especially from middle income households (average income $46,012 per year). Although the majority of the adjustment came from a decrease in food away from home spending, food at home spending also decreased as consumers have begun economizing purchases more since 2007. For the Food, Beverage and Tobacco Products Manufacturing Sector in Arkansas, substitutions for comparable but less expensive alternative foodstuffs may have caused some of the GDP losses. For example, sales of convenience foods, such as pre-washed and packaged greens, were eroded by purchases of unpackaged greens. Private label (store brand) items were increasingly substituted for brand name items. Additionally, consumers increasingly took advantage of sales, lower-priced store formats, and coupons when purchasing food for home consumption (Kumcu and Kaufman, 2011; Martinez, 2010). Since 2008, the sector showed a rebound from $2.9B in 2008 to $4.0B in 2010, a 37.1% increase; although this rebound appears to be short lived as by 2012, the sector had dropped 21.0% from its 2010 value to $3.2B.

1.4.2.2: Paper Manufacturing

The Paper Manufacturing Sector has been the second-largest processing industry in Arkansas since 1997. This sector decreased 5.6% from 1997 to 2012 (Fig. 11). However, while pulp and paper manufacturers in North America were affected by the Asian financial crisis during the mid-to-late 1990s (Simard, 1999), which continued to impact manufacturers through 2001, impact to Arkansas manufacturing was minimal. The value of Paper Manufacturing in Arkansas has remained relatively steady over the fifteen year period. The sector's lowest GDP in the period occurred in 2003 ($1.4B), but until 2007 the sector experienced strong growth. By 2007 the GDP of the Paper Manufacturing Sector had improved by 54.1%. In 2007, its GDP was at its period high of $2.2B (Fig. 11). Since 2007 the GDP has declined 15.0%, and in 2012 its value was down to $1.9B, a less than 1% gain from 2011 (USDC BEA, 2014b).

1.4.2.3: Wood Product Manufacturing

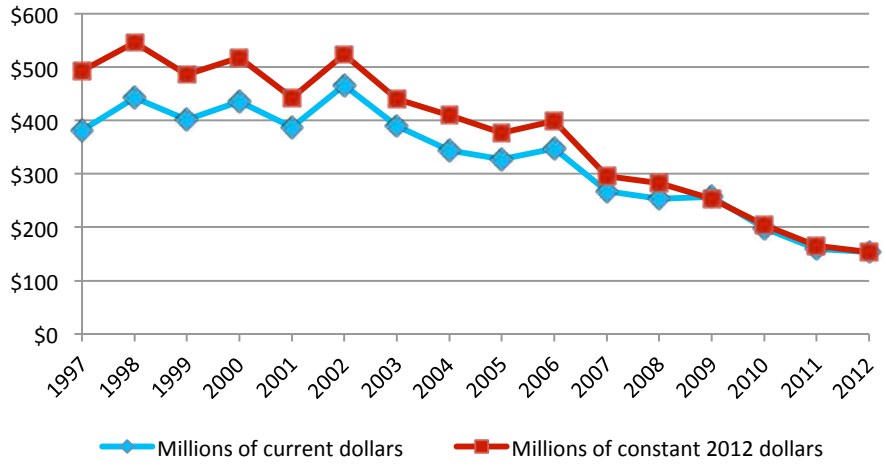
Arkansas' third largest agricultural processing sector lost 4.2% in value from 1997 to 2012. After a brief increase from 1998 to 1999, the GDP of Wood Product Manufacturing fell 22.4% from 1999 to 2001 (Fig. 12). As explained in detail in Popp, Vickery and Miller (2005), most of this decline was attributed to a slow-down in the international market for U.S. wood chips and a drop in soft wood prices that followed an influx of Canadian wood on the market. The sector returned to 1999 levels in 2003 and remained relatively steady until 2009, when it decreased 15.8% from 2008 to $535M. The 2009 year marked the second lowest value of the fifteen year period; only 2001 was lower ($500M). Much of this decline may be attributable to families planning to stay in their homes longer than originally anticipated. The value of U.S. private construction declined markedly from 2006 to 2009, especially in single family housing. Since 2009, the value has been almost flat (Bumgardner, Buehlmann, Schuler and Koenig, 2011). In 2011, Wood Product

Manufacturing showed signs of continued recovery and gained 23.9% from $535M in 2009 to $663M in 2011. This "recovery" may be due in part to some manufacturers closing, shifting remaining demand to a smaller number of manufacturers (Bumgardner, Buehlmann, Schuler and Koenig, 2011). In 2012, the value of Wood Products Manufacturing was $616M. This was down 7.1% from 2011, but still significantly higher than the drop experienced during 2009 (USDC BEA, 2014b).

1.4.2.4: Furniture and Related Products Manufacturing

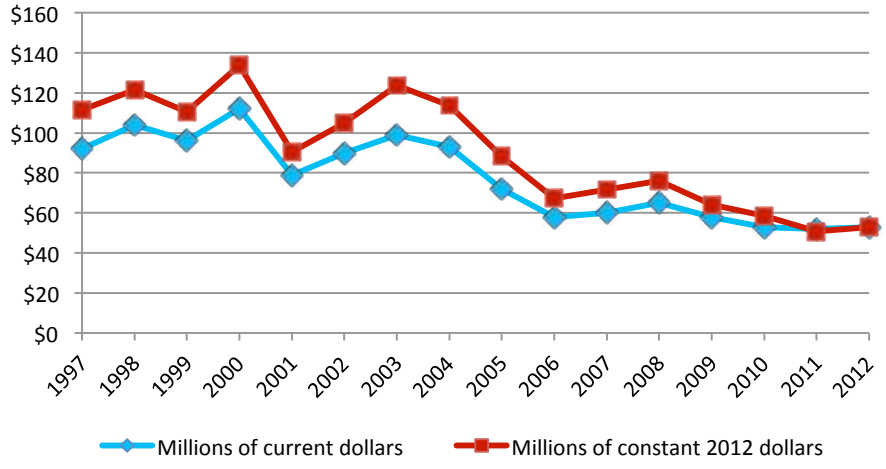
Over the 1997 to 2012 period, Furniture and Related Products Manufacturing lost 69.0% of its value. Its GDP was volatile from 1997 to 2002 and reached the period high level of $546M in 1998. This sector benefited from a strong resale housing market throughout the 1990s. The resale housing market is a leading indicator of demand for the furniture industry (Schuler, Taylor and Araman, 2001). The housing and real estate markets gained momentum in 2002; however, imports of furniture and other wood producers were also on the rise, flooding the market with less expensive substitutes for U.S. manufactured products. A flooded market partially led to the 39.0% drop from 2002 to 2005 to $377M. Since 2002, except for limited recovery in 2006, the sector has been on a marked path of decline from $524M in 2002 to $153M in 2012, a 70.8% decrease (Fig. 13; USDC BEA, 2014b). Much of the decline since 2006 may be attributed to recession effects, as Furniture and Related Products Manufacturing is closely tied to the housing construction and real estate markets. These markets have been anemic, as the 2007-2009 recession resulted in declining new construction and existing home sales, as families were staying in their homes longer (Bumgardner, Buehlmann, Schuler and Koenig, 2011). The U.S. in 2009 had the fewest new housing starts since 1959, but starts increased slightly in 2010 (554,000 starts in 2009; 586,900 starts in 2010) and continues to show recovery with 608,800 new housing starts in 2011 and 780,600 for 2012 (USCB, 2014b).

Fig. 13. The Gross Domestic Product of Arkansas Furniture and Related Products Manufacturing, 1997-2012.



Source: USDC BEA, (2014b).

Fig. 14. The Gross Domestic Product of Arkansas Textile and Textile Product Mills, 1997-2012.



Source: USDC BEA, (2014b).

1.4.2.5: Textile and Textile Product Mills

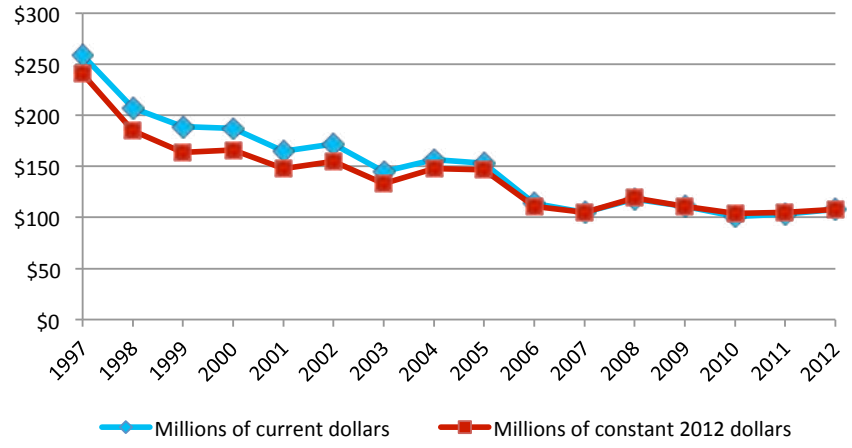
The Textile Mills and Textile Product Mills Sector has been in decline for three decades. From 1997 to 2012, its value declined 52.7%. Technological improvements and import competition have reduced the industry's activity in the U.S. The decline in textile and apparel industries accelerated following the implementation of the North American Free Trade Agreement (NAFTA) with Canada and Mexico in 1994. The overall effect of NAFTA on the U.S. economy is controversial. Some studies have concluded that NAFTA has actually increased demand for U.S. textiles in Mexico and Canada, which may explain some of the growth in 2002 and 2003 (Wall, 2000). Furthermore, in March 2001, the economy slipped into recession, which ended in November 2001 (NBER, 2012). The end of the 2001 recession may have also contributed to the growth in the following years. In Arkansas, the sector has been the smallest component of agricultural processing during the period from 1997 to 2011 but has been somewhat volatile. Much of the steep decline in 2001 occurred because a major textile manufacturer closed its last plant in Arkansas in 2000. From 2004 to 2006, Textile and Textile Product Mills declined in value by 41.2% to $67M (Fig. 14). The sector recovered briefly from 2006 to 2008, but since 2008 the value of its GDP decreased 32.9% from $76M in 2008 to

the fifteen year low of $51M in 2011. Although 2012 saw a slight increase (3.9%) in value over 2011 with $53M, it still reported the second lowest value of the period (USDC BEA, 2014b).

1.4.2.6: Apparel, Leather, and Allied Products Manufacturing

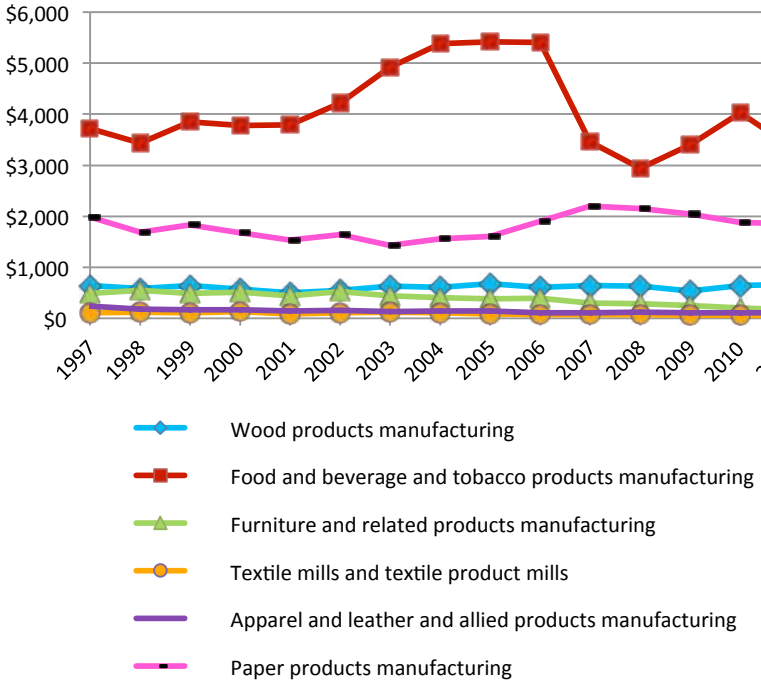
As seen in Fig. 15, the GDP for Apparel, Leather, and Allied Products Manufacturing has experienced alternating periods of growth and decline but has experienced a general overall decline in GDP from 1997 to 2012. During this period, the sector has declined from a high of $241M in 1997 to a low of $104M in 2010, representing a 56.8% drop over the fifteen year period. Much like the textile industry, apparel manufacturing has been in decline in the U.S. for over thirty years. The decline has also been partly attributed to NAFTA, which possibly accelerated the drop in apparel manufacturing in the late 1990s and the shifting of apparel manufacturing out of the state to countries with lower wage rates. In 2012, however, Apparel, Leather, and Allied Products Manufacturing increased 1.0% from 2010. This increase continued into 2012 as the industry saw an additional 2.9% increase in value over the previous year. (USDC BEA, 2014b).

Fig. 15. The Gross Domestic Product of Arkansas' Apparel, Leather, and Allied Products Manufacturing, 1997-2012.



Source: USDC BEA, (2014b).

Fig. 16. The Gross Domestic Products of Arkansas' Agricultural Processing Sectors, 1997 to 2012.



Source: USDC BEA, (2014b).
Note: Presented in millions of constant 2012 dollars.

1.4.2.7: Agricultural Processing Summary

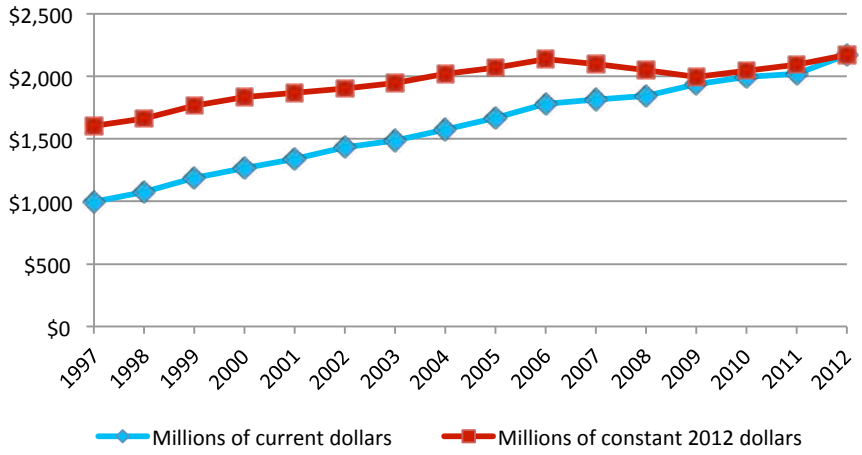
Fig. 16 shows all components of agricultural processing to better compare the sectors and their contributions over time to agricultural processing. Food Product Manufacturing has consistently contributed the largest share of agricultural processing, but has shown substantial volatility over the period, including a substantial decline in value from 2004 to 2008. The second largest component, Paper Manufacturing, has shown signs of volatility, but its pattern is almost perfectly anti-cyclical to Food Product Manufacturing, partially insulating agricultural processing. The remaining sectors contribute the least to the GDP of agricultural processing, and have either been relatively stable over the period or in steady decline.

1.4.3: Agricultural Retail

1.4.3.1: Food Services and Drinking Places

Gross domestic product in agricultural retail in 2012 was $2.1B (Fig. 17). From 1997 to 2007, agricultural retail increased 30.9%. Until 2007, there was an increase in the GDP of agricultural retail each year since 1997. Food service operations, including restaurants, have steadily increased their share of total food expenditures over time, contributing to the steady increases in the sector.[4] Long-term trends show that as household incomes have increased, and more women have entered the workforce, the share of household spending for prepared foods and meals has risen. Since estimates began in 1953, food expenditures away from home have been consistently increasing. In 1953, 33% of food expenditures were spent on food away from home, and by 2006 had risen to 49% of food expen-

Fig. 17. The Gross Domestic Product of Arkansas Food Services and Drinking Places, 1997-2012.



Source: USDC BEA, (2014b).

ditures, further evidence of the market forces behind the increases in agricultural retail GDP (calculated from constant 1988 dollars; USDA ERS, 2014e). From 2007 to 2009, the sector lost 5.0% of its value of GDP, its first period of decline since 1997. The recession from December 2007 to June 2009 resulted in downward food spending adjustments by households of all income levels in the U.S., but especially middle-income households (average income $46,012 per year). Most of the reductions were in food away from home spending. The decrease shown in the Arkansas Food Services and Drinking Places suggest Arkansas households followed the national trend; however, national data suggest that even food at home spending decreased slightly during the recession period (NBER, 2010; Kumcu and Kaufman, 2011). Following this brief decline, the sector has shown signs of strong recovery as it has increased 8.8% from its 2009 low.

2: Report Summary

The GDP by State data from BEA indicates that Arkansas' Agriculture and Food Sector continues to contribute a larger share of GDP by State to the overall Arkansas state economy than does Agriculture and Food in other states of the southeastern U.S. 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] Five SIC definitions, used to categorize GDP by State and IMPLAN data in some previous reports, were based upon what was produced. These definitions paid particular attention to manufacturing industries, as was appropriate for the economy of the 1930s when these definitions were created. The service sector of the economy has since developed in inconceivable ways. NAICS is designed to focus on how products and services are created resulting in major differences in industry groupings. NAICS categorizes data into one of two domains: goods producing or service providing. These domains are further divided into 12 super sectors and then broken into 20 industry sectors designated by two digits, compared with the eleven alphabetically designated divisions of SIC. Because of its increased number of sectors, NAICS allows for greater precision in data assignment and analyses. Only six of the twenty NAICS sectors had changes during the 2007 revision of NAICS. The sectors with changes in 2007 had no impact on the analyses presented here and the only sector of interest with any revision was: Sector 11 Agriculture, Forestry, Fishing and Hunting, in which sweet potato and yam farming was moved to sub-sector Potato Farming and algae, seaweed, and other plant aquaculture were moved to sub-sector Other Aquaculture. These were simply reallocations within sectors and had no impact on overall totals.

[2] The BEA defines agricultural production as Agriculture, Forestry, and Fishing and Hunting. They define agricultural processing as: Wood Product Manufacturing; Furniture and Related Products Manufacturing; Food Manufacturing; Textile and Textile Product Mills; Apparel, Leather, and Allied Products Manufacturing; and Paper Manufacturing. Agricultural retail is Food Services and Drinking Places (USDC, BEA, 2007b).

[3] For forestry reporting, the South includes 12 states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, North Carolina, South Carolina, Tennessee, and Virginia. It is not equivalent to either BEA's Southeast region or the South census region.

[4] GDP by State is reported for agricultural retail but the output from this sector is not included in the economic contribution analysis and is not used to calculate direct contributions of the agricultural sector. However, this sector does represent an important contribution through the purchases made from direct agricultural sectors and these contributions are captured in the indirect contributions analysis.

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