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Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2011

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UofA

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CONTENTS

List of Tables, Boxes, and Figures.....	3
Acknowledgements	3
Definitions and Styles	4
Gross Domestic Product by State (formerly Gross State Product)	4
Style Notes	4
1: The Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product.....	5
1.1: Introduction.....	5
1.2: Methods.....	5
1.2.1: A Note Regarding Presentation of Gross Domestic Product by State (formerly Gross State Product) Estimates	6
1.3: Agriculture and Food—The Regional Context	7
1.4: Agriculture and Food and the Arkansas Economy.....	8
1.4.1: Agricultural Production	9
1.4.2: Agricultural Processing	11
1.4.3: Agricultural Retail.....	15
2: Report Summary	17
End Notes	17
Literature Cited.....	17

TABLES

1. The Agriculture and Food Sector as a Percentage of Gross Domestic Product by State, 20117

FIGURES

1. Production, Processing and Retail as a Percentage of Arkansas Gross Domestic Product, 20117
2. Arkansas' Agriculture and Food Sector Gross Domestic Product, 1997-20118
3. The Agriculture and Food Sector's Share of Arkansas' Gross Domestic Product, 1997-20118
4. Sector Components of Arkansas' Gross Domestic Product, 20119
5. GDP for Arkansas' Agricultural Production, Processing and Retail, 1997-20119
6. Arkansas' Crops Value of Production, 1987-201110
7. Arkansas' Livestock and Livestock Products Value of Cash Receipts, 1987-201111
8. Agricultural Processing's Share of Arkansas' Manufacturing Gross Domestic Product, 1997-201112
9. Components of Arkansas' Agricultural Processing Sector Gross Domestic Product, 1997-201112
10. The GDP of Arkansas Food Product Manufacturing, 1997-201112
11. The GDP of Arkansas Paper Manufacturing, 1997-201113
12. The GDP of Arkansas Wood Product Manufacturing, 1997-201113
13. The GDP of Arkansas Furniture and Related Products Manufacturing, 1997-201114
14. The GDP of Arkansas Textile and Textile Product Mills, 1997-201114
15. The GDP of Arkansas Apparel, Leather and Allied Products Manufacturing, 1997-201115
16. The GDPs of Arkansas' Agricultural Processing Sectors, 1997-201115
17. The GDP of Arkansas Food Services and Drinking Places, 1997-201116

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Definitions and Styles

Gross Domestic Product by State (Formerly Gross State Product)

Gross Domestic Product by State is the state equivalent of the national measure of 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, 2013a). 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 agriculture 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 2011"** (English, Popp and Miller, 2013). Some retail activity is picked up as part of the indirect and induced effects and included in the total economic contribution in that report.

Note: It is important to note that agricultural retail is included as a component of the Agriculture and Food Sector in the GDP comparisons but is not included as a direct economic contribution when estimating the contribution of the Aggregate Agriculture Sector to the state economy (Part 2). 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. See "Gross Domestic Product" discussion under "Style Notes" (page 7) for further explanation.

Style Notes

In this report, Arkansas agriculture is presented in a historical context. These data are available for 1997 through 2011. 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: The 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. Part 1 of the report 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; provides an overview of Arkansas' economy and discusses Arkansas' agricultural sector in relation to the state economy; and 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 (2011 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 Product Manufacturing; 3) Furniture and Related Products Manufacturing; 4) Food Manufacturing; 5) Textile and Textile Product Mills; 6) Apparel, Leather, and Allied Products Manufacturing; 7) Paper Manufacturing; and 8) Food Services and Drinking Places. The Bureau of Economic Analysis' terminology is used to emphasize the important differences in what is being measured in the GDP portion (Part 1) of this report in comparison to the economic contribution analysis portion (Part 2). Furthermore, in Part 1, "contribution" is used to describe the percent or dollar values' portion of the whole, e.g., the part of agricultural processing attributable to Paper Manufacturing.

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) and utilizes data for 2011, the year that corresponds to the English, Popp and Miller (2013) study. All dollar values are expressed in 2011 constant dollar terms, unless otherwise noted. Data in Figs. 6 and 7 and their corresponding sections are expressed in constant 1990-1992 dollars. Constant dollar values were calculated using industry-specific deflators derived from BEA's chained 2005 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. 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.¹ 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 2011, the Agriculture and Food Sector accounted for just over 10% of Arkansas' GDP (Table 1). Arkansas agricultural retail however comprised a smaller percentage of GDP than all neighboring states, excluding Louisiana and Texas, the Southeast region, and was on par nationally (Fig. 1). Agricultural production contributed almost 2.5% to Arkansas' GDP in 2011, followed closely by agricultural production in Tennessee. Agricultural processing's contribution to GDP in Arkansas is 5.42%; whereas it is just over 4% in Tennessee, the southern state whose contribution comes closest to Arkansas'.

These comparisons can be stated another way. First when examining 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 times greater than in Texas
- 3 times greater than in Louisiana
- 2.6 times greater than in Oklahoma
- 1.7 times greater than in Tennessee
- 1.5 times greater than in Missouri
- 1.3 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. The Agriculture and Food Sector's share of the state economy in Arkansas is

- 2.5 times greater than in Texas
- 2.2 times greater than in Louisiana
- 1.9 times greater than in Oklahoma
- 1.4 times greater than in Tennessee
- 1.3 times greater than in Missouri
- 1.2 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.

The percentage contribution of Arkansas's Agriculture and Food Sector to the state economy fell -1.10 in 2011 real dollars from 2010. The Agriculture and Food Sector in the Southeast region² only experienced a slight decrease (-0.27%) as a percentage of GDP from 2010 to 2011. From 2010 to 2011, all reported states and regions experienced a decline in the share of Agriculture and Food Sector contribution to GDP. The smallest decrease in percentage of GDP was in the states of Louisiana and Missouri (-0.05%). This decrease in contribution to GDP is possibly a result of a rebounding economy overall; the aggregate Arkansas GDP increased in 2011 at a rate of 3.5%, while Arkansas' agriculture output only increased at a rate of 2.8%. This, along with declining commodity prices lead to the portion of GDP controlled by agriculture to decrease (Flanders, 2010). Despite this decrease Arkansas' agricultural production, processing, and retail as percentage of GDP is still 2.3 times greater than that of the U.S. and 1.7 times

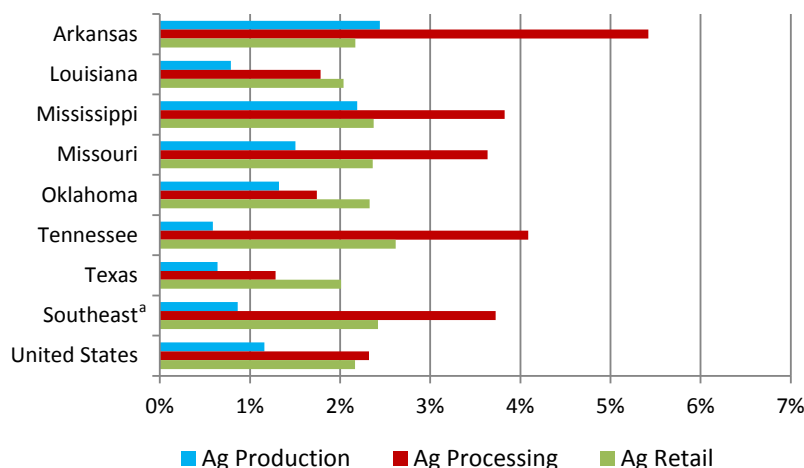
Table 1. The Agriculture and Food Sector as a Percentage of Gross Domestic Product by State, 2011.

State/Region	Percent of GDP by State
Arkansas	10.03
Louisiana	4.61
Mississippi	8.39
Missouri	7.50
Oklahoma	5.39
Tennessee	7.29
Texas	3.94
Southeast ^a	7.01
U.S.	5.64

Source: USDC BEA, (2013c).

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

Fig. 1. Production and Processing as a Percentage of Arkansas Gross Domestic Product, 2011.



Source: USDC BEA, (2013c).

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.

greater than that of the Southeast agricultural sector as a percentage of their respective GDPs in 2011.

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 55% of Arkansas' total land

base in 2012 (USDA Forest Service, 2013). Relatively low-valued timber is processed to produce higher-valued products (e.g., lumber, paper, and furniture). States that are more than half forested, including Arkansas, Mississippi, and Tennessee, tend to have high values of agricultural processing (Fig. 1; Mississippi Forestry Commission, 2010; Oswalt et al., 2009).

Arkansas remains number one of seven contiguous states in terms of the Agriculture and Food Sector as a percentage of GDP in 2011. While the value of the Agriculture and Food Sector GDP has decreased slightly (-1.10%) from 2010 to 2011, the importance of the Agriculture and Food Sector has remained constant in terms of its share of over 10% of the state's GDP.

1.4: Agriculture and Food and the Arkansas Economy

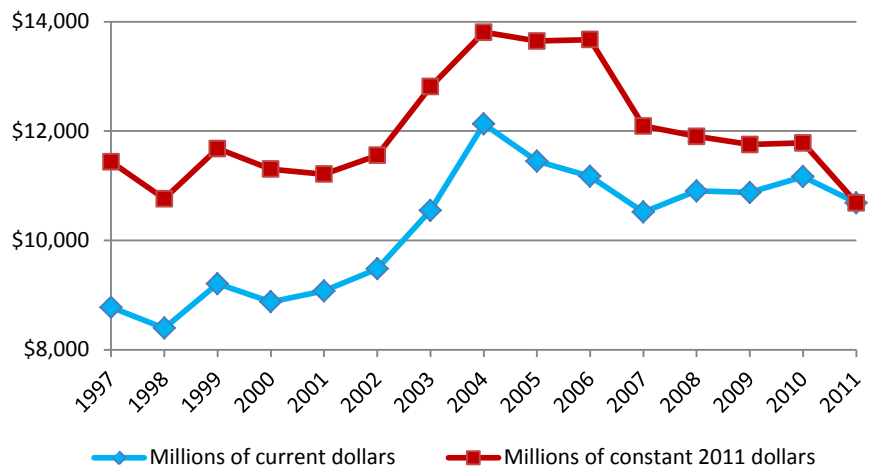
In 2011, Arkansas' total GDP was \$106.6B (constant 2011 dollars are used throughout this section, unless otherwise noted) with the Agriculture and Food Sector contributing \$10.7B to the total (USDC BEA, 2014). During the 1997 to 2011 period, the GDP of Agriculture and Food lost 6.5% of its value. However, the period was also marked by volatility. From 2001 to 2004, the GDP of Agriculture and Food increased to its peak of \$13.8B in 2004 and remained almost constant until 2007, when it declined sharply to \$12.1B (Fig. 2). The value of the Agriculture and Food Sector declined 13.8% from 2006 to 2010 due predominantly to decreases in GDP of agricultural processing sectors. (More details are provided throughout Part 1 of this document). GDP declined sharply (-9.3%) from 2010 to 2011 (Fig. 2). In 2011, only the percent of GDP share for agricultural retail increased (5.9%). From 2010 to 2011, the value of Arkansas agricultural cash receipts for all commodities increased 1.8% (USDA ERS, 2014a).

From 1997 to 2011, the percentage change in the percentage share of Arkansas GDP attributable to the Agriculture and Food Sector decreased 27.8%. In 1997, the Agriculture and Food Sector's contribution to GDP was approaching 14%, 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 (14.0%) to 2007 (11.5%), but remained fairly constant until 2010 (11.1%). It was in 2011 that Ag-

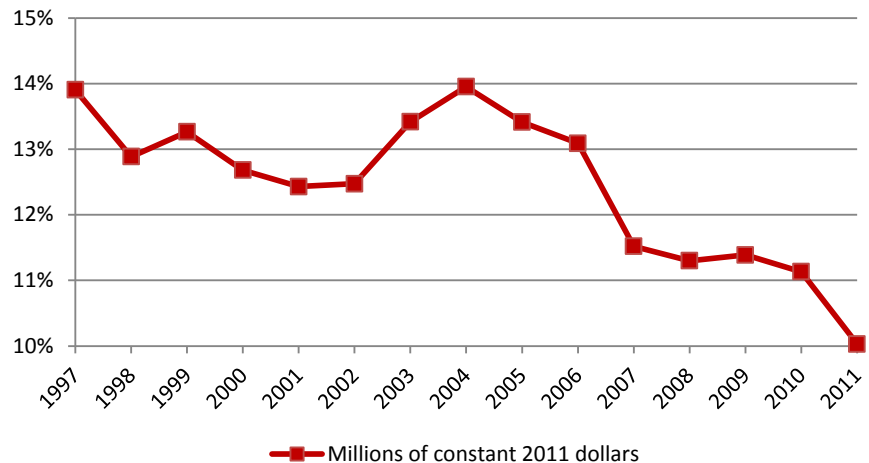
riculture and Food dropped to its current contribution to Arkansas GDP (10.03%) (USDA, ERS, 2013) (Fig. 3). Much of this

Fig. 2. Arkansas' Agriculture and Food Sector Gross Domestic Product, 1997-2011.



Source: USDC BEA, (2013c).

Fig. 3. The Agriculture and Food Sector's Share of Arkansas Gross Domestic Product, 1997-2011.



Source: USDC BEA, (2013c).

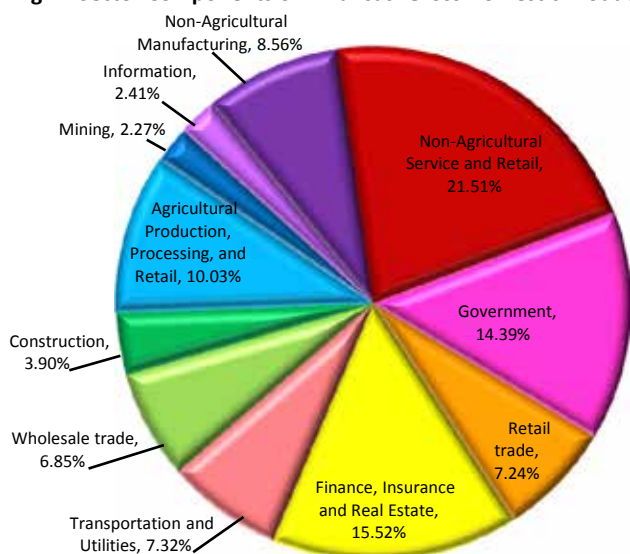
drop in the current contribution of agriculture's contribution to GDP can be contributed to the less optimal weather during the growing season (Pakko, 2013).

Arkansas' total GDP only experienced a 1.7% 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 2.8% 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 nonfarm 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. Farm loan delinquencies continued to decrease in 2011, and farm income increased, suggesting that the sector is moving back toward long term trends (FRS, 2014; USDA ERS, 2014c). As of August 2011, Arkansas boasted an average value per acre of farm real estate of \$2,600 (nominal dollars), an increase of 4.0% from 2010, which was 9.6% higher than the national average of \$2,350 (nominal dollars). Of Arkansas's contiguous states, only Tennessee (\$3,650, nominal dollars) claimed a higher per acre value of farm land than Arkansas in 2011. (USDA NASS, 2011).

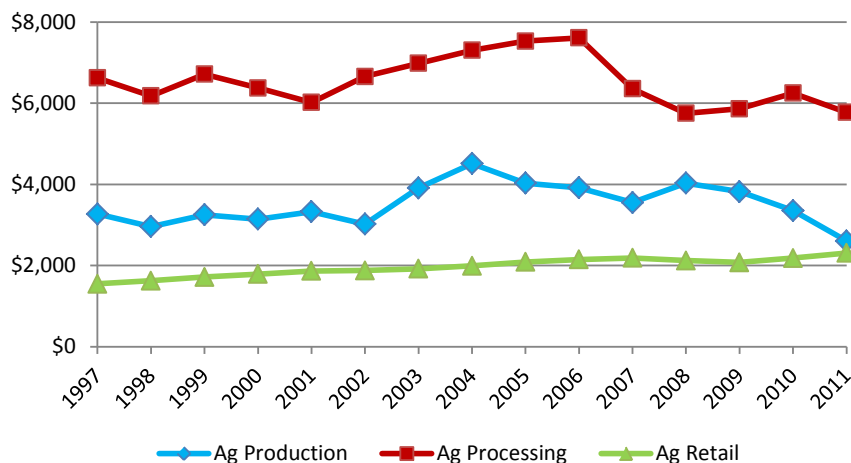
Fig. 4. Sector Components of Arkansas' Gross Domestic Product, 2011.



Source: USDC BEA, (2013).

Note: Calculated from constant 2011 dollars.

Fig. 5. Gross Domestic Product for Arkansas' Agricultural Production, Processing, and Retail, 1997-2011.



Source: USDC BEA, (2013c).

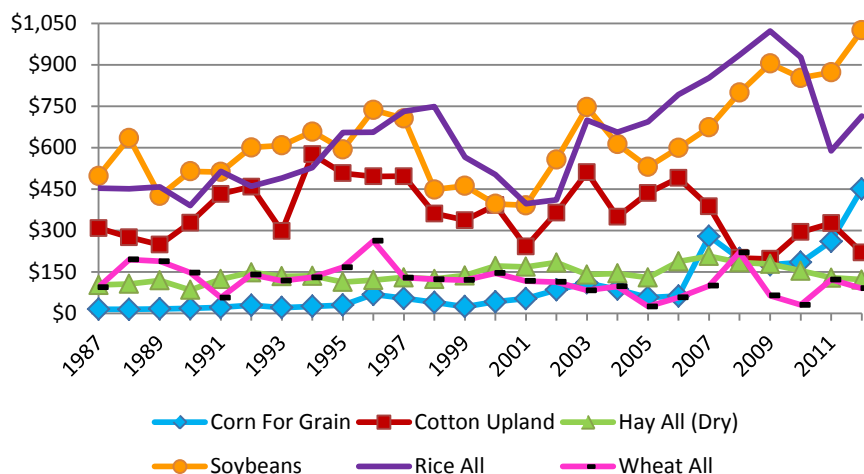
Note: Presented in millions of constant 2011 dollars.

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 (21.5%), Finance, Insurance, and Real Estate (15.5%) and Government (14.4%). The three major components of the Agriculture and Food Sector—agricultural production, agricultural processing and agricultural retail—totaled \$2.6B, \$5.8B, and \$2.3B GDP, respectively (Fig. 5). Both agricultural production and processing showed a decrease from 2010 (-22.4% and -7.6%, respectively), but agricultural retail gained 5.9% 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 in the U.S. for cash receipts of major commodities in 2011. Arkansas was ranked first in rice, second in broilers, and third in poultry and egg production for 2011. (Haydu, Hodges and Hall, 2006; USDA ERS, 2014a). Overall, agricultural production declined 22.4% between 2010 and 2011. During the fifteen year period of 1997 to 2011, agricultural production rose and fell several times. (Fig. 5). From 1997 to 2002, agricultural production was fairly constant with its lowest level being (\$3.0B) in 1998. Growth stalled in these years

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.

due to low agricultural prices in the world market, especially in the Crops Sector. Barriers to poultry exports also contributed to the decline (Childs and Kiawu, 2008). However, the value of the GDP of agricultural production then rebounded in 2003 and reached \$4.5B 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 3.2B (constant 2009 dollars) for Arkansas in 2004 (USDA ERS, 2014a). 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 \$3.6B. However, the value of the GDP of agricultural production increased in 2008. The rally was short-lived, as by 2011, agricultural production had lost 42.3% of its 2004 value and declined to \$2.6B. Although many commodities reached record nominal prices in 2011, the real prices (in 1990-1992 dollars) for commodities in Arkansas remained relatively constant, and in some cases, even declined (USDA NASS, 2014a; Trostle, Marti, Rosen and Westcott, 2011). In 2011, total real cash receipts in Arkansas were up 1.8% from 2010, while U.S. total real cash receipts increased 12.4% (USDA ERS, 2014a). Cash receipts in Arkansas declined in 2011 for many com-

modities possibly due to a decrease in livestock production and resulting decreased demand for feed crops as inputs. Many crops real prices decreased or remained steady in 2011, while many major crops production increased markedly from 2010 (soybean 15%, grain sorghum 140%, corn for grain 30%, wheat 272% ; USDA NASS, 2014b.).

1.4.1.1: Crops Production

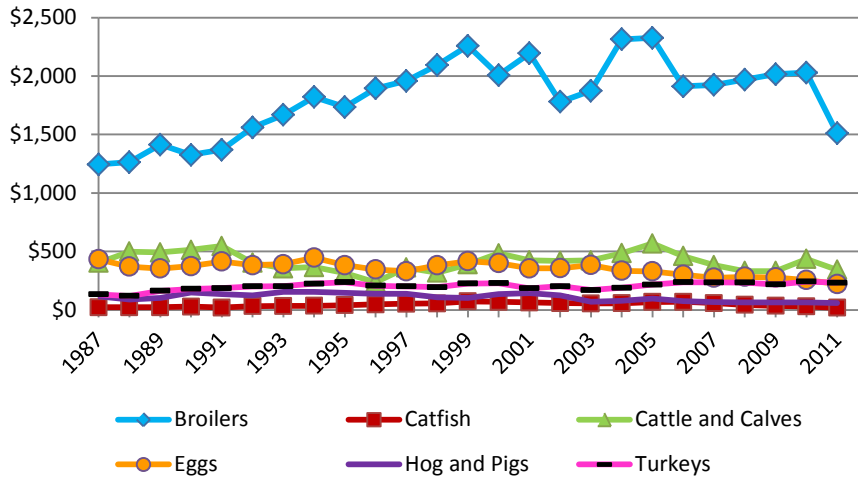
A time-series graph of major crops in Arkansas shows trends in value of production from 1987-2011 (Fig. 6). Despite volatility and a substantial decline of the value of field crop production from 1996 to 2001, the value of crop production increased overall by 54.6% from 1987 to 2011. Over this period, 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 19% 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 ex-

ports 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. The total field crops' value of production was lower in 2011 than any year of the 2007-2009 recession. Although production, prices, and cash receipts for corn were up in 2011, possibly due to ethanol policies and increased ethanol demand (Trostle, Marti, Rosen and Westcott, 2011), corn is only tied for fifth in acreage (behind soybean, rice, hay, cotton, and tied with wheat) in Arkansas and fourth in cash receipts (behind soybean, rice, and cotton), so these increases did little to offset declines in other crops. Some of the decrease may be due to declines in the livestock production sector, as feed crops are a main input in livestock production. Additionally, cotton cash receipts increased 10.9% from 2010 to 2011. Increased cotton acreage (18.2% from 2010 to 2011) left less area to produce food and feed crops (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, rep-

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.

representing a 34.2% gain in value (USDA ERS, 2014a; USDA NASS, 2014b). However, from 2010 to 2011 cash receipts decreased 21.7%. 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 11.5%, and turkeys fell 8.1% from 2006 to 2009 (Fig. 7). However, cash receipts for broilers actually increased 5.2% 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: 34.9% and 25.6%, respectively. Lower production of hogs and pigs and catfish also contributed to the declines in cash receipts, even though real prices for these commodities increased (USDA ERS, 2014a). 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). Furthermore, cattle and calves lost 21.1%, eggs 12.0%, hogs and pigs 7.7%, and turkeys 4.1% from 2010 to 2011. The value of animal production in Arkansas in 2011 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

Arkansas' land base was composed of approximately 18.8M acres of forest in 2011 (56% of total land base) (USDA Forest Service, 2013). The state was ranked fourth in the production of saw-logs in the South³ in 2007, the latest year for which data are available (Johnson, Bentley and Howell, 2009). There were 20.0M tons of timber (soft- and hardwood) removed from forests in Arkansas in 2011, valued at \$352M. Data for 2011 show an increase in softwood production (5%) but a decrease in hardwood production (4%) from 2010. Total value of timber declined 15% from 2010 to 2011. The five-year

(2007 to 2011) high in both production and value was in 2007 (22.6M tons removed valued at \$566M; AFC, 2012). 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 (USDA FS, 2013).

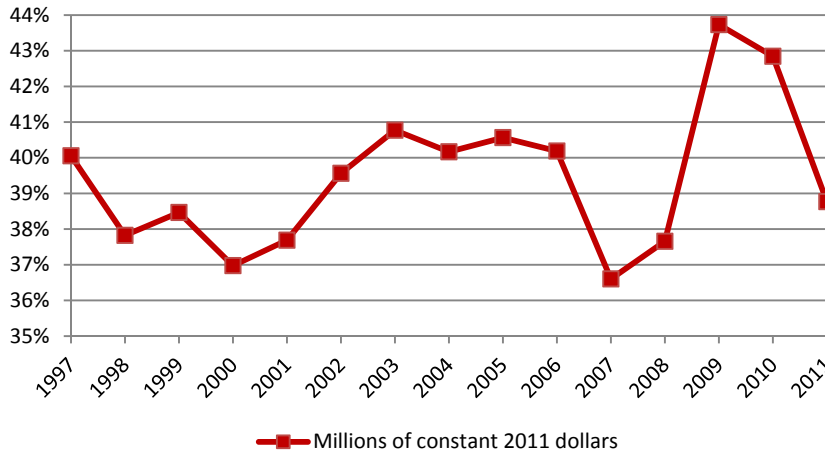
1.4.1.4: Agriculture-Related and Support Industries

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 2011-2012 fiscal year, total licenses issued were 1,260,832, an increase of 7.0% from the 2010-2011 fiscal year generating \$23,031,076.50 in revenue from sales. Fishing license total sales increased 8.8% to \$722,041 from \$663,426; hunting license total sales increased 3.1% to \$468,755 from \$454,794 in fiscal year 2011-2012. Lifetime license sales increased 21.5% to \$30,843 the largest categorical increase. (AGFC, 2013).

1.4.2: Agricultural Processing

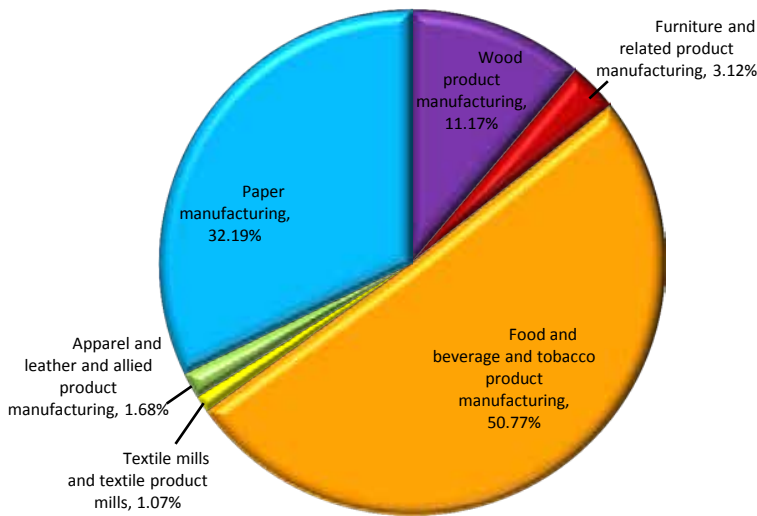
Processed crop, livestock, and forestry products are an integral part of agriculture in Arkansas. Arkansas' manufacturing sector depends upon raw materials from the crops, animal agriculture, and forestry sectors for use in many of its largest industries. Poultry production and processing, for example, may lead to such processed goods as frozen chicken,

Fig. 8. Agricultural Processing's Share of Arkansas' Manufacturing Gross Domestic Product, 1997-2011.



Source: USDC BEA, (2013).

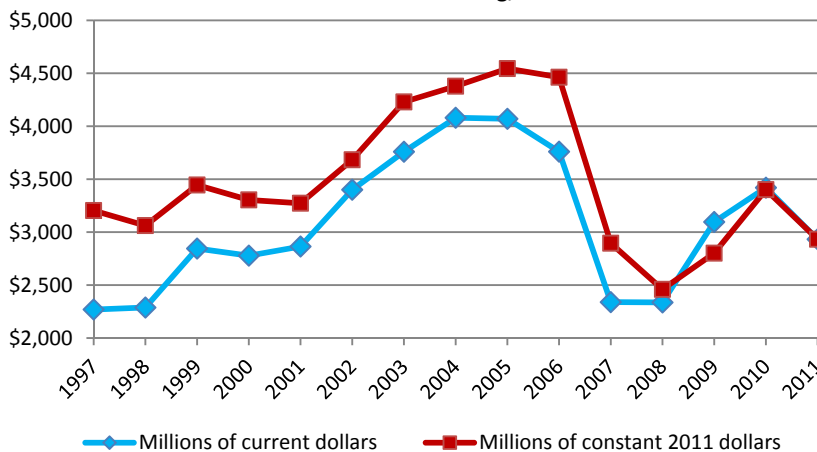
Fig. 9. Components of Arkansas' Agricultural Processing Sector Gross Domestic Product, 2011.



Source: USDC BEA, (2013c).

Note: Calculated from constant 2011 dollars.

Fig. 10. The Gross Domestic Product of Arkansas Food Product Manufacturing, 1997-2011.



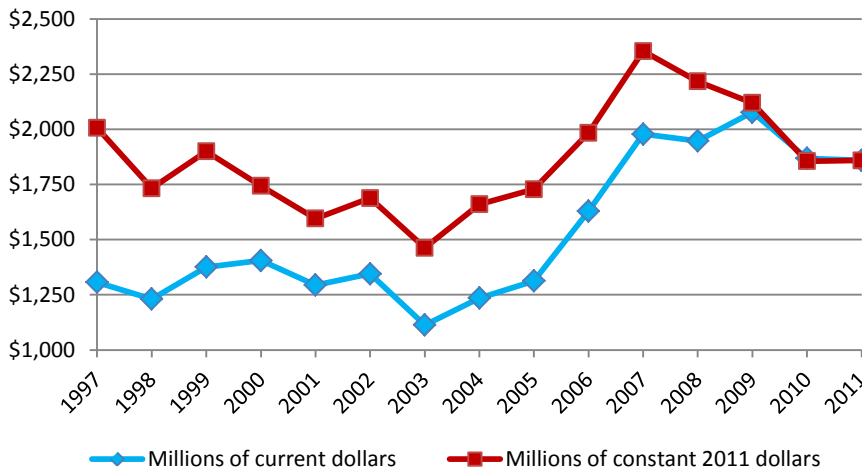
Source: USDC BEA, (2013).

eggs, animal feed, and animal oils; cotton production may lead to ginning and processing of materials to be used in the textile industry. Fig. 5 details the trend of agricultural processing in Arkansas from 1997 to 2011. Over the fifteen year period, the value of agricultural processing has declined by 12.8%. From 2001 to 2006, agricultural processing was on an upward trend, peaking at \$7.6B in 2006. Since 2006, agricultural processing decreased 24.4% to \$5.8B in 2008. The value of processing rebounded 8.7% to \$6.2B from 2009 to 2010. In 2011 Agricultural processing took a downfall of 7.6% to \$5.8B (USDC BEA, 2014). Since 1997, agricultural processing's share of manufacturing GDP has ranged from a low of 36.6% in 2007 to a high of 43.7% in 2009. Agricultural processing's share of manufacturing declined from 40.1% in 1997 to 36.6% in 2007, except for the steady years between 2002 and 2006 when its share was 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 39.5%, suggesting that it continues to be important to the value of manufacturing. Agricultural processing accounted for about \$2 of every \$5 of manufacturing in Arkansas. Food Product Manufacturing, Paper Manufacturing, and Wood Product Manufacturing accounted for 94.1% of Arkansas' processed agricultural goods in 2011. The contribution of individual agricultural processing industries to agricultural processing in 2011 is shown in Fig. 9. Three of six agricultural processing sectors declined from 2010 to 2011; and although three sectors increased, the net effect on processing was negative for the first time since 2008. A discussion of each industry's percentage of GDP over time follows.

1.4.2.1: Food Product Manufacturing

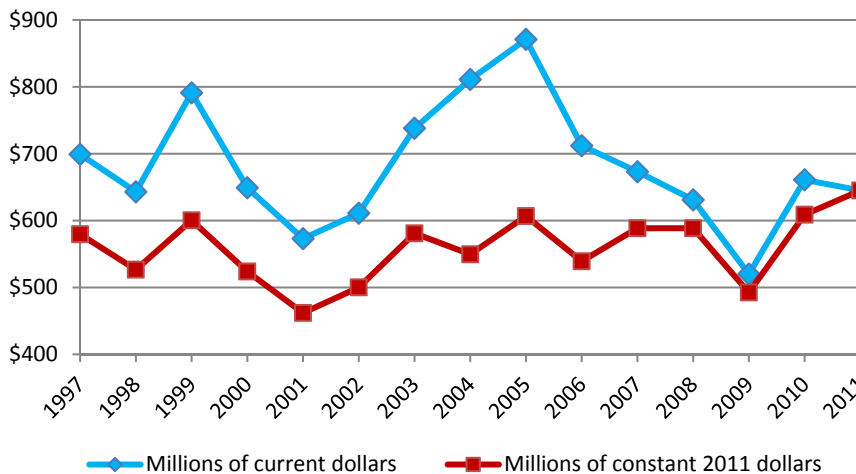
The Food Product Manufacturing Sector has consistently been the largest agricultural processing sector in Arkansas since 1997, accounting for 50.8% of agricultural processing's GDP in 2011. This sector decreased 8.5% over the 1997 to 2011 period. The decelerating global economic growth from 1997 to 2003, at-

Fig. 11. The Gross Domestic Product of Arkansas Paper Manufacturing, 1997-2011.



Source: USDC BEA, (2013c).

Fig. 12. The Gross Domestic Product of Arkansas Wood Manufacturing, 1997-2011.



Source: USDC BEA, (2013).

tributable 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 commodity prices for a number of commodities. The Food Product Manufacturing Sector experienced rapid growth from 2001 to 2005, when it increased 38.8% from \$3.3B to \$4.5B, the period high (Fig. 10). The sector declined from 2005 to 2008, dropping 45.9% (Fig. 10; USDC BEA, 2014). 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, espe-

cially 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 Product 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 for-

mats, and coupons when purchasing food for home consumption (Kumcu and Kaufman, 2011; Martinez, 2010). Since 2008, the sector showed a rebound from \$2.5B in 2008 to \$3.4B in 2010, a 38.3% increase. Although 2011 was lower than 2010, the data still exhibits an upward trend suggesting that Food Product Manufacturing is returning to pre-recession levels; long-term effects remain to be seen, as consumer behavior determines the immediate future gains or losses in the sector.

1.4.2.2: Paper Manufacturing

The Paper Manufacturing Sector has been the second-largest processing industry in Arkansas since 1997. This sector decreased 7.3% from 1997 to 2011 (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 (\$1.5B), but until 2007 the sector experienced strong growth. By 2007 the GDP of the Paper Manufacturing Sector had improved by 60.9%. In 2007, its GDP was at its period high of \$2.4B (Fig. 11). Since 2007 the GDP has declined 21.0%, and in 2011 its value was down to \$1.9B, a less than 1% gain from 2010 (USDC BEA, 2013b).

1.4.2.3: Wood Product Manufacturing

Arkansas' third largest agricultural processing sector gained 11.3% in value from 1997 to 2011. After a brief increase from 1998 to 1999, the GDP of Wood Product Manufacturing fell 23.1% 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 16.3% from 2008 to \$492M. The 2009 year marked the second

lowest value of the fifteen year period; only 2001 was lower (\$462M). Much of this decline may be attributable to families planning to stay in their homes longer than originally anticipated (Bumgardner, Buehlmann, Schuler and Koenig, 2012). 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, 2012). In 2011, Wood Product Manufacturing showed signs of continued recovery and gained 31.0% from \$492M in 2009 to \$645M in 2011 (USDC BEA, 2014). This “recovery” may be due in part to some manufacturers closing, shifting

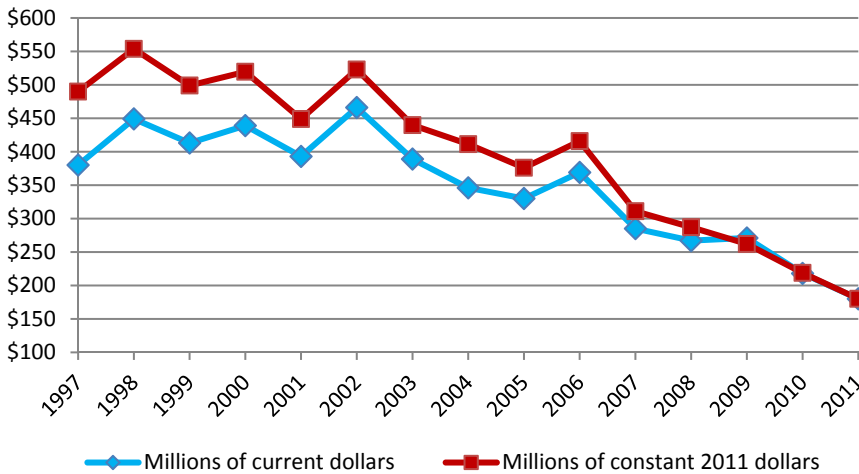
remaining demand to a smaller number of manufacturers (Bumgardner, Buehlmann, Schuler and Koenig, 2012).

1.4.2.4: Furniture and Related Products Manufacturing

Over the 1997 to 2011 period, Furniture and Related Products Manufacturing lost 63.3% of its value. Its GDP was volatile from 1997 to 2002 and reached the period high level of \$554M 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 es-

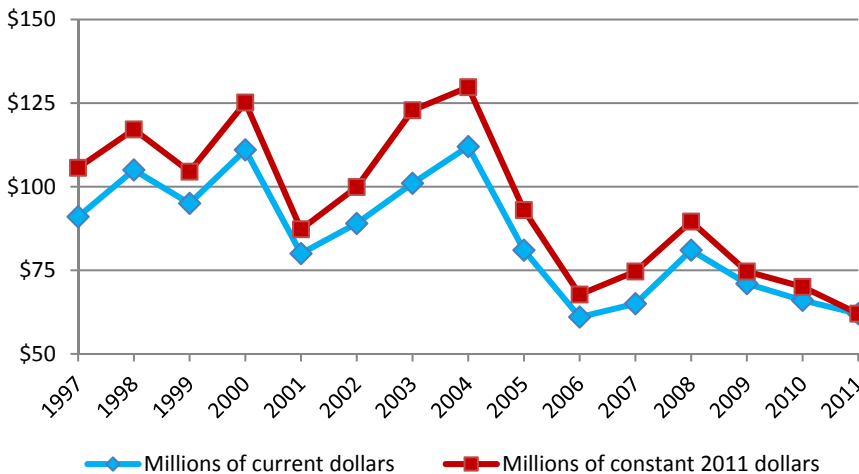
tate markets gained momentum in 2002; however, imports of furniture and other wood producers were also on the rise, flooding the market with less expensive substitutes for U.S. manufactured products. A flooded market partially led to the 28.1% drop from 2002 to 2005 to \$376M. Since 2002, except for limited recovery in 2006, the sector has been on a marked path of decline from \$523M in 2002 to \$180M in 2011, a 65.6% decrease (Fig. 13; USDC BEA, 2014). 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, 2012). 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 (USCB, 2014b).

Fig. 13. The Gross Domestic Product of Arkansas Furniture and Related Products Manufacturing, 1997-2011.



Source: USDC BEA, (2013).

Fig. 14. The Gross Domestic Product of Arkansas Textile and Textile Product Mills, 1997-2011.



Source: USDC BEA, (2013).

1.4.2.5: Textile and Textile Product Mills

The Textile and Textile Product Mills Sector has been in decline for three decades. From 1997 to 2011, its value declined 41.3%. 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

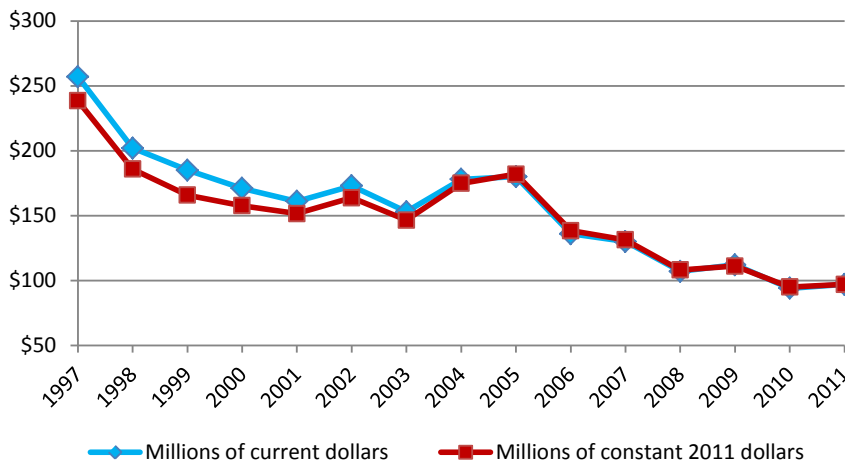
steep decline in 2001 occurred because a major textile manufacturer closed its last plant in Arkansas in 2000. From 2004 to 2006, Textile and Textile Product Mills declined in value by almost half (47.7%) to \$68M (Fig. 14). The sector recovered briefly from 2006 to 2008, but since 2008 the value of its GDP decreased 30.8% from \$90M in 2008 to the fifteen year low of \$62M in 2011 (USDC BEA, 2014).

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 2011. During this period, the sector has declined from a high of \$238M in 1997 to a low of \$95M in 2010, representing a 60.1% drop over the four-

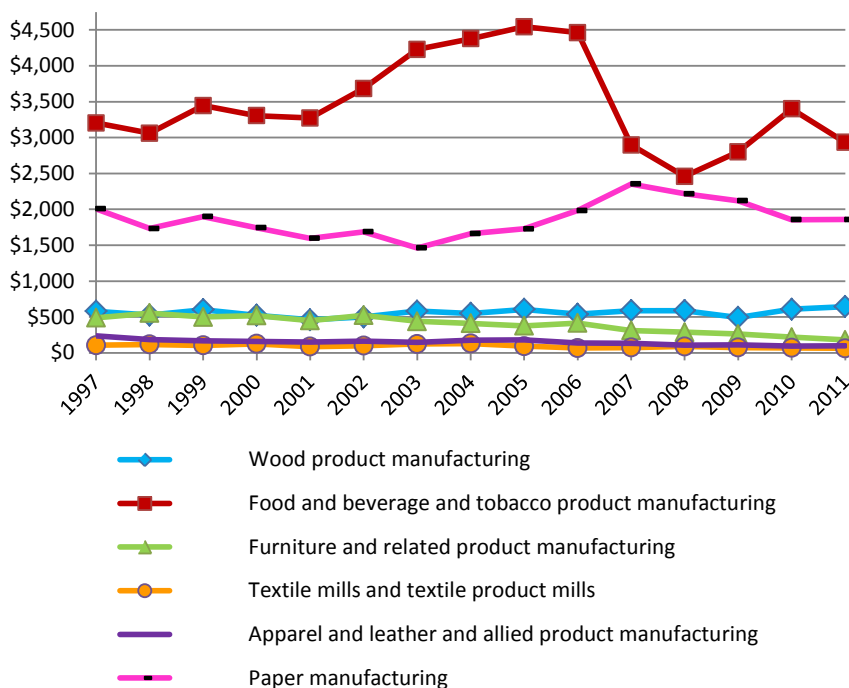
teen year period. In 2011 the Apparel, Leather, and allied Products Manufacturing increased 2.1% from 2010 (USDC BEA, 2014). Much like the textile industry, apparel manufacturing has been in decline in the U.S. for over thirty years. The decline has also been partly attributed to NAFTA, which possibly 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.

Fig. 15. The Gross Domestic Product of Arkansas' Apparel, Leather, and Allied Products Manufacturing, 1997-2011.



Source: USDC BEA, (2013c).

Fig. 16. The Gross Domestic Products of Arkansas' Agricultural Processing Sectors, 1997 to 2011.



Source: USDC BEA, (2013c).

Note: Presented in millions of constant 2011 dollars.

1.4.2.7: Agricultural Processing Summary

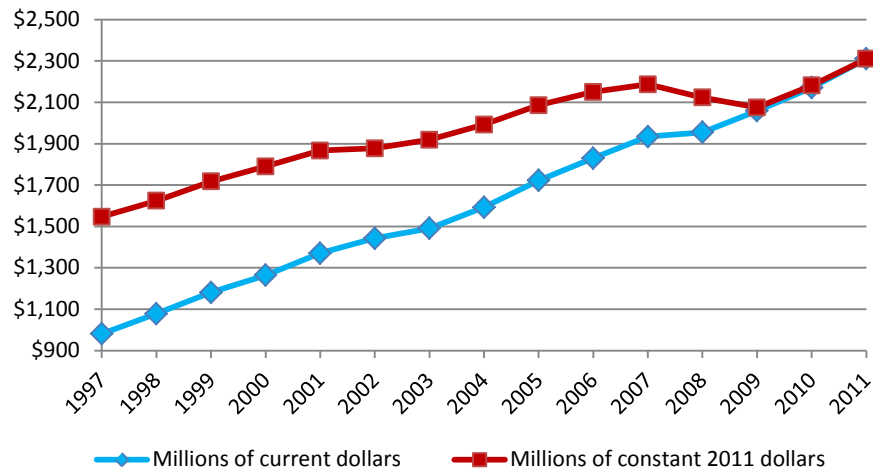
Figure 16 shows all components of agricultural processing to better compare the sectors and their contributions over time to agricultural processing. Food Product Manufacturing has consistently contributed the largest share of agricultural processing, but has shown substantial volatility over the period, 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 2011 was \$2.3B (Fig. 17). From 1997 to 2007, agricultural retail increased 41.3%. 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

Fig. 17. The Gross Domestic Product of Arkansas Food Services and Drinking Places, 1997-2011.



Source: USDC BEA, (2013c).

spent on food away from home, and by 2006 had risen to 49% of food expenditures, further evidence of the market forces behind the increases in agricultural retail GDP (calculated from constant 1988 dollars; USDA ERS, 2013). From 2007 to 2009, the sector lost 5.1% 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). In 2011, the sector showed signs of strong recovery from this brief decline when it increased 5.9% from 2010, the only agriculture component to make a positive gain.

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 ag-

riculture 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 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).
- ² The BEA includes Alabama, Arkansas, Florida, Georgia, Kentucky, Lou-

isiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia in the Southeast region (USDC, BEA, 2013b). It is not equivalent to either Johnson, Bentley and Howell's (2009) definition of the South or the South census region.

³ For forestry reporting, the South includes 13 states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, North Carolina, South Carolina, Tennessee, Texas, 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 agriculture 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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