

Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2019



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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 differs from national GDP measures in that it excludes compensation of federal civilian and military personnel stationed abroad as well as government consumption of fixed capital for military structures located abroad and for military equipment. Gross Domestic Product by State values are derived as the sum of GDP originating in all the industries within a state. Industry GDP is an estimate of value added by industry. Value added is defined as an industry's gross output (sales or receipts and other operating income, commodity taxes, and inventory change) minus its intermediate inputs (energy, raw materials, semi-finished goods, and purchased services). Real GDP by State values are prepared using chained (2012) dollars. This allows for an inflation-adjusted measure of a state's gross product that is based on national prices for the goods and services produced within that state (USDC BEA, 2017).

Style Notes

In this report, Arkansas agriculture is presented in a historical context. These data are available for 1997 through 2019. Throughout the report, agriculture is defined in terms of agricultural sectors, North American Industry Classification Scheme (NAICS) sectors, industries, and general descriptive terms that can be applied to agriculture. As shown below, 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 Sector and the Agriculture and Food Sector. The Agriculture Sector includes all industries related to agricultural production and processing. The Agriculture and Food Sector consists of those industries within the Agriculture Sector, with the addition of the Food Services and Drinking Places industry. These terms are capitalized and underlined throughout the text.

NAICS Sectors. This report uses the 2012 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." Within this framework, business establishments are assigned one NAICS code, corresponding to their primary business activity (USCB, 2016). 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 and Beverage and Tobacco Products Manufacturing, Paper Products Manufacturing, and Wood Products Manufacturing.

General Descriptive Terms. These are terms used throughout the text to describe agricultural areas 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 Arkansas' GDP. Agriculture contributes to the state economy through direct agricultural production, value-added processing, and agricultural retail activities. The Agriculture and Food Sector, which is comprised of agricultural production, processing, and retail industries, promotes economic strength through various interactions with other industries. The use of non-agricultural goods and services as inputs into the agricultural sector promotes diversified growth in Arkansas' economy and thus plays a vital role in maintaining economic stability throughout the state. This report 1) compares the relative size of the Agriculture and Food Sector in Arkansas with those of neighboring states; 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 (2019 data) from the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) for agricultural production, processing, and retail are reported in this report. The Agriculture and Food Sector is defined to include eight sectors from 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 and 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) in which Arkansas agriculture's economic contribution was determined using both Gross Domestic Product by State data obtained from BEA, as well as IMPLAN Group LLC's (formerly Minnesota IMPLAN Group, Inc.) input-output software and data. However, in an effort to increase clarity, beginning in 2013, the report was divided into two separate reports; one utilizing BEA's GDP by State data to provide a time series analysis and state-to-state comparison of Arkansas' agriculture sector, and the second utilizing IMPLAN data and software to provide a snapshot of agriculture's contribution, including direct, indirect, and induced economic effects. This paper is a continuation of the Gross Domestic Product by State analyses described in previous reports (Manlove et al., 2014; English, Popp, and Miller, 2014; English, Popp, and Miller, 2015; English, Popp, and Miller, 2016) and utilizes data for 1997–2019. All dollar values are expressed in 2019 constant dollar terms unless otherwise noted. Constant dollar values were calculated using industry-specific deflators derived from BEA's chained 2012 dollar GDP by State series, except for the data presented in Figs. 6 and 7. For Figs. 6 and 7, data deflators from the U.S. Department of Agriculture National Agricultural Statistics Service (NASS)'s "Index for Price Received, 2011" data series are used to calculate constant dollar values (USDA NASS, 2020a).

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 in 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 fact 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 (Yuskavage, 2007). 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

Although Arkansas ranked 35th nationwide for total state GDP value in 2019, Arkansas' Agriculture and Food Sector, when 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 (USDC BEA, 2020). In 2019, this trend continued with the Agriculture and Food Sector accounting for almost 10% of Arkansas' GDP (Table 1). Agricultural production and processing sectors contributed 1.5% and 5.9%, respectively, to Arkansas' GDP in 2019. With the exception of Mississippi, which held a slightly larger share percentage for agricultural production (1.8%), these production and processing percentages were higher for

Arkansas than all neighboring states, the Southeast region, and the nation as a whole. With a value of 2.5%, Arkansas' agricultural retail sector fell in the middle of neighboring states whose values ranged from 2.3% to 2.8% of total GDP. This was on par with that of the Southeast region (2.5%) and slightly higher than the national average, which was 2.3% (Fig. 1).

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:

- 4.2 times greater than in Texas
- 2.7 times greater than in Louisiana
- 2.4 times greater than in Oklahoma
- 1.9 times greater than in Tennessee
- 1.9 times greater than in Missouri
- 1.2 times greater than in Mississippi
- 1.9 times greater than for the Southeast region
- 2.6 times greater than for the U.S. as a whole.

When retail is added, these numbers decrease slightly, indicating proportionally higher levels of agricultural retail activities within other states. Taking this into account, the Agriculture and Food Sector's share of the state economy in Arkansas is:

- 2.5 times greater than in Texas
- 1.9 times greater than in Louisiana
- 1.8 times greater than in Oklahoma
- 1.6 times greater than in Missouri
- 1.5 times greater than in Tennessee
- 1.1 times greater than in Mississippi
- 1.6 times greater than for the Southeast region
- 1.9 times greater than for the U.S. as a whole.

Table 1. Agricultural Production, Processing, and Retail as a Percentage of Arkansas Gross Domestic Product, 2019.

State/Region	Percent of GDP by State
Arkansas	9.84%
Louisiana	5.13%
Mississippi	8.79%
Missouri	6.15%
Oklahoma	5.54%
Tennessee	6.70%
Texas	3.96%
Southeast ^a	6.32%
U.S.	5.05%

Source: USDC BEA, (2020).

^a The BEA includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia in the Southeast region.

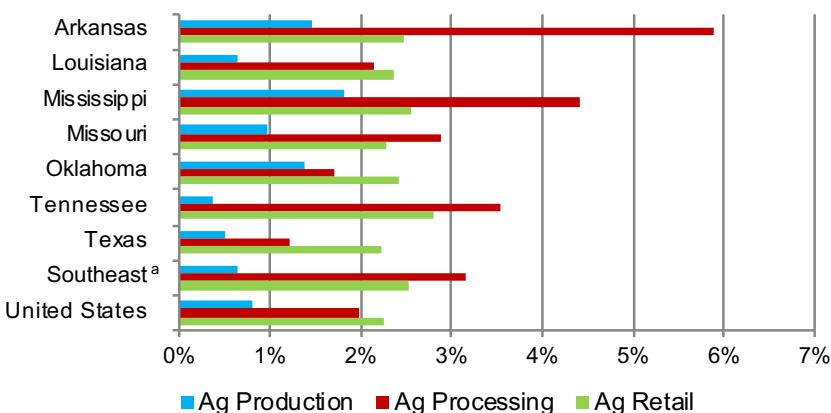


Fig. 1. Agricultural Production, Processing, and Retail as a Percentage of Arkansas Gross Domestic Product, 2019.

Source: USDC BEA (2020).

Note: Calculated from current dollars.

^a The BEA includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia in the Southeast region.

Between 2018 and 2019, Arkansas' total state GDP increased slightly (0.6%), while GDP stemming from the Agriculture and Food Sector fell by 5.5%. Although Arkansas' agricultural processing and retail sectors recognized modest gains in GDP value from 2018 to 2019 (1.8% and 1.7%, respectively), agricultural production GDP fell by 33.0%, resulting in a decrease in the aggregate Agriculture and Food Sector's overall share of state GDP. This drop in agricultural production was largely the result of uncertainty in trade markets, coupled with delayed plantings caused by heavy rains and flooding in late 2018 and early 2019. Arkansas was not the only state to lose agricultural production value in 2019. Mississippi, Louisiana, Texas, and Oklahoma all saw drops in GDP for agricultural production as well. The U.S. as a whole experienced a modest

fall in agricultural production GDP (-1.8%), with the Southeast region showing a more significant decrease of 8.0%.

Although experiencing significant losses in production value for 2019, Arkansas' Agriculture and Food Sector continues to hold a larger share of state GDP than surrounding states, the Southeast region, and the United States as a whole. In 2019, Arkansas' Agriculture and Food Sector share of GDP fell by 6.1% from 10.5% in 2018 to 9.8% in 2019. Missouri saw a slight gain (0.6%) in the Agriculture and Food Sector share of state GDP with shares for Texas, Mississippi, Louisiana, Oklahoma, and Tennessee each falling by 4.0%, 3.6%, 1.2%, 1.3%, and 1.2%, respectively. The Agriculture and Food Sector contribution to overall GDP also fell for the Southeast region and the United States as a whole with realized losses of -2.8% and -1.6%, respectively.

1.4: Agriculture and Food and the Arkansas Economy

In 2019, Arkansas' total state GDP increased 0.6% from \$130.1B in 2018 to \$131.0B (constant 2019 dollars are used throughout this section unless otherwise noted). During the same period, GDP in Arkansas' Agriculture and Food Sector decreased by 5.5%, contributing \$12.9B (or 9.8%) to the state GDP total (USDC BEA, 2020). Although the sector experienced a slight loss from 2018, when viewed from a historical perspective, Arkansas' Agriculture and Food Sector recognized overall gains in 2019. While the period was marked by volatility, from 1997 to 2019, the GDP value for Arkansas' Agriculture and Food Sector grew by 1.4%. From 1997 to 2004, value in the sector increased 22.4% to its peak of \$15.5B and remained almost constant until 2007 when recession effects took hold. From 2006 to 2012, the value of the Agriculture and Food Sector declined 27.0%, erasing earlier gains. This decline was followed by a slight recovery in 2013, with value in the sector remaining fairly constant through 2016. Beginning in 2016, GDP in the sector appeared to be on the rise, reaching \$13.6B in 2018, before returning to levels seen prior to the rise (Fig. 2).

While value in Arkansas' Agriculture and Food Sector saw overall growth between 1997 and 2019, this growth

wasn't as strong as gains observed across the state economy as a whole. From 2006 to 2009, Arkansas' total state GDP fell by 4.3%. During this same period, Arkansas' Agriculture and Food Sector lost almost 20% of its GDP value. Following 2009, the state economy experienced steady growth while value in the Agriculture and Food Sector either decreased or stagnated. Although the Agriculture and Food Sector began to rebound in 2013, gains were not in line with that seen for the overall state economy. This factor points toward deeper long-term recession effects for agriculture than the economy as a whole. As a result, while the GDP of Arkansas' Agriculture and Food Sector increased 1.4% from 1997 to 2019, the percentage share of Arkansas GDP attributable to the Agriculture and Food Sector decreased by 28.5% during this time. In 1997, the Agriculture and Food Sector's contribution to GDP was approaching 14%. Following 1997, the sector's share fell slightly, remaining between 12% and 13% of state GDP before rebounding in 2004. After reaching a share of 13.8% in 2004, the portion of state GDP attributed to the Agriculture and Food Sector fell steadily to a period low of 9.3% in 2012. While slight gains were recognized after 2012, the sector has yet to see its share of

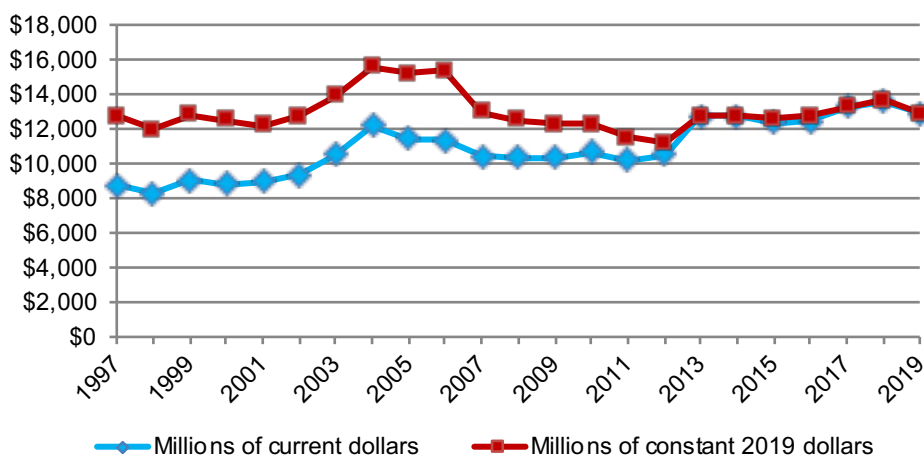


Fig. 2. Arkansas' Agriculture and Food Sector Gross Domestic Product, 1997–2019.

Source: USDC BEA (2020).

state GDP return to levels achieved prior to the recession (Fig. 3; USDC BEA, 2020).

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. In 2008, Arkansas' agricultural exports were at a record high, primarily due to simultaneous increases in rice, soybean, broiler, and wheat trading. In 2009, exports of all major agricultural products for Arkansas declined but quickly recovered and continued to rise to new record highs in 2012 and 2013. Since 2000, rice has consistently been the top export product from the state. However, in recent years, soybean exports have grown dramatically. Between 2007 and 2012, the export value for soybeans rose 247.4%, making it Arkansas' top agricultural export commodity in 2012. In recent years, U.S. trade negotiations with Canada, Mexico, and China have led to uncertainty across commodity trade markets. In 2019, ongoing

trade disputes, coupled with weather-related delays in planting resulted in a substantial decrease in rice and soybean production. While 2019 was a challenging year for many Arkansas growers, by the end of the season, things began to turn around. Favorable late-season weather extended harvests, leading to average yields that were similar to 2018 (McGeeney, 2019a). Corn and peanut production also rose in 2019, offsetting some of the losses to rice and soybeans (USDA NASS, 2020b).

The diversity of Arkansas' GDP components may provide partial insulation from the effects of recession and trade policy. In 2019, the Agriculture and Food Sector ranked as the fourth largest sector in the state (Fig. 4). The only sectors larger were Non-Agricultural Service and Retail (25.0%), Finance, Insurance, and Real Estate (16.1%), and Government (12.8%). The three major components of the Agriculture and Food Sector—agricultural production, agricultural processing, and agricultural retail—totaled \$1.9B, \$7.7B, and \$3.2B GDP, respectively (Fig. 5). Agricultural processing and retail each showed an increase in GDP value from 2018 to 2019 (1.8% and 1.7%,

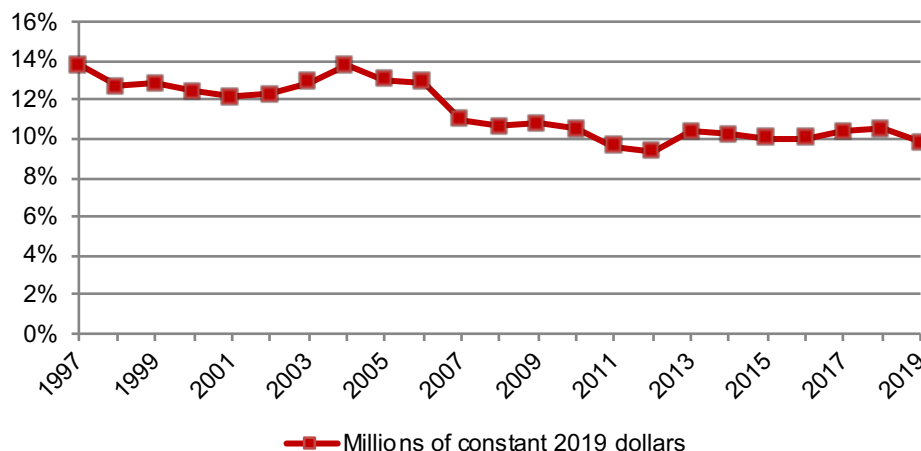


Fig. 3. The Agriculture and Food Sector's Share of Arkansas Gross Domestic Product, 1997–2019.

Source: USDC BEA (2020).

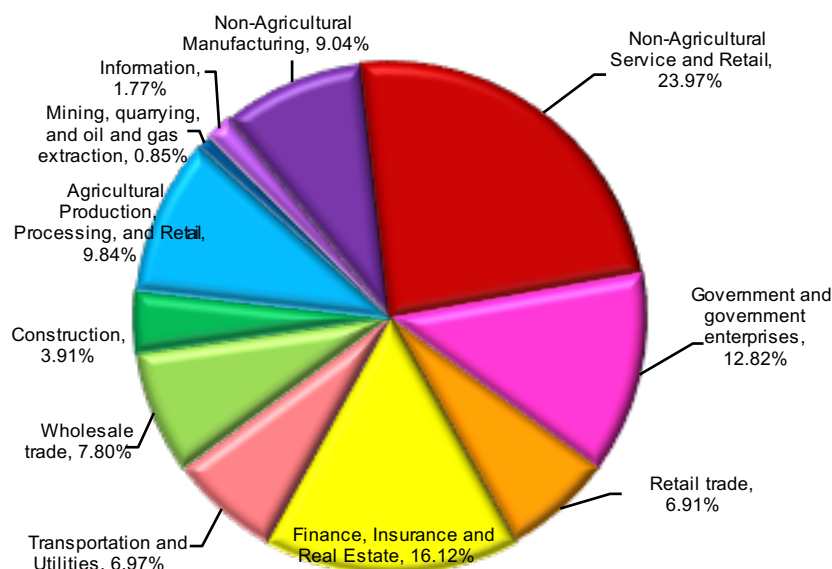


Fig. 4. Sector Components of Arkansas' Gross Domestic Product, 2019.

Source: USDC BEA (2020).

Note: Calculated from constant 2019 dollars.

respectively), while the value for agricultural production fell by 33.0%. Each agricultural component of Arkansas' GDP will be discussed in the sections to follow (USDC BEA, 2020).

1.4.1: Agricultural Production

Crop and animal production, forestry, aquaculture, and horticulture are the primary agricultural production industries found in Arkansas. In 2019, Arkansas was nationally ranked first in the production of rice, second in broilers, third in catfish, fourth in cotton and cottonseeds, and fifth in turkeys (USDA NASS, 2020b). Additionally, Arkansas was ranked 18th in the U.S. for value of crop production and 10th in value of livestock products (USDA ERS, 2020a).

Overall, the GDP of agricultural production fell 23.5% between 1997 and 2019. During the twenty-three year period, agricultural production rose and fell several times (Fig. 5). From 1997 to 2002, agricultural production was fairly constant with its lowest level being \$2.3B in 1998. Following this period of stagnation, the GDP value of agricultural production began

to increase in 2003, reaching a period high of \$3.5B in 2004. In 2003 and 2004, farmers experienced consecutive years of large harvests for major crops and unusually high prices for livestock and milk. From 2004 to 2011, there was a steady decrease in the GDP value of agricultural production across the state. By 2011, agricultural production had lost 52.3% of its 2004 value and declined to \$1.7B. In 2012, the sector began to show signs of recovery. By 2013, value in the sector had increased 61.5% over the 2011 low. Value remained fairly steady from 2013 to 2018 before falling from a value of \$2.9B in 2018 to \$1.9B in 2019, a 33.0% drop (USDC BEA, 2020). This drop in agricultural production value was the result of lower values being reported for the soybean, rice, and poultry and egg industries.

1.4.1.1: Crops Production

A time-series graph of major crops in Arkansas shows trends in value of production from 1997–2019 in terms of constant 2011 dollars (Fig. 6). Despite volatility and a substantial decline of the value of field crop production from 1997 to 2001, the value of crop production increased overall by 0.4%

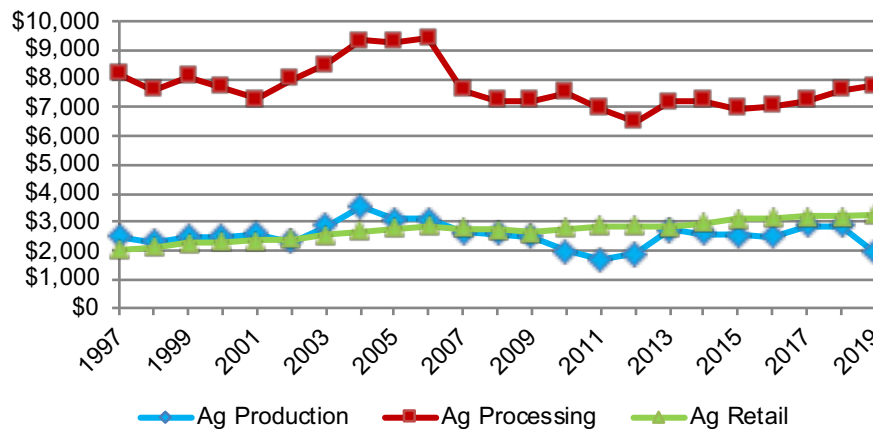


Fig. 5. Gross Domestic Product for Arkansas' Agricultural Production, Processing, and Retail, 1997–2019.

Source: USDC BEA (2020).

Note: Presented in millions of constant 2019 dollars.

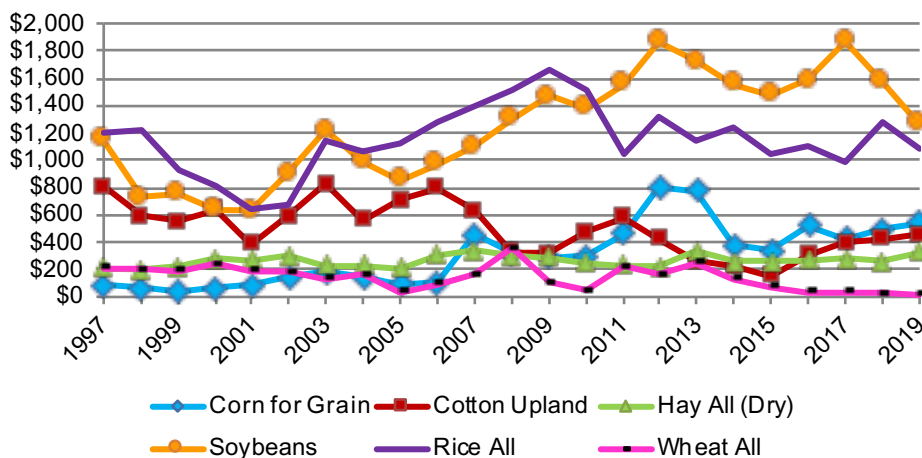


Fig. 6. Arkansas' Crops Value of Production, 1997–2019.

Source: USDA NASS (2020b, 2020a).

Note: Presented in millions of constant 2011 dollars.

For selected crops: rice, soybeans, cotton, hay, wheat, and corn.

from 1997 to 2019. Over this period, rice and soybean have consistently been the highest valued crops, with each representing an average of around 30% of the total value of field and miscellaneous crops over the years. From 1997–2011, upland cotton took third place in value of field production, representing an average of around 15% of field and miscellaneous crops (USDA NASS, 2020b). However, in 2012, corn for grain experienced a 73.2% increase in value, replacing cotton as the third most valued crop in the state. In 2001, total field crop value of production reached a period low of \$2.3B. This decrease was primarily caused by downward trends of the top three crops' values (rice, soybeans, and cotton) in Arkansas. From 1997 to 2001, rice, soybeans, and cotton lost 46.1%, 45.1%, and 51.7% of their value, respectively. However, from 2001 to 2003, crop prices and exports increased, and domestic and international demand for products was strong. As a result, the total value of crop production jumped 65.8% between 2001 and 2003. The gains were partly erased as the total market value (in constant 2011 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. From 2005 to 2008, Arkansas' crop value of production increased 35.9% to \$4.3B. 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). Between 2008 and 2009, the total field crops' value of production dropped slightly and continued to decline until 2011, where it increased 4.6% over 2010 values before reaching a period high of \$5.0B in 2012. In 2015, total field crop value of production dropped by 27.6% over 2012 values to \$3.6B, the lowest value since 2005. These losses can be attributed to losses in value for corn, cotton, and soybeans. From 2015 to 2018, the total value of crops in-

creased by 15.5% to \$4.2B, before falling by 8.3% to \$3.8B in 2019. Much of this drop was attributable to soybeans and rice, which showed losses of 19.7% and 14.4%, respectively (USDA NASS, 2020b). Unfavorable weather contributed to the drop in crop value for 2019 with heavy rains and flooding from late 2018 through early 2019, resulting in a delay in planting for corn, rice, and soybeans. Ongoing trade talks with China also led to uncertainty in the markets, high national stocks, and depressed prices for soybeans during this time (McGeeney, 2019b).

1.4.1.2: Animal Production

Animal production is also a major component of Arkansas' agricultural production. In terms of constant 2011 dollars, animal production cash receipts (which measure income and sales from marketing) in Arkansas saw an increase from \$5.1B in 1997 to \$5.5B in 2019, representing a 7.5% gain in value (USDA ERS, 2020a). Arkansas' animal production experienced much volatility over the twenty-three year study period. With poultry and eggs accounting for an average of around 82% of animal production value, much of the volatility can be attributed to changes occurring in this sector (Fig. 7). Peaking at \$4.6B in 2005, the poultry and egg sector dropped 14.3% to \$4.0B at the start of the 2007–2009 recession. The sector grew during the recession period and peaked again at \$4.1B in 2010 before dropping 14.7% to \$3.5B in 2011, the lowest value of the period. In 2013, the poultry sector rebounded to \$4.2B, and continued this growth through 2018, reaching a value of \$5.4B before dropping 9.7% to \$4.9B in 2019.

The cattle and calves sector experienced similar growth and decline patterns, peaking at \$921M in 2005 before dropping 41.8% to \$536M by 2009. In 2010, the sector peaked again at \$706M before steadily declining 28.0% to \$508M in 2013. The cattle and calves sector recovered in 2014, increasing 41.1% over 2013 to \$716M. This recovery was short-lived as value fell 30.5% from 2014 to the period low of \$498M in 2019.

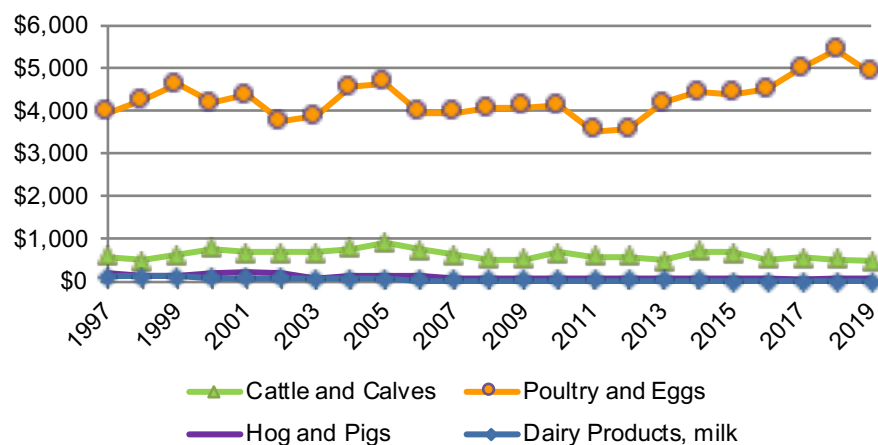


Fig. 7. Arkansas' Livestock and Livestock Products Value of Cash Receipts, 1997–2019.

Source: USDA ERS (2020a); USDA NASS (2020a).

Note: Presented in millions of constant 2011 dollars.

For selected products: cattle and calves, poultry and eggs, hogs and pigs, and dairy products.

Although there were some periods of slight growth, the hogs and pigs and dairy products sectors showed a steady decline throughout the twenty-three year period. After peaking at \$233M in 2001, the hogs and pigs sector declined 65.2% to \$81M by 2012 before increasing 28.4% in 2013. The rebound was short-lived as the hog and pig sector value fell to \$83M in 2014, followed by a period low of \$61M by 2017. Value in the sector rose in 2018 to \$66M before falling 4.6% in 2019 to \$63M.

From a value of \$137M in 1997 to a low of \$13M in 2019, the dairy products sector declined 90.4% between 1997 and 2019 with no clear sign of recovery.

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 lowest production year of the twenty-three year period. 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 et al., 2011). With an increase of 12.1% over 2012 values, animal production rebounded in 2013. The rebound continued into 2014 as animal production realized an additional increase in value of 9.0% over 2013, continuing to rise to a period high of \$6.0B by 2018 before dropping 9.4% to \$5.5B in 2019.

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 19.0M acres of forest in 2019 (57.1% of total land base) (USDA FS, 2020). There were 24.2M tons of timber (soft- and hardwood) removed from forests in Arkansas in 2019, valued at \$445.1M. From 2005 to 2009, the value of timber production in Arkansas dropped by 70.1%. Following the recession, the sector began to rebound, with 2019 showing an increase of 109.1% over the low seen in 2009 (AFRC, 2020; USBLS, 2020). With annual new home construction rising steadily since 2009, a strong housing market going into 2020 was expected to increase demand for softwood pine. However, with the onset of COVID-19, the number of new housing starts in the U.S. dropped significantly throughout March and April, potentially impacting the anticipated growth in Arkansas timber sales for 2020 (Pelkki, 2020; USCB, 2020).

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), as well as 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. From 1997 to 2019, the GDP value of Forestry, Fishing, and Related Activities rose by 32.9% from a period low of \$472M to \$627M. Unlike many of the agricultural production industries, this area experienced a slight drop in 2018, followed by a rise in 2019. A smaller portion of the sector is made up of commercial fishing, hunting, and trapping activities. Mirroring national trends, Arkansas' hunting and fishing license sales have been on the decline. For the 2014–2019 fiscal years, the Arkansas Game and Fish Commission reports a decline in fishing license sales of 16.8%, with hunting license sales declining by 9.4%. Beyond dollars lost through license sales, funding for conservation programs across the state are impacted as the distribution of federal tax funds to fish and wildlife program is, in part, based on the number of licensed hunters and anglers participating in each state (Zellers, 2020).

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 2019. Over the twenty-three year period, the value of agricultural processing has declined by 5.5%. From 2001 to 2006, agricultural processing was on an upward trend, peaking at \$9.4B in 2006. Since 2006, agricultural processing decreased 23.3% to \$7.2B in 2009. The value of processing rebounded in 2010, reaching \$7.5B before dropping 13.7% by 2012 to \$6.5B, the lowest value seen during the twenty-three year period. By 2019, agricultural processing rebounded, showing an increase of 19.1% over 2012 with a value of \$7.7B.

Over the twenty-three year period, agricultural processing has made up around 42% of GDP from manufacturing in Arkansas. Since reaching its period low of 38.5% in 2007, agricultural processing rebounded to its highest share in 2009 with 46.7% before stabilizing at around 40% of manufacturing from 2011 to 2019 (Fig. 8). In 2019, agricultural processing accounted for more than \$2 of every \$5 of manufacturing in Arkansas. The contribution of individual agricultural processing industries to agricultural processing in 2019 is shown in Fig. 9 (USDC BEA, 2020). A discussion of each industry's percentage of GDP over time follows.

1.4.2.1: Food and Beverage and Tobacco Products Manufacturing

The Food and Beverage and Tobacco Products Manufacturing sector has consistently been the largest agricultural processing sector in Arkansas since 1997, accounting for 53.1% of agricultural processing's GDP in 2019. The value of this sector decreased 2.1% over the 1997 to 2019 period. The sector experienced rapid growth from 2001 to 2004, when it increased 45.3% from \$4.1B to \$6.0B, the period high (Fig. 10). The sector declined from 2004 to 2008, dropping 43.9% (Fig. 10; USDC BEA, 2020). The sector experienced one of its lowest values of the twenty-three year period in 2008, during 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. Although the majority of the adjustment came from a decrease in food-away-from-home spending, food-at-home spending also de-

creased as consumers have begun economizing purchases more since 2007. For the Food and 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). Following the recession period, the Food and Beverage and Tobacco Product Manufacturing sector showed a slight rebound in 2010; however this rebound was short-lived as by 2012, the sector had dropped to its period low of \$3.0B. In 2013, the sector grew by 21.9% to a value of \$3.7B. By 2019, GDP from the Food and Beverage and Tobacco Products Manufacturing sector grew an additional 10.5% to \$4.1B.

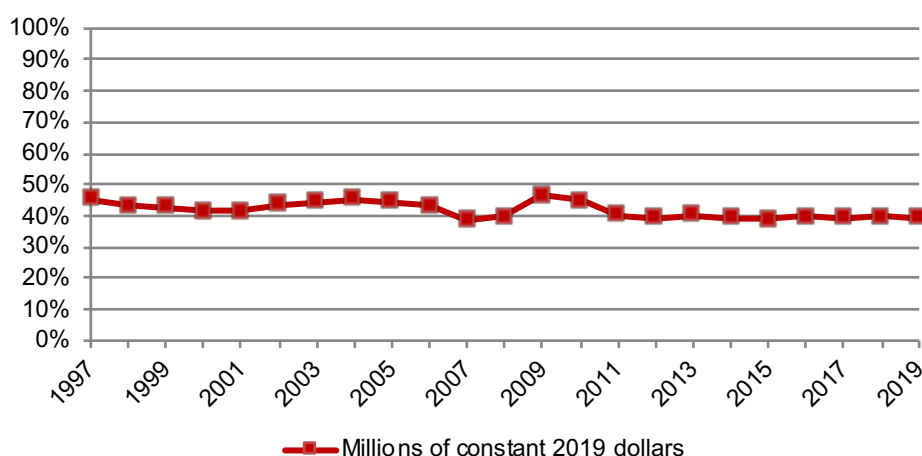


Fig. 8. Agricultural Processing's Share of Arkansas' Manufacturing Gross Domestic Product, 1997–2019.

Source: USDC BEA (2020).

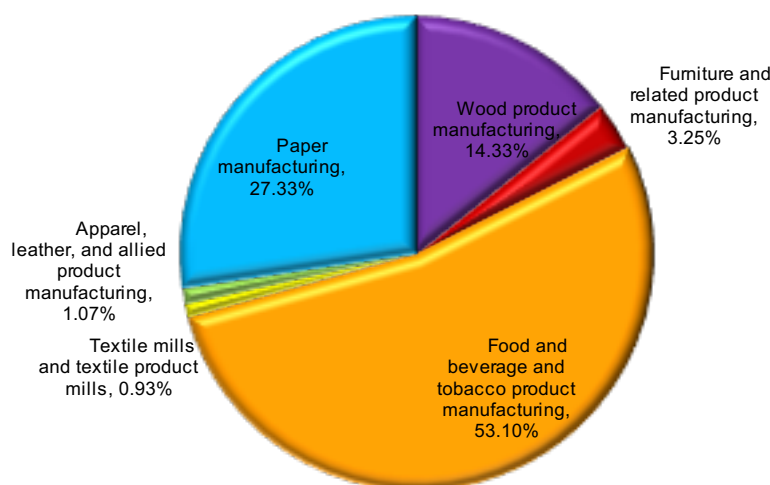


Fig. 9. Components of Arkansas' Agricultural Processing Sector Gross Domestic Product, 1997–2019.

Source: USDC BEA (2020).

Note: Calculated from constant 2019 dollars.

1.4.2.2: Paper Products Manufacturing

While the value of this sector has decreased 1.7% from 1997 to 2019 (Fig. 11), the Paper Products Manufacturing sector has remained the second-largest processing industry in Arkansas since 1997. While pulp and paper manufacturers in North America were affected by the Asian financial crisis during the mid-to-late 1990s (Simard, 1999), and continued to impact manufacturers through 2001, impact on Arkansas manufacturing was minimal. The sector's lowest GDP in the period occurred in 2003 (\$1.6B), but from 2003 to 2008, the sector experienced strong growth. By 2008, the GDP of the Paper Products Manufacturing sector had improved by 57.2% to its period high of \$2.5B (Fig. 11). From 2008 to 2013, the GDP for this sector declined 21.4% to \$2.0B but rebounded slightly in 2014, gaining 7.7% of GDP value. Following this rebound, value in the sector fluctuated around \$2.0B before reaching \$2.1B in 2019 (USDC BEA, 2020).

1.4.2.3: Wood Products Manufacturing

Arkansas' third-largest agricultural processing sector gained 25.9% in value from 1997 to 2019. After a brief increase

from 1998 to 1999, the GDP of Wood Products Manufacturing fell 22.6% 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 softwood 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 by 14.5% from 2008 levels of \$870 to \$743M in 2009. 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 (Bumgardner et al., 2011). By 2013, Wood Products Manufacturing showed signs of continued recovery and gained 53.0% from \$743M in 2009 to \$1,137M in 2013, the highest value of the twenty-three year period. This recovery may be due in part to some manufacturers closing, shifting remaining demand to a smaller number of manufacturers (Bumgardner et al., 2011). By 2016, the value of Wood Products Manufacturing was down 12.8% from 2013, but still significantly higher than the drop experienced during 2009. The sector has since

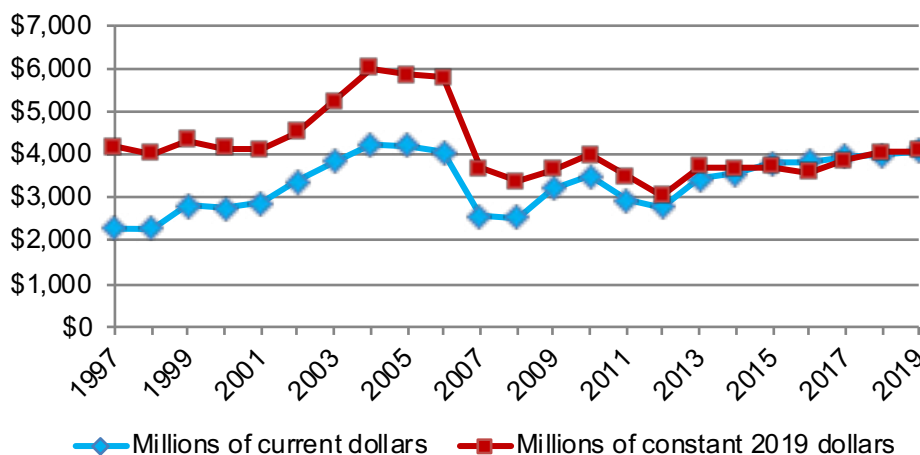


Fig. 10. The Gross Domestic Product of Arkansas Food and Beverage and Tobacco Products Manufacturing, 1997–2019.

Source: USDC BEA (2020).

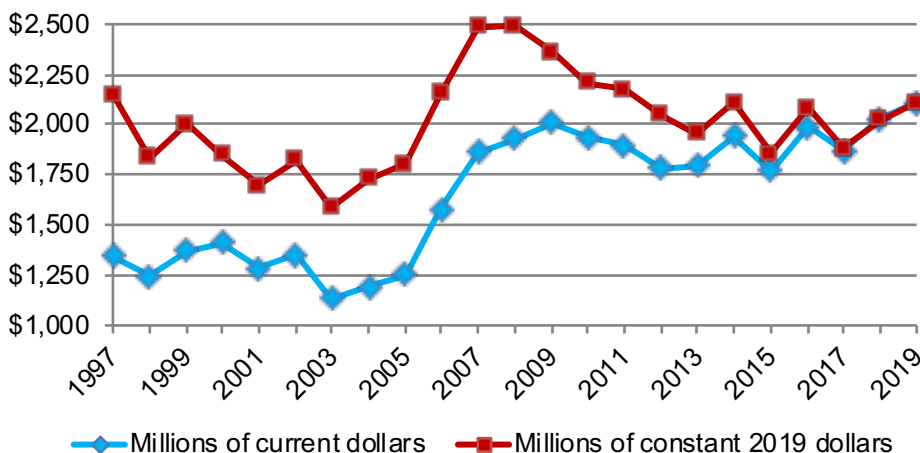


Fig. 11. The Gross Domestic Product of Arkansas Paper Manufacturing, 1997–2019.

Source: USDC BEA (2020).

recovered those losses, rising steadily from a value of \$992M in 2016 to \$1,107M by 2019, the second-highest value of the period (USDC BEA, 2020).

1.4.2.4: Furniture and Related Products Manufacturing

Over the 1997 to 2019 period, Furniture and Related Products Manufacturing lost 56.1% of its value. The sector's GDP was volatile from 1997 to 2002 and reached a period high level of \$632M 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 products were also on the rise, flooding the market with less expensive substitutes for U.S. manufactured products. Since 2002, except for limited recovery in 2006, the sector has been on a marked path of decline from \$603M in 2002 to \$172M in 2012, a 71.6% decrease (Fig. 13; USDC BEA, 2020). Much of the decline since 2006 may be attributed to recession effects, as Furniture and Related Prod-

ucts Manufacturing is closely tied to the housing construction and real estate markets. The 2007–2009 recession resulted in declining new construction and existing home sales, as families were staying in their homes longer (Bumgardner et al., 2011). In 2009, the U.S. had the fewest new housing starts on record, decreasing 73.2% from a high of 2.1 million units started in 2005 to 554,000 units in 2009. The housing market saw slight gains between 2009 and 2011. By 2012, it appeared that the market had recovered, with new housing starts rising steadily into 2019 (USCB, 2020). In Arkansas, the Furniture and Related Products Manufacturing sector saw a similar but delayed recovery, increasing 55.4% from 2012 to 2014. Following this rebound, value for the sector has remained steady at around \$250M through 2019.

1.4.2.5: Textile Mills and Textile Product Mills

The Textile Mills and Textile Product Mills sector has been in decline for three decades. In Arkansas, the sector has been the smallest component of agricultural processing during the period from 1997 to 2019 but has been somewhat

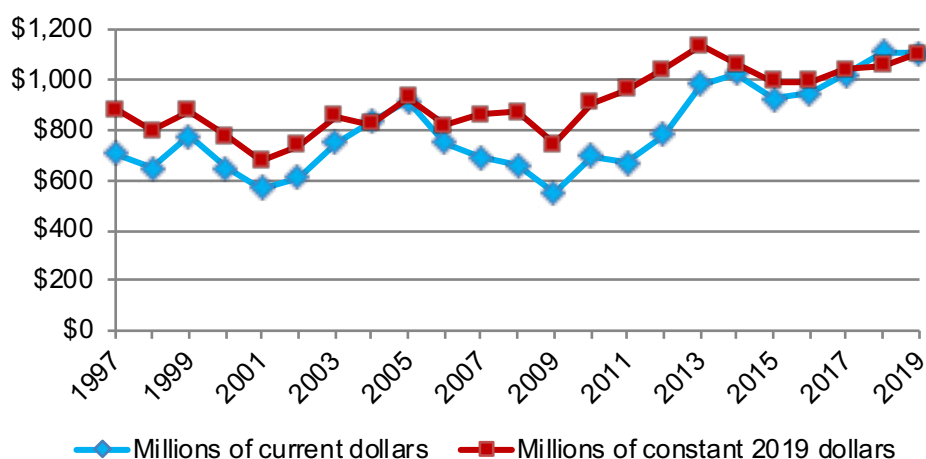


Fig. 12. The Gross Domestic Product of Arkansas Wood Products Manufacturing, 1997–2019.

Source: USDC BEA (2020).

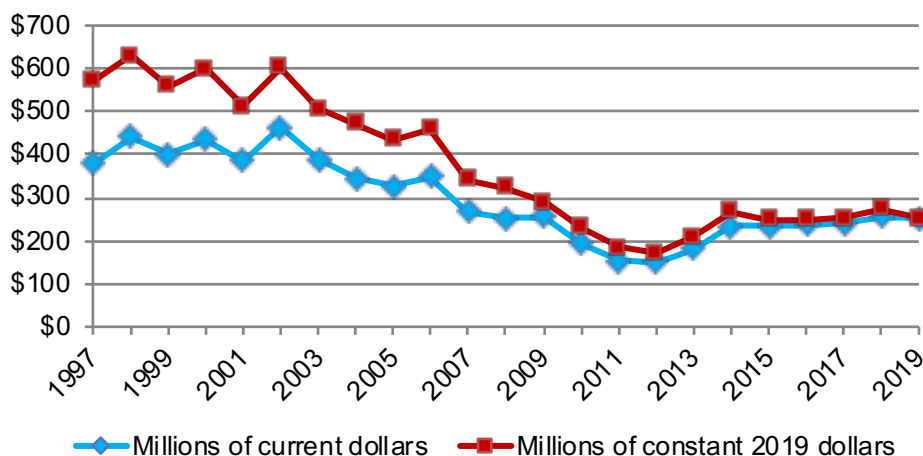


Fig. 13. The Gross Domestic Product of Arkansas Furniture and Related Products Manufacturing, 1997–2019.

Source: USDC BEA (2020).

volatile (Fig. 14). During this time, its value declined 30.9%. 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, 2020). Much of the steep decline during 2001 occurred because a major textile manufacturer closed its last plant in Arkansas in 2000. The sector recovered briefly from 2006 to 2008, but since 2008 the value of its GDP decreased 26.7% from \$87M in 2008 to the twenty-three year low of \$64M in 2015. The GDP values for this sector increased 33.3%, from \$64M in 2015 to \$85 in 2017, but have since declined to \$72M in 2019 (USDC BEA, 2020).

1.4.2.6: Apparel and Leather and Allied Products Manufacturing

As seen in Fig. 15, the GDP for Apparel and Leather and Allied Products Manufacturing has experienced alternating periods of growth and decline but has shown a general declining trend in GDP from 1997 to 2019. During this period, the sector has declined from a high of \$282M in 1997 to a period low of \$74M in 2014, representing a 73.9% drop over the seventeen-year period (USDC BEA, 2020). 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. Following the low seen in 2014, the sector saw a slight rebound in 2015 to \$83M with value remaining steady into 2019.

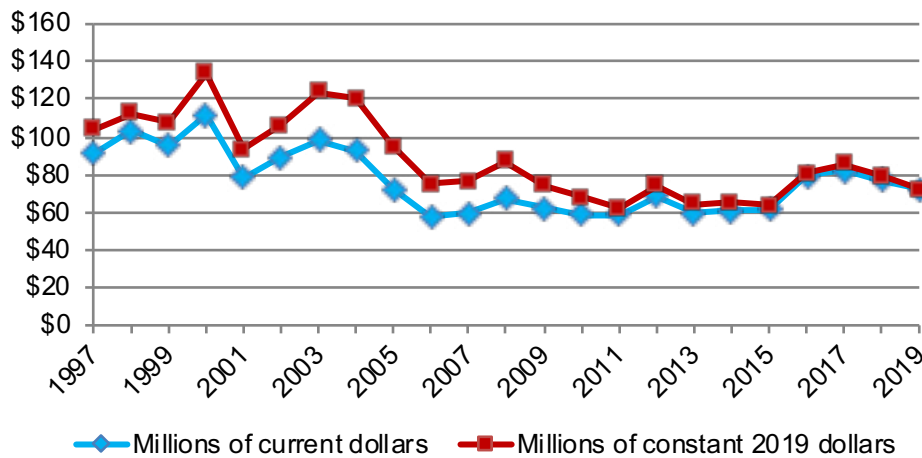


Fig. 14. The Gross Domestic Product of Arkansas Textile Mills and Textile Product Mills, 1997–2019.

Source: USDC BEA (2020).

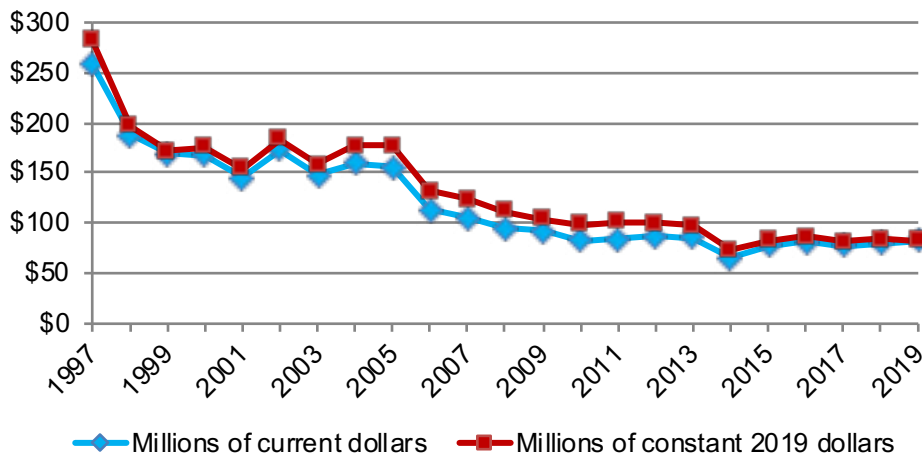


Fig. 15. The Gross Domestic Product of Arkansas' Apparel and Leather and Allied Products Manufacturing, 1997–2019.

Source: USDC BEA (2020).

1.4.2.7: Agricultural Processing Summary

Food and Beverage and Tobacco Product Manufacturing has consistently contributed the largest share of agricultural processing (Fig. 16), but has shown substantial volatility over the period, including a substantial decline in value from 2004 to 2008. By 2013, value in the sector stabilized with modest gains being recognized since 2016. The second-largest component, Paper Products Manufacturing, has shown signs of volatility, but its pattern is almost perfectly anti-cyclical to Food and Beverage and Tobacco 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 a steady decline.

1.4.3: Agricultural Retail

1.4.3.1: Food Services and Drinking Places

Gross domestic product in agricultural retail increased 60.2% from 1997 to 2019 (Fig. 17). From 1997 to 2006, agricultural retail increased each year for a total of 41.3%. Food service operations, including restaurants, have steadily increased their share of total food expenditures over time, contributing to the steady increases in the sector. 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 con-



Fig. 16. The Gross Domestic Products of Arkansas' Agricultural Processing Sectors, 1997–2019.

Source: USDC BEA (2020).

Note: Presented in millions of constant 2019 dollars.

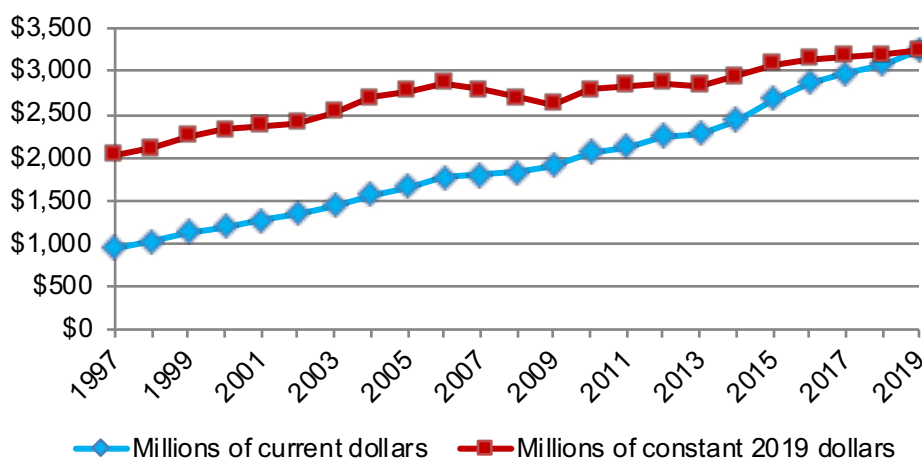


Fig. 17. The Gross Domestic Product of Arkansas Food Services and Drinking Places, 1997–2019.

Source: USDC BEA (2020).

sistently increasing. In 1953, 31.6% of food expenditures were spent on food away from home, and by 2019 had risen to 51.3% of food expenditures, further evidence of the market forces behind the increases in agricultural retail GDP (calculated from constant 1988 dollars; USDA ERS, 2020b). From 2006 to 2009, the sector lost 8.7% 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 sector suggests 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 showed signs of recovery as it increased 24.3% to \$3.2B in 2019 compared to \$2.6B in 2009.

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 contiguous states, the south-east region, and the nation as a whole. World and domestic price stability and associated agricultural and food policies will con-

tinue to have a significant impact on Arkansas agriculture and its contribution to the Arkansas economy. The 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 re-allocations within sectors and had no impact on overall totals.

² For this report, agricultural production includes NAICS industries falling under the classification of Agriculture, Forestry, and Fishing and Hunting (11). Agricultural processing includes these sectors falling under the Manufacturing (31-32) classification: Food Manufacturing (311); Textile Mills and Textile Product Mills (313); Apparel, Leather, and Allied Products Manufacturing (315-316); Wood Product Manufacturing (321); Paper Manufacturing (322); Furniture and Related Products Manufacturing (337); and agricultural retail is captured under the Accommodation and Food Services (72) classification with the Food Services and Drinking Places (7220) sector (USDC BEA, 2007).

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