11-2022

Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2021

Leah English

Jennie Popp

Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2021

Leah English and Jennie Popp

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

ARKANSAS AGRICULTURAL EXPERIMENT STATION
November 2022 **Research Report 1008**

This publication is available on the internet at: https://aaes.uada.edu/communications/publications/

Layout and editing by Gail Halleck.

Arkansas Agricultural Experiment Station (AAES), University of Arkansas System Division of Agriculture, Fayetteville.
Deacue Fields, Vice President for Agriculture; Jean-François Meullenet, AAES Director and Senior Associate Vice-President for Agriculture–Research. WWW/CC2022.

ISSN: 1539-5944 CODEN: AKABA7

Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997–2021

Leah English*
Jennie Popp

Arkansas Agricultural Experiment Station
University of Arkansas System
Division of Agriculture
Fayetteville, Arkansas 72704

* Leah English is a Program Associate for the Center for Agricultural and Rural Sustainability with the University of Arkansas System Division of Agriculture; Jennie Popp is a Professor in the Department of Agricultural Economics and Agribusiness in Fayetteville.

CONTENTS

TABLES

FIGURES

ACKNOWLEDGMENTS

We, the authors, would like to thank the University of Arkansas System Division of Agriculture for funding this initiative. We would like to thank our reviewers for their insightful input and suggestions. Finally, we sincerely appreciate Gail Halleck's publishing skills and attention to detail.

Definitions and Styles

Gross Domestic Product by State

Gross Domestic Product by State is the state equivalent of the national measure of Gross Domestic Product (GDP), the most comprehensive measure of U.S. economic activity. Gross Domestic Product by State 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, 2017a).

Style Notes

In this report, Arkansas agriculture is presented in a historical context. These data are available for 1997 through 2021. 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 2017 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 (2021 data) from the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) for agricultural production, processing, and retail are presented 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 Product Manufacturing; 3) Furniture and Related Product Manufacturing; 4) Food and Beverage and Tobacco Product Manufacturing; 5) Textile Mills and Textile Product Mills; 6) Apparel, Leather, and Allied Product Manufacturing; 7) Paper 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; English, Popp, and Miller, 2020; English, Popp, and Miller 2021) and utilizes data for 1997–2021. All dollar values are expressed in 2021 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, 2022a).

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 34th nationwide for total state GDP value in 2021, 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, 2022). In 2021, this trend continued with, the Agriculture and Food Sector accounting for almost 11% of Arkansas' GDP (Table 1). Agricultural production and processing sectors contributed 2.3% and 5.9%, respectively, to Arkansas' GDP in 2021. 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 2.6%, Arkansas' share of agricultural retail fell in the middle of neighboring states, whose values ranged from 2.2% to 3.1% of total GDP. This was on par with that of the Southeast region (2.7%) and slightly higher than the national average, which was 2.5% (Fig. 1).

Table 1. The Agriculture and Food Sector as a Percentage of Gross Domestic Product by State, 2021.

State/Region	Percent of GDP by State
Arkansas	10.81%
Louisiana	5.61%
Mississippi	9.49%
Missouri	6.79%
Oklahoma	6.19%
Tennessee	8.10%
Texas	4.16%
Southeast[a]	6.75%
U.S.	5.30%

Source: USDC BEA (2022).

[a] The Bureau of Economic Analysis (BEA) includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia in the Southeast region.

These comparisons can be stated in 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
- 2.6 times greater than in Louisiana
- 2.5 times greater than in Oklahoma
- 1.9 times greater than in Missouri
- 1.6 times greater than in Tennessee
- 1.2 times greater than in Mississippi
- 2.0 times greater than for the Southeast region
- 2.7 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:

- 2.6 times greater than in Texas
- 1.9 times greater than in Louisiana
- 1.7 times greater than in Oklahoma
- 1.6 times greater than in Missouri
- 1.3 times greater than in Tennessee
- 1.1 times greater than in Mississippi
- 1.6 times greater than for the Southeast region
- 2.0 times greater than for the U.S. as a whole.

Between 2020 and 2021, Arkansas' total state GDP increased by 5.2%, while GDP stemming from the Agriculture

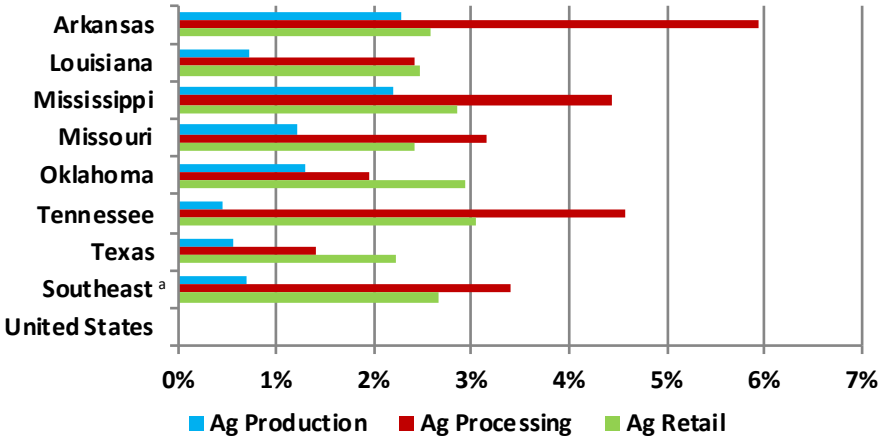


Fig. 1. Production, Processing, and Retail as a Percentage of Arkansas Gross Domestic Product, 2021.

Source: USDC BEA (2022).

Note: Calculated from current dollars.

[a] The Bureau of Economic Analysis (BEA) includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia in the Southeast region.

and Food Sector grew by 11.2%. This rise was the result of growth across agricultural production, processing, and retail sectors, which grew in value by 29.3%, 3.9%, and 15.0%, respectively. Most notable was growth shown for the agricultural production sector as value in this sector declined for Louisiana, Oklahoma, Missouri, and the U.S. as a whole. Agricultural production value grew for Tennessee, Mississippi, Texas, and the Southeast region. However, this growth was not as great as that shown for Arkansas.

Overall, 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 2021, Arkansas' Agriculture and Food Sector share of GDP grew by 5.7% from 10.2% in 2020 to 10.8% in 2021. While all areas saw gains in their Agriculture and Food Sector share of state GDP, the rise for Arkansas was greater than all areas except for Texas, whose share rose by 7.5%.

1.4: Agriculture and Food and the Arkansas Economy

In 2021, GDP in Arkansas' Agriculture and Food Sector increased by 11.2%, from $14.5B in 2020 to $16.1B (constant 2021 dollars are used throughout this section unless otherwise noted) (USDC BEA, 2022). While the period was marked by volatility, from 1997 to 2021, the GDP value for Arkansas' Agriculture and Food Sector rose by 11.0%. From 1997 to 2004, value in the sector increased 23.7% to its peak of $17.9B and remained almost constant until 2007, when recession effects took hold. From 2006 to 2012, the value of the Agriculture and Food Sector declined 26.3%, 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 $15.2B in 2018, before returning to levels seen prior to the rise (Fig. 2).

When viewing the value of GDP stemming from the Agriculture and Food Sector in relation to the state as a whole, the sector generally represents greater than 10.0% of Arkansas' total state GDP (Fig. 3). In 1997, the Agriculture and Food Sector's contribution to GDP was approaching 15%. Following 1997, the sector's share fell slightly, remaining between 12% and 14% of state GDP before rebounding to a high of 14.6 in 2004. During the recession period from 2006 to 2009, Arkansas' total state GDP fell by only 5.0%, with value in the Agriculture and Food Sector declining by more than 20.0%. This caused agriculture's share of GDP to fall below 12.0%. From 2009 to 2012, 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 for the period since the recession. This factor points toward greater long-term recession effects for agriculture than the economy as a whole. While slight gains were recognized after 2012, the sector has yet to see its share of state GDP return to levels achieved prior to the recession.

This could be explained by diversity in Arkansas' total GDP components, which help to provide partial insulation from the effects of recession, trade policy, and other unforeseen events. While the Agriculture and Food Sector is a major contributor to the state economy, it is consistently out-ranked by three other sectors (Fig. 4). In 2021, Non-Agricultural Service and Retail contributed the most to Arkansas' GDP, representing almost a quarter of the state total. Finance, Insurance, and Real Estate held the second largest value, representing more than 15% of total state GDP. This was followed by the Government and Government Enterprises sector, which contributed more than 12% to the state

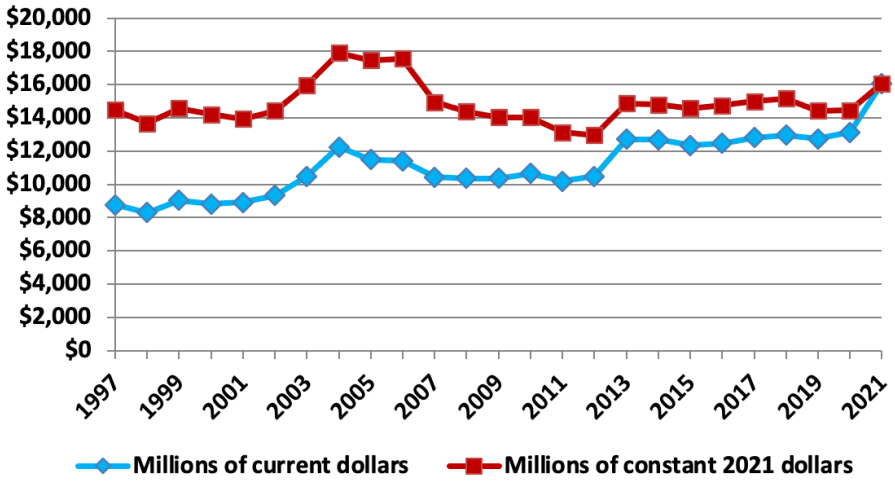


Fig. 2. Arkansas' Agriculture and Food Sector Gross Domestic Product, 1997–2021.

Source: USDC BEA (2022).

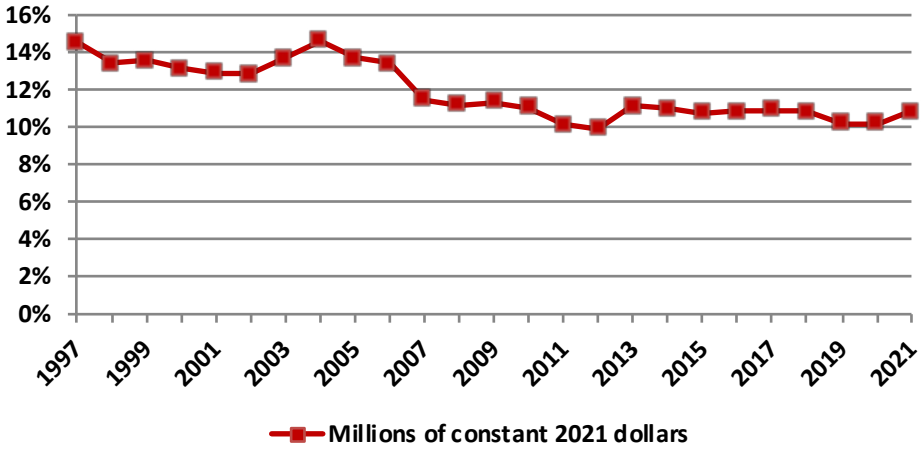
total. The Agriculture and Food Sector rounded out the top four contributing 10.8% to Arkansas' GDP in 2021.

The three major components of the Agriculture and Food Sector—agricultural production, agricultural processing, and agricultural retail—each showed an increase in value from 2020 to 2021. During this period, the value of agricultural production rose by 29.3% to $3.4B. Agricultural processing value grew by 4.0% to $8.8B, with agricultural retail value rising 15.2% to $3.9B (Fig. 5). Each of these components will be further discussed in the sections to follow.

1.4.1: Agricultural Production

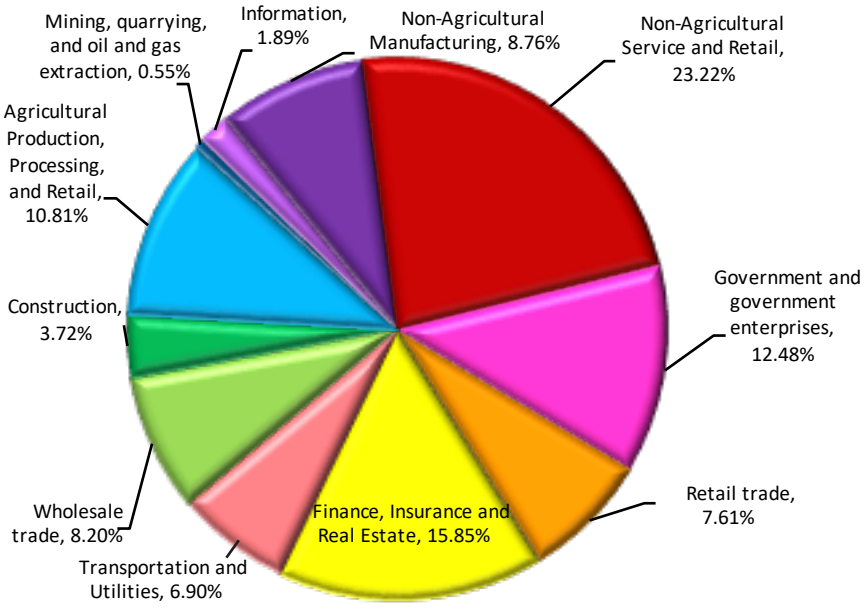
Crop and animal production, forestry, aquaculture, and horticulture are the primary agricultural production industries found in Arkansas. In 2021, Arkansas was nationally ranked first in the value of rice, second in chicken eggs, third in broilers, cotton, and cottonseed, fourth in catfish, and fifth in turkeys (USDA NASS, 2022b). Additionally, Arkansas was ranked 17th in the U.S. for the value of crop production and 10th for the value of livestock products (USDA ERS, 2022).

Overall, the GDP of agricultural production fell 0.4% between 1997 and 2021. During the twenty-five-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 $3.1B in 1998. Following this period of stagnation, the GDP value of agricultural production began to increase in 2003, reaching a period high of $4.8B 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 52.0% of its 2004 value and declined to $2.3B. In 2012, the sector began to show signs of



Source: USDC BEA (2022).

Fig. 3. The Agriculture and Food Sector's Share of Arkansas' Gross Domestic Product, 1997–2021.



Source: USDC BEA (2022).
Note: Calculated from constant 2021 dollars.

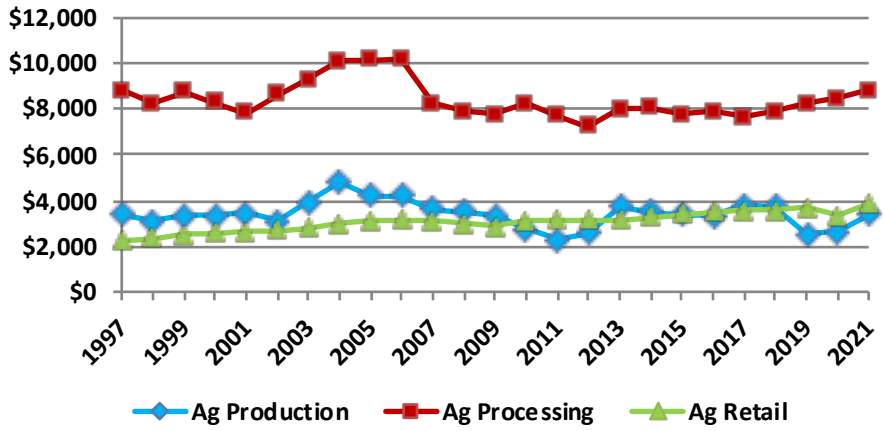
Fig. 4. Sector Components of Arkansas' Gross Domestic Product, 2021.

recovery. By 2013, the value in the sector had increased 61.3% over the 2011 low. The value remained fairly steady from 2013 to 2017 before falling from a value of $3.8B in 2017 to $2.5B in 2019, a 33.7% drop (USDC BEA, 2022). This drop in agricultural production value was the result of lower values being reported for the soybean, rice, and poultry and egg industries. Since 2019, the sector has rebounded, with the value of GDP rising 34% from $2.5B in 2019 to $3.4B in 2021.

1.4.1.1: Crops Production

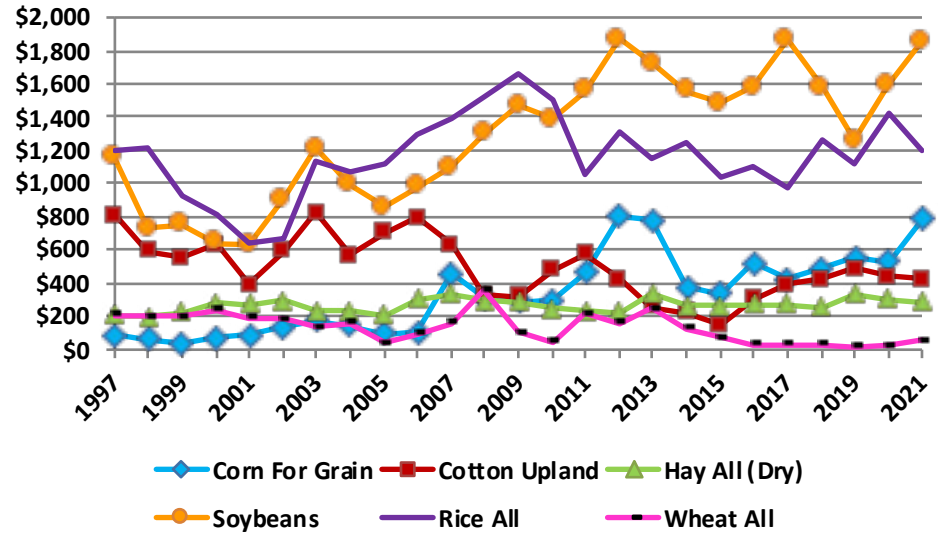
A time-series graph of major crops in Arkansas shows trends in the value of production from 1997–2021 in terms of constant 2011 dollars (Fig. 6). Despite volatility experienced throughout the twenty-five-year period, the value of field crop production increased overall by 24.1% from 1997 to 2021. Over 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. With the exception of 2008, when the production, yield, and price of wheat were unusually high, upland cotton took third place in the value of field production from 1997–2011, representing an average of around 15% of field and miscellaneous crops (USDA NASS, 2022b). However, in 2012, corn for grain experienced a 73.3% increase in value, replacing cotton as the third most valued crop in the state.

In 2001, the 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 46.2%, 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



Source: USDC BEA (2022).
Note: Presented in millions of constant 2021 dollars.

Fig. 5. Gross Domestic Product for Arkansas' Agricultural Production, Processing, and Retail, 1997–2021.



Source: USDA NASS (2022b, 2022a).
Note: Presented in millions of constant 2011 dollars.
For selected crops: rice, soybeans, cotton, hay, wheat, and corn.

Fig. 6. Arkansas' Crops Value of Production, 1997–2021.

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, when it increased 4.6% over 2010 values before reaching a period high of $5.0B in 2012. In 2015, the total field crop value of production dropped by 27.6% below 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 increased by 15.2% to $4.2B before falling by 6.8% to $3.9B in 2019. Much of this drop was attributable to soybeans and rice, which showed losses of 20.0% and 11.8%, respectively (USDA NASS, 2022b). 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, 2019). From 2019 to 2020, the value of field crop production rose by 13.7%, with much of this growth stemming from the soybean and rice sectors. Although the state experienced record rainfall and flooding in June of 2021, the value of crop production rose by another 6.7% in 2021. This growth was driven by favorable planting and harvest windows coupled with good grain prices. Near 10-year high wheat prices resulted in the value of wheat production rising by 121.7% (Lovett, 2021). While soybean growers faced several hardships in 2021, high market prices kept the sector afloat, resulting in a 16.3% increase in soybean value over 2020 (USDA NASS, 2022b; McGeeney, 2021).

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 increased from $5.1B in 1997 to $5.4B in 2021, representing a 6.6% increase (USDA ERS, 2022a). Arkansas' animal production experienced much volatility over the twenty-five-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 slightly 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 by almost 30.0% to $3.8B by 2020. In 2021, the sector rebounded, with value rising 27.3% to $4.9B.

The cattle and calves sector experienced similar growth and decline patterns. The sector peaked at $921M in 2005 before dropping 41.8% to $536M by 2009. In 2010, the sector peaked again at $706M before steadily declining 28.1% 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 36.8% from 2014 to the period low of $453M in 2020. In 2021, value rose by 10.0% to $498M.

Although there were some periods of slight growth, the hogs and pigs, and dairy products sectors showed a steady decline throughout the twenty-five-year period. After peaking at $233M in 2001, the hogs and pigs sector declined 65.2% to $81M by 2012 before increasing 28.1% in 2013. The rebound was short-lived as the hog and pig sector value began falling in 2014, continuing this downward trend until 2018, when the value

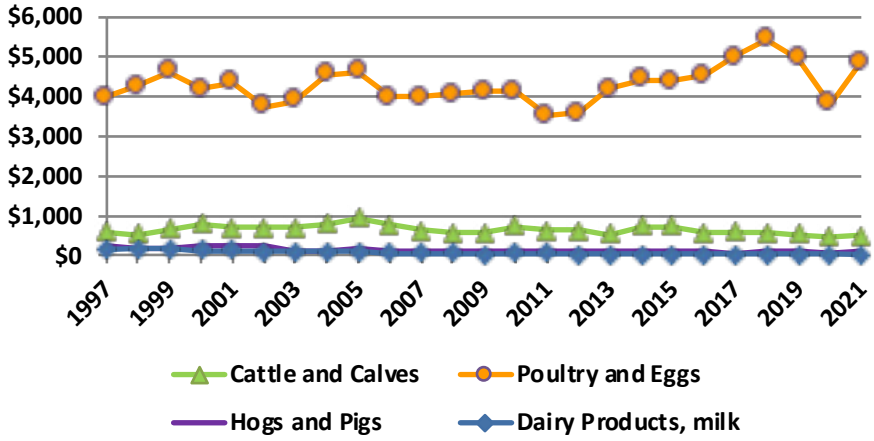


Fig. 7. Arkansas' Livestock and Livestock Products Value of Cash Receipts, 1997–2021.

Source: USDA ERS (2022); USDA NASS (2022a).
Note: Presented in millions of constant 2011 dollars.
For selected products: cattle and calves, poultry and eggs, hogs and pigs, and dairy products.

rose by 8.0% from 2017 to $66M. Value in the sector continued to rise in 2018 and 2019 to $68M before falling 34.4% to a period low of $45M in 2020. In 2021, value in the sector rose by 56.6% to $70M, the highest value seen since 2016.

From a value of $137M in 1997 to a low of $10M in 2021, the dairy products sector declined 92.5% between 1997 and 2021 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. 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 lowering prices more recently to adjust for the surplus (Trostle et al., 2011). With an increase of 12.3% over 2012 values, animal production rebounded in 2013. The rebound continued into 2014, with value across the sector reaching $6.0B by 2018 before dropping 9.0% in 2019 and a further 16.0% in 2020 to a value of $4.3B, the lowest value recorded across the twenty-five-year study period. This drop is likely attributable to numerous issues that resulted in limited processing capacity during the onset of the COVID-19 pandemic (English et al., 2022). In contrast to decreased demand recognized during the recession, demand for meat remained high throughout the pandemic resulting in a swift rebound in 2021 as processing capabilities recovered.

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 2021 (57.1% of total land base) (USDA FS, 2022). There were 22.7M tons of timber (soft- and hardwood) removed from forests in Arkansas in 2021, valued at $408.8M (AFRC, 2022). 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 before picking up in June. By December 2021, housing starts were at the highest levels seen since January 2006. Following this trend, hardwood lumber production across the South fell to exceptionally low levels in the early months of 2020, with growth being shown later in the year, reflecting high demand from the U.S. housing market (Tegels, 2021; USCB, 2022).

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 2021, the GDP value of Forestry, Fishing, and Related Activities rose by 17.8% from a period low of $489M to $576M (presented in 2021 dollars). From 1997 to 2006, the sector grew by 52.0%, reaching a period high of $744M. Following this high, value in the sector saw some fluctuation until 2018, when value began to decline. Since 2018, value has fallen 9.3% from $635M to $576M in 2021.

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 had 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). In 2020, there was a slight uptick in the number of hunting and fishing licenses sold across the country as the onset of COVID-19 disrupted meat processing activity (Drillinger, 2021). According to data reported by the U.S. Fish and Wildlife Service, the number of paid hunting license holders in Arkansas fell slightly by 0.4% from 343,300 in 2020 to 341,842 in 2021, with the gross cost of hunting licenses falling 2.2% from $19.1M to $18.7M.

1.4.2: Agricultural Processing

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 2021. Over the twenty-five-year period, the value of agricultural processing has declined by 0.1%. From 2001 to 2006, agricultural processing was on an upward trend, peaking at $10.2B in 2006. Since 2006, agricultural processing decreased 23.6% to $7.8B in 2009. The value of processing rebounded in 2010, reaching $8.2B before dropping 12.3% by 2012 to $7.2B, the lowest value seen during the twenty-five-year period. By 2021, agricultural processing rebounded, showing an increase of 22.1% over 2012 with a value of $8.8B.

Over the twenty-five-year period, agricultural processing has made up around 42% of GDP from manufacturing in Arkansas. Since reaching a low of 38.6% in 2007, agricultural processing rebounded to its highest share in 2009 with 46.6% before stabilizing at around 40% of manufacturing from 2011 to 2021 (Fig. 8). In 2021, agricultural processing accounted for roughly $2 of every $5 of manufacturing in Arkansas. The

contribution of individual agricultural processing industries to agricultural processing in 2021 is shown in Fig. 9 (USDC BEA, 2022). A discussion of each industry's percentage of GDP over time follows.

1.4.2.1: Food and Beverage and Tobacco Product Manufacturing

The Food and Beverage and Tobacco Product Manufacturing sector has consistently been the largest agricultural processing sector in Arkansas since 1997, accounting for 55.9% of agricultural processing's GDP in 2021. The value of this sector increased 14.3% over the 1997 to 2021 period. The sector experienced rapid growth from 2001 to 2004, when it increased 45.4% from $4.4B to $6.4B, the period high (Fig. 10). The sector declined from 2004 to 2008, dropping 43.8% (Fig. 10; USDC BEA, 2022). The sector experienced one of its lowest values of the twenty-five-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 decreased as consumers have begun economizing purchases more since 2007. For the Food and Beverage and Tobacco 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 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

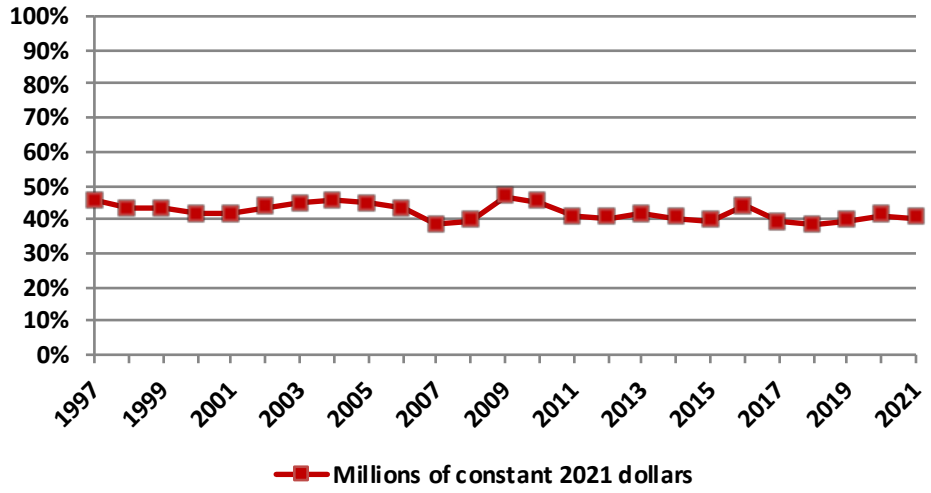


Fig. 8. Agricultural Processing's Share of Arkansas' Manufacturing Gross Domestic Product, 1997–2021.

Source: USDC BEA (2022).

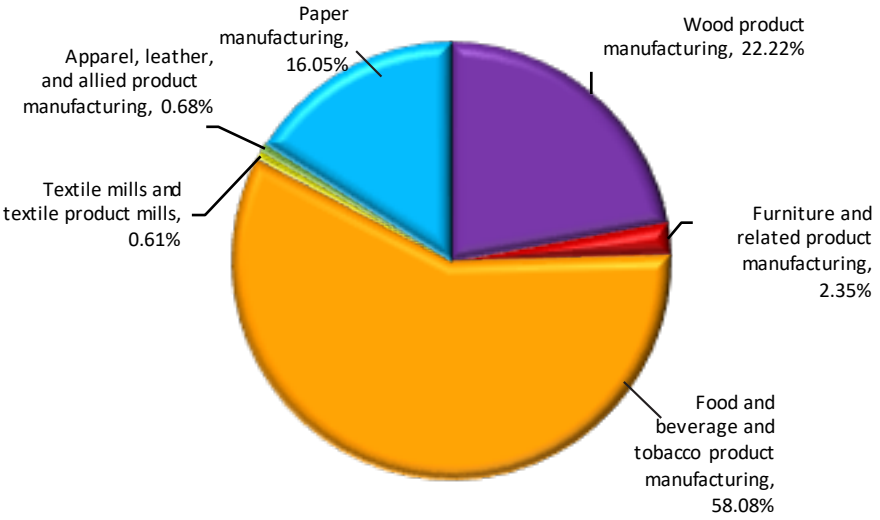


Fig. 9. Components of Arkansas' Agricultural Processing Sector Gross Domestic Product, 2021.

Source: USDC BEA (2022).
Note: Calculated from constant 2021 dollars.

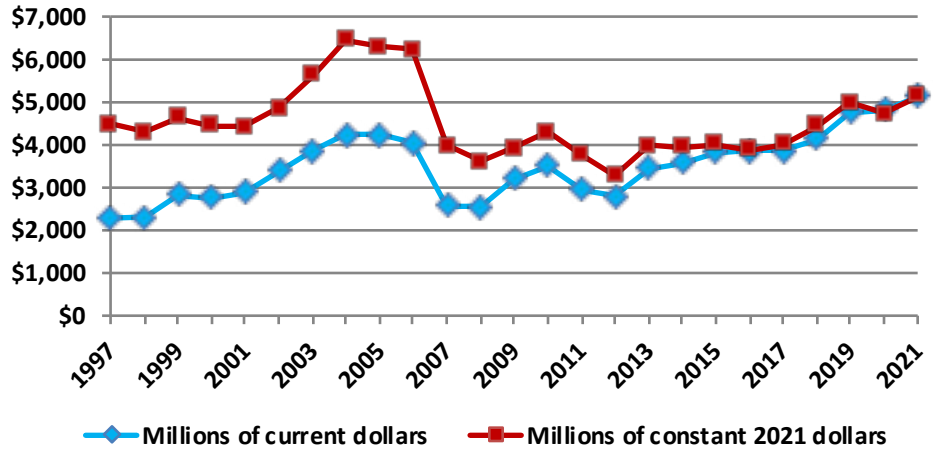
Product Manufacturing sector showed a slight rebound in 2010; however, this rebound was short-lived as by 2012, the sector had dropped to its period low of $3.3B. In 2013, the sector grew by 21.8% to a value of $4.0B. By 2021, GDP from the Food and Beverage and Tobacco Product Manufacturing sector grew an additional 28.3% to $5.1B.

1.4.2.2: Paper Manufacturing

While the value of this sector has decreased 31.0% from 1997 to 2021 (Fig. 11), the Paper 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, the impact on Arkansas manufacturing was minimal. From 1997 to 2003, value in the sector declined by 26.0%. However, from 2003 to 2008, the sector experienced strong growth. By 2008, the GDP of the Paper Manufacturing sector had improved by 57.3% to its period high of $2.4B (Fig. 11). From 2008 to 2013, the GDP for this sector declined 21.3% to $1.9B. Since 2013, value in the sector has fluctuated, showing an overall downward trend. A period low of $1.4B was experienced in 2018, with value rising slightly (4.5%) by 2021 (USDC BEA, 2022).

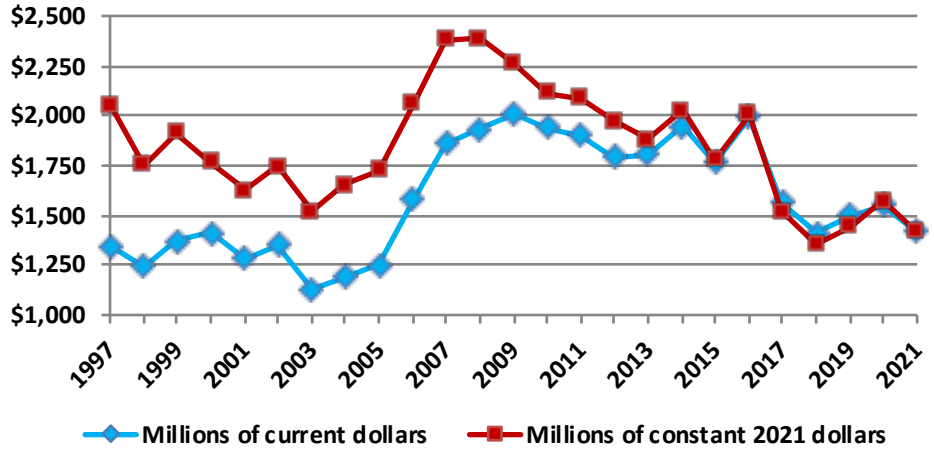
1.4.2.3: Wood Product Manufacturing

Arkansas' third-largest agricultural processing sector gained 42.2% in value from 1997 to 2021. After a brief increase from 1998 to 1999, the GDP of Wood Product Manufacturing fell 22.4% from 1999 to 2001 (Fig. 12). As explained in detail in Popp, Vickery, and Miller (2005), most of this decline was attributed to a slow-down in the international market for U.S. wood chips and a drop in 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 14.6% from a value of $1.4B in 2008 to $1.2B 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 Product Manufacturing showed signs of continued recovery and gained 53.5% from $1.2B in 2009 to



Source: USDC BEA (2022).

Fig. 10. The Gross Domestic Product of Arkansas' Food and Beverage and Tobacco Product Manufacturing, 1997–2021.



Source: USDC BEA (2022).

Fig. 11. The Gross Domestic Product of Arkansas' Paper Manufacturing, 1997–2021.

$1.8B in 2013, the highest value of the twenty-five-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 Product Manufacturing was down 11.8% from 2013 but rebounded in 2017 and continued to rise in 2018 to the second-highest value of the period ($1.7B). Value in the sector has since increased to $2.0B in 2021, largely due to rising levels of new home construction coupled with record- high prices for lumber products (USDC BEA, 2022; Pelkki and Tian, 2022).

1.4.2.4: Furniture and Related Product Manufacturing

Over the 1997 to 2021 period, Furniture and Related Product Manufacturing lost 62.8% of its value. The sector's GDP was volatile from 1997 to 2002 and reached a period-high level of $615M 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 $589M in 2002 to $168M in 2012, a 71.5% decrease (Fig. 13; USDC BEA, 2022). Much of the decline since 2006 may be attributed to recession effects, as Furniture and Related Product 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). 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. Although the pandemic caused a drastic decrease in housing starts during the early part of 2020, by the end of the year, the market showed a strong rebound, which has continued through 2022 (USCB, 2022). In Arkansas, the Furniture and Related Product Manufacturing sector saw a similar but delayed recovery, increasing 74.1% from 2012 to 2017. Following this rebound, value for the sector started to drop, falling to a period low of 197M in 2020 before increasing 5.3% in 2021to 207M.

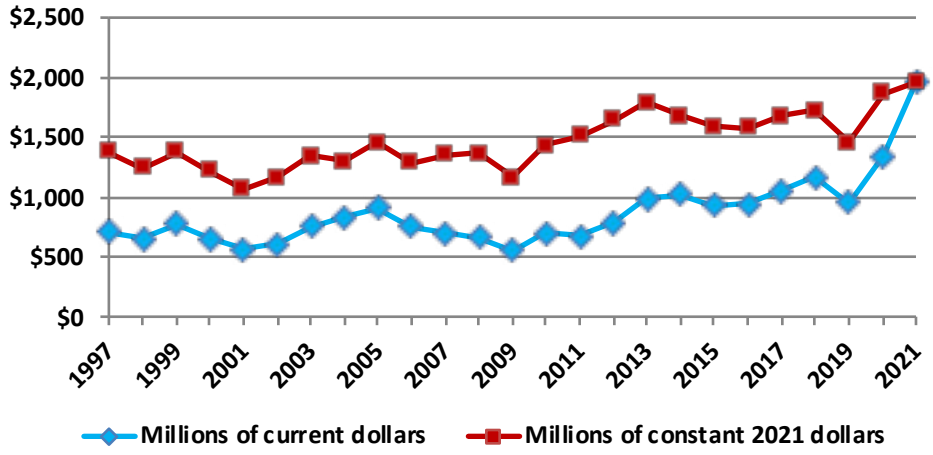


Fig. 12. The Gross Domestic Product of Arkansas' Wood Product Manufacturing, 1997–2021.

Source: USDC BEA (2022).

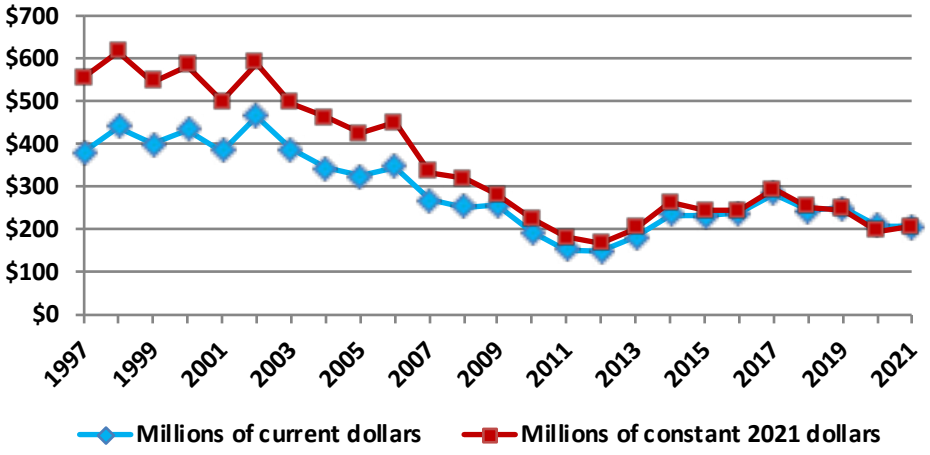


Fig. 13. The Gross Domestic Product of Arkansas' Furniture and Related Product Manufacturing, 1997–2021.

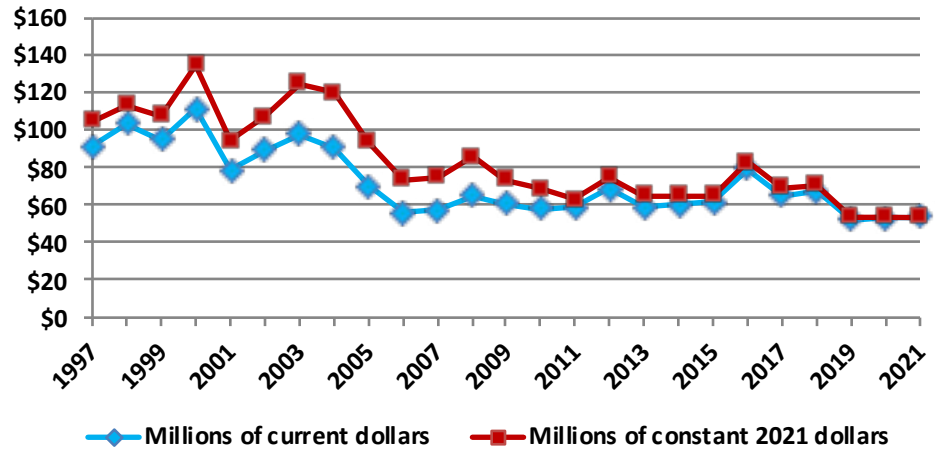
Source: USDC BEA (2022).

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 2021 but has been somewhat volatile (Fig. 14). During this time, its value declined 48.5%. 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, 2021). 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 2002 to 2004 but has since decreased by 55.5% to the period low of $54M for both 2020 and 2021 (USDC BEA, 2022).

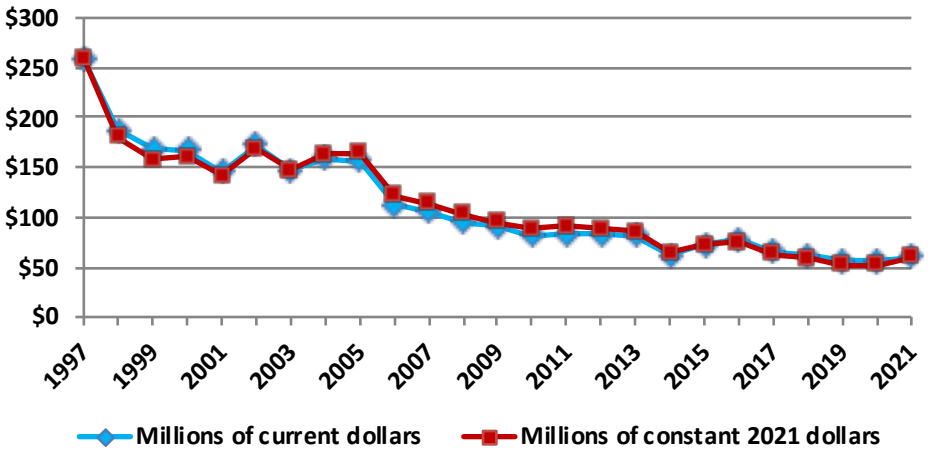
1.4.2.6: Apparel, Leather, and Allied Product Manufacturing

As seen in Fig. 15, the GDP for Apparel, Leather, and Allied Product Manufacturing has experienced alternating periods of growth and decline but has shown a general declining trend in GDP from 1997 to 2021. During this period, the sector has declined from a high of $259M in 1997 to a period low of $52M in 2019, representing an 80.1% drop over that period (USDC BEA, 2022). 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 2019, the sector saw a slight rebound to $60M in 2021. This rise may be partially attributed to a recent rise in demand for locally produced apparel, coupled with an urgency for expanding local production of items such as sewn facemasks and other apparel items spurred on by the pandemic (Jordan, 2021).



Source: USDC BEA (2022).

Fig. 14. The Gross Domestic Product of Arkansas' Textile Mills and Textile Product Mills, 1997–2021.



Source: USDC BEA (2022).

Fig. 15. The Gross Domestic Product of Arkansas' Apparel, Leather, and Allied Product Manufacturing, 1997–2021.

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 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 72.2% from 1997 to 2021 (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 consistently

Fig. 16. The Gross Domestic Product of Arkansas' Agricultural Processing Sectors, 1997–2021.

Source: USDC BEA (2022).
Note: Presented in millions of constant 2021 dollars.

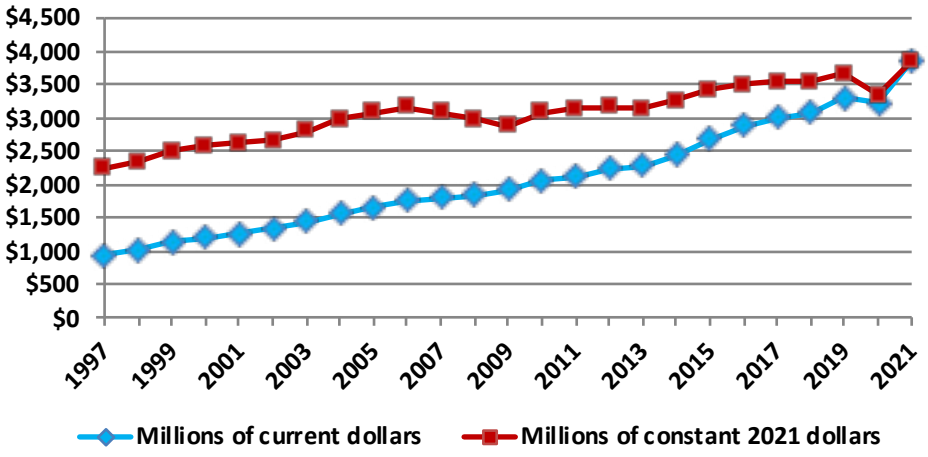


Fig. 17. The Gross Domestic Product of Arkansas' Food Services and Drinking Places, 1997–2021.

Source: USDC BEA (2022).

increasing. From 2006 to 2009, the sector lost 8.8% 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 (a then average income of $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 27.2% to $3.7B between 2009 and 2019. In 2020, the pandemic had a disproportionate impact on the Food Services and Drinking Places sector as restaurants were forced to either close or operate at a limited capacity during much of the year. As a result, the value of GDP from this sector fell by 8.8% from 2019. However, as lockdown restrictions were lifted, the sector saw a substantial rebound, rising 15.1% to a period high of $3.9B in 2021.

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 southeast region, and the nation as a whole. 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. 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 reallocations 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); Beverage and Tobacco Product Manufacturing (312); Textile Mills (313); Textile Product Mills (314); Apparel Manufacturing (315); Leather and Allied Product Manufacturing (316); Wood Product Manufacturing (321); Paper Manufacturing (322); Furniture and Related Product Manufacturing (337); and agricultural retail is captured under the Accommodation and Food Services (72) classification with the Food Services and Drinking Places (722) sector (USDC BEA, 2017b).

Literature Cited

AFRC (Arkansas Forest Resources Center). 2022. Production and value data for 2016-2022. Data available by request only. https://www.uamont.edu/academics/CFANR/afrc.html

Bumgardner, M., U. Buehlmann, A. Schuler, and K. Koenig. 2011. Housing Trends and Impact On Wood Products Manufacturing. *Wood and Wood Products* 117(5):17-18, 20, 22, 24. Accessed 10 October 2022. https://www.srs.fs.usda.gov/pubs/41026

Drillinger, M. 2021. States with the most registered hunters. Stacker.com. Accessed 4 October 2022. https://stacker.com/stories/4268/states-most-registered-hunters

English, L., J. Popp, and W. Miller. 2014. Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2012. Research Report 995. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/4/

English, L., J. Popp, and W. Miller, 2015. Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2013. Research Report 996. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/3/

English, L., J. Popp, and W. Miller, 2016. Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2014. Research Report 997. University of Arkansas System Division of Agriculture Arkansas Agri-

cultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/2/

English, L., J. Popp and W. Miller. 2020. Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2019. Research Report 1001. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/47/

English, L., J. Popp and W. Miller. 2021. Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2020. Research Report 1005. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/51/

English, L., M. Pelkki, R. Montgomery, N. Tian, and J. Popp. 2022. Evaluating economic impacts of COVID-19 for Arkansas' agriculture and forestry sectors in 2020. Selected paper presented at the Mid-Continent Regional Science Association conference. June 9-10, 2022. Accessed 11 October 2022. https://cpb-us-e1.wpmucdn.com/wordpressua.uark.edu/dist/9/350/files/2022/09/AR2022-Paper-EvaluatingEconomicImpactsOfCOVID-19ForArkansasAgricultureAndForestrySectorsIn2020.pdf

Goodwin, H.L., J. Popp, W. Miller, G. Vickery, and Z. Clayton-Neiderman. 2002. Impact of the Agricultural Sector on the Arkansas Economy. Research Report 969. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/28/

Jordan, M. 2021. Pandemic forces change in Arkansas fashion industry. Arkansas Democrat Gazette. Published online: 4 January 2021. Accessed 4 October 2022. https://www.arkansasonline.com/news/2021/jan/04/pandemic-forces-change-in-arkansas-fashion/?bcsubid=4f61ffb7-baf5-45c5-b097-63d8b4667014&pbdialog=reg-wall-login-created-ao

Kemper, N., J. Popp, and W. Miller. 2009. Economic Contribution of the Agriculture Sector to the Arkansas Economy in 2007 and Revised Estimates for 2006. Research Report 987. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/12/

Kumcu, A. and P. Kaufman. 2011. "Food Spending Adjustments During Recessionary Times." *Amber Waves* 9(3), September. Accessed 4 October 2022. https://www.ers.usda.gov/amber-waves/2011/september/food-spending/

Lovett, J. 2021. Arkansas pumps up corn, grain sorghum and winter wheat production High Plains Journal. Published online: December 28, 2021. Accessed 11 October 2022. https://www.hpj.com/crops/arkansas-pumps-up-corn-grain-sorghum-and-winter-wheat-production/article_56e5cdb4-67f5-11ec-9dfe-0bfd58f9da7f.html

Manlove, J., L. English, J. Popp, and W. Miller. 2014. Economic Contribution of Agriculture and Food to Arkansas' Gross Domestic Product 1997-2011. Research Report 993. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/6/

Martinez, S. 2010. Recession Brings Record Number of New Store-Brand Offerings. Amber Waves. 8(2), June. Accessed 4 October 2022. https://www.ers.usda.gov/amber-waves/2010/june/recession-brings-record-number-of-new-store-brand-food-offerings/

McGeeney, R. 2019. In 2019, the bottom line really is the bottom line. University of Arkansas System Division of Agriculture. Accessed 11 October 2022. https://www.uaex.uada.edu/media-resources/news/2019/february2019/020819Ark-Rector-production-money-final.aspx

McGeeney, R. 2021. YEAREND: Arkansas soybean growers make the best of a challenging year. University of Arkansas System Division of Agriculture. Accessed 11 October 2022. https://www.uaex.uada.edu/media-resources/news/2021/december2021/12-17-2021-Ark-yeared-soybeans.aspx

McGraw, K., J. Popp, and W. Miller. 2011. Economic Contribution of the Agriculture Sector to the Arkansas Economy in 2009. Research Report 990. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/9/

McGraw, K., J. Popp, and W. Miller. 2012. Economic Contribution of the Agriculture Sector to the Arkansas Economy in 2010. Research Report 991. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/8/

NBER (National Bureau for Economic Research). 2010. September 20, 2010 Announcement. Accessed 4 October 2022. www.nber.org/cycles/sept2010.pdf

NBER (National Bureau for Economic Research). 2021. U.S. Business Cycle Expansions and Contractions. Accessed 4 October 2022. https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions

Pelkki, M. and N. Tian. 2021. 21 a year of ups, downs for timber. Northwest Arkansas Democrat Gazette. Published online 24 December 2021. Accessed 10 October 2022. https://www.nwaonline.com/news/2021/dec/24/21-a-year-of-ups-downs-for-timber/

Popp, J., N. Kemper, and W. Miller. 2007. Impact of the Agricultural Sector on the Arkansas Economy in 2003. Research Report 981. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/18/

Popp, J., N. Kemper, W. Miller, K. McGraw, and K. Karr. 2010. The Economic Contribution of the Agricultural Sector to the Arkansas Economy in 2008. Research Report 989. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/10/

Popp, J., G. Vickery, and W. Miller. 2005. Impact of the Agricultural Sector on the Arkansas Economy in 2001. Research Report 975. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station, Fayetteville. Accessed 11 October 2022. https://scholarworks.uark.edu/aaesrb/23/

Schuler, A., R. Taylor, and P. Araman. 2001. Competitiveness of U.S. wood furniture manufacturers: Lessons learned from the softwood molding industry. Forest Production, 55: 14-20. Accessed 4 October 2022. https://www.srs.fs.usda.gov/pubs/VT_Publications/01t21.pdf

Simard, G. 1999. Logging Industry: Manufacturing, Construction and Energy Division. Accessed 4 October 2022. www.statcan.gc.ca/pub/25 f0002m/25f0002m1999001-eng.htm

Tegels, L. 2021. New Report Outlines Economic Trajectory for Arkansas' Timber Industry. 26 Feb. 2021. University of Arkansas System Division of Agriculture Arkansas Agricultural Experiment Station. Accessed 4 October 2022. https://aaes.uada.edu/news/ark-timber-industry-report/

Trostle, R. 2008. Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices. Economic Research Service Report WRS-0801. Accessed 4 October 2022. https://www.eere.energy.gov/bioenergy/pdfs/global_agricultural_supply_and_demand.pdf

Trostle, R., D. Marti, S. Rosen, and P. Westcott. 2011. Why Have Food Commodity Prices Risen Again? Economic Research Service Report WRS-1103. Accessed 4 October 2022. https://www.ers.usda.gov/webdocs/outlooks/40481/7392_wrs1103.pdf?v=3116.2

USCB (U.S. Census Bureau). 2016. North American Industry Classification System: Frequently Asked Questions (FAQs). Accessed 4 October 2022. https://www.census.gov/topics/employment/industry-occupation/about/faq.html

USCB (U.S. Census Bureau). 2022. New Privately Owned Housing Units Started: Annual Data, 1959 to 2022. Accessed 4 October 2022. https://www.census.gov/econ/currentdata/dbsearch?program=RESCONST&startYear=1959&endYear=2022&categories=APERMITS&dataType=TOTAL&geoLevel=US&adjusted=1&submit=GET+DATA&releaseScheduleId=

USDA ERS (U.S. Department of Agriculture Economic Research Service). 2022. U.S. and State-Level Farm Income and Wealth Statistics: Data files for Arkansas. Annual Cash Receipts by Commodity, U.S. and State. Accessed 4 October 2022. www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/annual-cash-receipts-by-commodity.aspx#.UyyPHPldWSo

USDA FS (U.S. Department of Agriculture Forest Service). 2022. Forests of Arkansas, 2021 Forest Inventory and Analysis: State Fact Sheets. Accessed 10 October 2022. https://public.tableau.com/views/FIA_OneClick_V1_2/StateSelection?%3AshowVizHome=no

USDA NASS (U.S. Department of Agriculture National Agricultural Statistics Service. 2022a. Index for Price Received, 2011. Accessed 3 October 2022. https://quickstats.nass.usda.gov/

USDA NASS (U.S. Department of Agriculture National Agricultural Statistics Service). 2022b. Commodity Production and Values Data for 1987-2022. Accessed 4 October 2022. https://quickstats.nass.usda.gov/

USDC BEA (U.S. Department of Commerce Bureau of Economic Analysis). 2017a. Gross Domestic Product by State Estimation Methodology. Accessed 4 October 2022. https://www.bea.gov/resources/methodologies/gdp-by-state

USDC BEA (U.S. Department of Commerce Bureau of Economic Analysis). 2017b. Guide to Industry Classifications For International Surveys, 2017. Accessed 4 October 2022. https://www.bea.gov/sites/default/files/2018-04/2017-industry-code-guide.pdf

USDC BEA (U.S. Department of Commerce Bureau of Economic Analysis). 2022. Interactive Data Tables: Gross Domestic Product GDP by State. Accessed 4 October 2022. https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=1#reqid=70&step=1&isuri=1&acrdn=1

Wall, H.J. 2000. Now and Forever NAFTA. The Regional Economist. Accessed 4 October 2022. https://www.stlouisfed.org/publications/regional-economist/april-2000/now-and-forever-nafta

Yuskavage, R.E. 2007. Converting Historical Industry Time Series Data from SIC to NAICS. Federal Committee on Statistical Methodology 2007 Research Conference. Arlington, VA. Nov. 5-7, 2007. Accessed 4 October 2022. https://bea.gov/papers/pdf/SIC_NAICS.pdf

Zellers, R. 2020. Decreased participation in hunting, angling hurts conservation of all Arkansas species. Arkansas Game and Fish Commission. Accessed 11 October 2022. https://www.agfc.com/en/news/2020/02/13/decreased-participation-in-hunting-angling-hurts-conservation-of-all-arkansas-species/

DIVISION OF AGRICULTURE

RESEARCH & EXTENSION

University of Arkansas System