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ECONOMIC IMPACTS

from Agricultural Production in Mississippi

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Economic Impacts from Agricultural Production in Mississippi

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ABSTRACT

About 43,000 farms in Mississippi control 11 million acres, but about 70% of the farms are small, having annual sales of less than $10,000. Based on data used in an input-output model of the state's economy in the year 2000, it was found that about 55,000 people worked on farms. About 42,000 of these people were engaged in the production of hay and pasture, poultry and eggs, miscellaneous livestock (primarily catfish), beef cattle, soybeans, and cotton. Agricultural products had a market value of more than $3.1 billion, and the rest of the state's industries produced an output worth almost $122 billion. Agricultural producers purchased about $2.1 billion in inputs (with about 43% of this coming from instate sources), leaving a value added of about $975 million, which was distributed as follows: $437.7 million to proprietors, $288.5 as other property income, $184.3 million to employees, and $65 million as indirect business taxes.

An input-output model was used to estimate the contribution of agricultural production to the state's economy. Type SAM multipliers were estimated for each of the 20 agricultural production industries identified in the model. Value-added multipliers ranged from 1.945517(greenhouse and nursery products) to 3.300958 (poultry and eggs), while employment multipliers ranged from 1.064675 (sheep, lambs, and goats) to 2.938445 (poultry and eggs). Treating the state's 20 agricultural production industries as a group, impact analysis was performed and resulted in a value-added multiplier of 2.428150 and an employment multiplier of 1.693539. Impact analysis was also conducted for each of the state's eight largest agricultural production and processing industries. As expected, the poultry and egg production and processing industries had the largest impact on the state's economy. This group of businesses generated $678.5 million in value added directly with spillover impacts of $1.09 billion. Direct employment in this group was about 27,000 jobs with spillover impacts of almost 30,000 jobs.

Keywords: Agricultural production, input-output model, multiplier, impact analysis

Economic Impacts from Agricultural Production in Mississippi

INTRODUCTION

Various types of business and government activities generate a diverse and dynamic economy for the residents of a region. Economic diversity is reflected by the wide variety of goods and services produced by private firms and government agencies, as well as the availability of imported commodities. The economy is dynamic in the sense that economic activity may either grow or decline over time. In addition, every year some businesses are initiated while others are terminated. Another feature of an economy is the complex interdependence exhibited by private firms, government agencies, and consumers. A firm may impact many other firms through its input purchases and product sales. Furthermore, employees use their earnings to purchase a wide variety of consumer goods and services, adding another level of interdependence to the economy. Thus, a business is able to generate both direct impacts and spillover impacts within an economy. This study measures these types of impacts from businesses engaged in the production of agricultural commodities in Mississippi.

While agricultural producers rely on the development and use of natural resources, they also rely on many other businesses to provide a variety of inputs and services. Various manufacturers, wholesalers, and retailers produce and sell many production inputs such as feed, fertilizers, chemicals, and seed. Agricultural producers also purchase or lease many durable inputs such as machinery, equipment, and buildings. Other entities, such as lenders, consultants, veterinarians, and government agencies, provide services to producers. After producers sell their products, many other activities take place before consumers purchase the final products. Firms engaged in supply chain activities either transform raw farm products into higher-valued forms or engage in wholesale or retail trade activities. The group of firms commonly called "agribusiness" includes both "upstream" input suppliers and "downstream" supply chain firms directly involved in the production, processing, and marketing of farm products.

Farms and agribusinesses have been, and continue to be, important contributors to economies around the world. Lipton et al. estimated that the food and fiber system (farms and related industries) accounted for 13.1% of the U.S. gross domestic product and 16.9% of the country's employment in 1996. Employment among the four major food and fiber system categories was distributed as follows: input suppliers, 3.2%; farms, 1.2%; manufacturers, 2.1%; and distributors, 10.4%. Edmondson et al. used two different methods to measure farm and farm-related employment and derived similar values for the period 1982-1992.

Barnett and Reinschmiedt used an input-output model and 1992 Mississippi data to determine that the state's food and fiber industries directly contributed almost 238,000, or 19%, of the state's 1.25 million jobs. These jobs were distributed as follows: 63,605 in production, 85,866 in manufacturing, and 88,364 in food-related retail trade businesses. Spillover impacts attributed to the food and fiber system resulted in another 113,000 jobs, for a total contribution of 28% of the state's employment. Barnett and Reinschmiedt included logging, forestry products, and related wood and paper processing industries in their definition of the food and fiber system, whereas Lipton et al. and Edmondson et al. did not.

Spurlock et al., using an input-output model with 1999 Mississippi data, found that the state's agricultural and forestry industries (including production, manufacturing, and retail businesses) directly contributed more than 363,000, or 24%, of the state's 1.5 million jobs. In addition to retail businesses involved in food marketing, Spurlock et al. included retail trade of textile and forestry products, whereas Barnett and Reinschmiedt did not. Agricultural and forestry jobs were distributed as follows: 81,368 in production (5.4% of the state's employment), 106,611 in manufacturing (7% of total employment), and 175,405 in food- and fiber-related retail businesses (11.6% of total employment). Spillover effects from the production sector amounted to about an additional 47,000 jobs. Agricultural production and related manufacturing jobs together accounted for 12.4% of the state's total employment. Spillover impacts from these two industry groups generated another 154,000 jobs, for a total of 22.6% of the state's employment. When retail industries were added to the production and manufacturing industries, total spillover impacts generated more than 187,000 jobs, increasing the total contribution of agriculture and forestry to 36.4% of the state's employment.

Goodwin et al. estimated that, in 1999, about 192,000 jobs in Arkansas were directly related to its agricultural economy (defined to include forestry production and manufacturing but not retail businesses), and about 135,000 more jobs were due to spillover effects. More than 81,000 jobs were involved in production activities and almost 111,000 jobs were in manufacturing industries. The direct impact from agricultural businesses represented 12.8% of the state's employment, while the total impact was 21.9%. Hughes found that agricultural production and processing industries (including forestry, lumber, and paper products, but not textiles, food stores, or eating and drinking establishments) contributed about 11.5% of the employment in Louisiana in 1985 (almost 228,000 out of a total of 1.984 million jobs). Agriculture and related businesses created about 112,000 jobs (74,500 in production and 37,500 in processing), and the spillover effect was about 116,000 jobs.

Munn and Henderson analyzed Mississippi's forest product industry using an input-output model with 1998 data. In their study, they developed the following five categories to describe the forest product industry: farm and nonfarm forest products, logging, solid wood products, wood furniture, and pulp and paper. Direct employment in Mississippi's forest product industry was almost 65,000 jobs (about 4.4% of the state's employment), and estimated spillover effects accounted for another 87,000 jobs. In addition, the forest product industry contributed almost $3 billion in value added (about 5% of the state's value added), and spillover impacts generated another $3.5 billion in value added.

Because linkages between agriculture and the rest of the economy are complex, analysts often attempt to measure direct and spillover contributions from one or more industries. However, analysts must also group industries in a meaningful way. As noted previously, some analysts include retail establishments while others do not, and some include forestry with traditional agriculture while others do not. In this study, the group of industries called "agricultural production" includes farms and ranches that produce crops and livestock. Farm-produced forest products will be included, but nonfarm forest products will not. This study will focus on businesses that are typically classified as farms and ranches; agribusinesses involved in processing and marketing food and fiber products, although very important, are not the primary concern of this study.

The objective of this study was to evaluate the economic impacts from agricultural production on Mississippi's economy. Various aspects related to the production of agricultural commodities were examined. An input-output model was used to estimate direct and spillover effects arising from Mississippi's major agricultural production and processing industries. Impacts on tax payments were also estimated. Policy makers and other interested parties will gain a better understanding of the structure of the state's agricultural production and the linkages between these businesses and the rest of the state's economy.

PROFILE OF MISSISSIPPI FARMS

Mississippi farms (defined as having annual sales more than $1,000) and land in farms by economic sales class in 2002 are reported in Table 1. About 70% of the state's 43,000 farms control 30% of the farmland and are in the smallest size category, selling less than $10,000 of farm products per year. These farms, with an average operation of 106 acres, are much smaller than commercial-sized farms and would probably require nonfarm income to generate a satisfactory standard of living. As expected, average farm size increases with sales category. The largest three sales categories together account for about 10% of the state's total farms and control almost half of the state's farmland.

Table 1. Mississippi farms, farmland, and average farm size, by economic sales class, 2002.

Sales class	Number of farms	Land in farms (acres)	Average farm size (acres)
$1,000 – $9,999	31,000	3,300,000	106
$10,000 – $99,999	7,500	2,600,000	347
$100,000 – $249,999	2,000	1,100,000	550
$250,000 – $499,999	1,000	1,000,000	1,000
$500,000+	1,500	3,000,000	2,000
Total	**43,000**	**11,000,000**	**256**

Source: USDA, National Agricultural Statistics Service, State Published Estimates Data Base.

Harvested acreage of major crops over the period 1988–2002 is presented in Table 2. There has been some variability over time in the state's crop mix. Soybean acreage has been fairly stable since 1988 but declined in 2000. Cotton acreage peaked in 1995, declined for 3 years, increased to a new high in 2001, but returned to a more typical level in 2002. Corn acreage, fairly stable during 1988–1991, exhibited large increases during 1996-98, declined, and then increased again in 2002. Rice and hay acreage have been relatively stable over the selected period. It appears that the 1996 Farm Bill, which removed acreage controls, has allowed producers to be more responsive to changes in relative risks and/or returns between crops when making their crop mix decisions.

Table 2. Harvested acres of selected crops in Mississippi, 1988-2002.

Year	Soybean acres (X1,000)	Cotton acres (X1,000)	Corn acres (X1,000)	Rice acres (X1,000)	Hay acres (X1,000)
1988	2,250	1,190	150	260	650
1989	2,000	1,020	140	235	650
1990	1,900	1,220	140	250	575
1991	1,800	1,230	150	220	720
1992	1,750	1,345	300	275	750
1993	1,950	1,300	190	245	720
1994	1,870	1,270	265	313	750
1995	1,800	1,420	275	288	725
1996	1,750	1,100	595	208	800
1997	2,070	970	433	238	720
1998	2,000	940	500	268	790
1999	1,900	1,180	310	323	850
2000	1,580	1,280	365	218	800
2001	1,120	1,600	385	253	780
2002	1,370	1,150	530	253	750

Source: USDA, National Agricultural Statistics Service, State Published Estimates Data Base.

Poultry and cattle data for Mississippi from 1987–2001 are reported in Table 3. During this period, both egg and chick output has more than doubled. Cows that calved for beef production had fairly stable numbers until about 5 years ago, when a downward trend

Table 3. Poultry production and January 1 inventory of cows, Mississippi, 1987-2001.

Year	Eggs set (X1,000)	Chicks placed (X1,000)	Cows that calved (X1,000)	
			Beef	Milk
1987	409,633	355,641	690	75
1988	425,088	374,196	706	68
1989	454,135	400,079	662	68
1990	487,980	430,909	657	63
1991	543,243	478,095	657	63
1992	574,504	506,454	660	60
1993	635,204	550,414	700	60
1994	742,104	643,017	682	58
1995	772,041	670,382	653	57
1996	828,341	710,289	677	53
1997	891,776	758,358	632	48
1998	917,546	754,638	604	46
1999	931,314	767,748	591	39
2000	924,242	774,279	579	36
2001	959,761	793,480	579	36

Source: USDA, National Agricultural Statistics Service, State Published Estimates Data Base.

became evident. Dairy cow numbers have exhibited a downward trend over this time span.

Information on the value of Mississippi farm products, expenditures for farm inputs, value added, and net farm income over 1996-2001 is presented in Tables 4-6. Sales of livestock and poultry generate more market value than crops. Substantial growth in poultry, catfish, and hog production has been the driving force behind the upward trend in livestock values. Poultry and eggs account for about 65% of total livestock value. The next largest category, miscellaneous livestock, includes catfish production. Cotton and soybeans are the state's major row crops. Feed expenditures represent the largest category of farm expenses, accounting for about 33% of total purchased inputs. Government payments received by farmers have been increasing since 1997. Gross value added, net value added, and net farm income were fairly stable from 1996-1999, but declined in 2000 before rebounding in 2001.

Table 4. Value of crop and livestock production in Mississippi, 1996-2001.

Item	1996 (X $1,000)	1997 (X $1,000)	1998 (X $1,000)	1999 (X $1,000)	2000 (X $1,000)	2001 (X $1,000)
Value of crop production	**1,618,117**	**1,485,406**	**1,157,825**	**1,051,636**	**830,675**	**1,072,373**
Food grains	190,307	164,897	154,704	138,745	109,484	118,440
Feed crops	198,681	160,199	102,619	78,890	89,407	119,910
Cotton	701,329	601,795	581,803	468,174	219,494	369,600
Oil crops	312,122	450,763	334,546	210,442	173,157	161,976
Fruits and tree nuts	4,405	8,660	4,110	9,795	9,025	5,860
Vegetables	30,656	34,333	37,707	44,780	39,079	43,184
All other crops	**47,476**	**57,018**	**49,608**	**51,476**	**51,343**	**52,086**
Home consumption	2,798	2,731	2,731	2,796	2,731	2,667
Value of inventory adjustment	130,343	5,010	-110,003	46,538	136,955	198,650
Value of livestock production	**1,930,846**	**1,949,021**	**2,161,326**	**2,098,063**	**2,041,922**	**2,297,800**
Meat animals	190,292	251,219	214,148	256,012	266,411	260,624
Dairy products	105,455	90,720	93,150	89,324	74,782	79,695
Poultry and eggs	1,354,444	1,376,992	1,535,328	1,489,866	1,379,825	1,659,106
Miscellaneous livestock	291,500	281,458	321,933	309,502	315,428	276,101
Home consumption	3,567	5,141	4,118	5,198	6,801	6,569
Value of inventory adjustment	-14,412	-56,509	-7,351	-51,839	-1,325	15,705
Revenues from services and forestry	**392,188**	**443,390**	**466,845**	**500,611**	**441,130**	**523,656**
Machine hire and custom work	11,794	10,160	9,343	15,506	9,493	14,859
Forest products sold	24,400	25,500	25,000	24,100	24,600	24,300
Other farm income	185,003	234,413	256,770	285,869	228,059	300,462
Gross imputed rental value of farm dwellings	170,991	173,317	175,732	175,136	178,978	184,035
Value of production	**3,941,151**	**3,877,817**	**3,785,996**	**3,650,310**	**3,313,727**	**3,893,829**

Source: Economic Research Service, USDA.

Table 5. Value of inputs used by Mississippi's agricultural producers, 1996-2001.

Item	1996 (X $1,000)	1997 (X $1,000)	1998 (X $1,000)	1999 (X $1,000)	2000 (X $1,000)	2001 (X $1,000)
Farm origin	**786,208**	**815,070**	**819,835**	**815,856**	**795,580**	**880,246**
Feed purchased	597,858	603,084	612,763	589,984	566,517	626,329
Livestock and poultry purchased	124,691	141,657	133,041	143,909	147,100	161,378
Seed purchased	63,659	70,329	74,031	81,963	81,963	92,539
Manufactured inputs	**528,441**	**535,374**	**500,145**	**512,411**	**511,426**	**531,979**
Fertilizers and lime	161,133	132,852	123,148	134,331	125,746	133,068
Pesticides	225,076	245,783	239,229	240,868	222,843	235,952
Petroleum fuel and oils	100,932	106,102	93,545	100,154	123,732	126,761
Electricity	41,300	50,637	44,223	37,058	39,105	36,198
Other purchased inputs	**945,259**	**815,040**	**845,672**	**870,796**	**770,288**	**916,951**
Repair and maintenance of capital items	186,300	190,461	173,742	197,318	166,998	206,057
Machine hire and custom work	190,330	96,571	117,124	96,188	71,864	74,663
Marketing, storage, and transportation expenses	170,561	95,427	94,186	114,378	144,123	203,896
Contract labor	8,620	11,689	8,631	11,945	12,822	15,129
Miscellaneous expenses	389,448	420,892	451,989	450,967	374,481	417,206
Value of purchased inputs	**2,259,908**	**2,165,484**	**2,165,652**	**2,199,063**	**2,077,294**	**2,329,176**

Source: Economic Research Service, USDA.

Table 6. Value added and net farm income for Mississippi's agricultural producers, 1996-2001.

Item	1996 (X $1,000)	1997 (X $1,000)	1998 (X $1,000)	1999 (X $1,000)	2000 (X $1,000)	2001 (X $1,000)
Value of production	**3,941,151**	**3,877,817**	**3,785,996**	**3,650,310**	**3,313,727**	**3,893,829**
Less purchased inputs	**2,259,908**	**2,165,484**	**2,165,652**	**2,199,063**	**2,077,294**	**2,329,176**
Plus net government transactions	**140,104**	**108,383**	**221,349**	**380,508**	**402,491**	**454,864**
+ Direct government payments	197,665	169,868	283,008	440,837	463,901	517,007
- Motor vehicle registration and licensing fees	3,545	3,589	4,231	5,097	4,396	3,348
- Property taxes	54,016	57,896	57,428	55,232	57,014	58,795
Gross value added	**1,821,348**	**1,820,716**	**1,841,694**	**1,831,755**	**1,638,924**	**2,019,517**
Less capital consumption	**275,759**	**287,061**	**293,238**	**301,515**	**304,383**	**305,476**
Net value added	**1,545,589**	**1,533,655**	**1,548,456**	**1,530,240**	**1,334,541**	**1,714,041**
Less payments to stakeholders	**491,053**	**508,117**	**541,479**	**535,381**	**548,712**	**602,293**
Employee compensation (total hired labor)	163,946	166,505	172,094	179,034	172,996	186,100
Net rent received by nonoperator landlords	103,226	116,674	144,616	129,493	135,770	177,007
Real-estate and non-real-estate interest	223,881	224,938	224,769	226,854	239,946	239,186
Net farm income	**1,054,536**	**1,025,538**	**1,006,977**	**994,859**	**785,829**	**1,111,748**

Source: Economic Research Service, USDA.

Supply Chains in the Food and Fiber System

Major linkages between industries in the food and fiber system are depicted in Figure 1. In a market-based economy, consumer demand for goods and services is the underlying force that drives production activities. The arrows in the figure show, quite naturally, that goods and services move through the supply chain from the sources of supply toward the sources of demand. The demand for goods or services flows from final consumers backward through the various stages in the marketing channels and eventually reaches producers. Farmers, in order to produce their commodities, purchase a wide variety of inputs from agribusinesses and other businesses. Although not shown in the figure, input supply firms purchase their inputs from many other businesses, including farms and other agribusinesses. Farm products then leave the farm and move into various marketing channels and, finally, to consumers.

It is possible for some farm products to be used as inputs in the production of other farm products. For example, a farm could produce hay or corn and feed it to livestock on that farm or sell it to other livestock producers. A feed manufacturer may buy corn or soybeans and then sell the feed to livestock producers. It is important to have information about interindustry linkages, as well as linkages to final consumers, because a change in the supply or demand in any industry may impact many other industries due to the complex interactions between industries and consumers. That is, a given change in one industry's production creates a series of ripple effects throughout the entire economy. These spillover impacts will continue until "leakages" from the region eventually stop the cycle. Leakages could be payments for imported commodities or payments to one of the region's value-added components that are not respent within the region.

Farm products originating within the region may remain in marketing channels within the region or may be exported to firms located outside the region. In the first case, the funds used in the transaction originate and remain inside the region. The sales value counts as revenue to the farm and as an expense to the "downstream" firm. In the case of exported commodities, the funds originate outside the region and come into the region. The farm still counts the sales value as revenue, but an export account will be needed for the expense. Imports of commodities into a region require the sales value to be included in an import account, and the importer treats the funds as an expense.

A business tends to make its purchase (or sales) transactions that generate the largest net benefits, regardless of the seller's (or buyer's) location. The overall performance of the regional economy depends either directly or indirectly on all activities of businesses located inside and outside the region. If import and export activities are a significant component of a regional economy, a change in the demand and supply situations of buyers and sellers outside the region may have important impacts for participants within the region, and vice versa.

The labor involved in carrying out the various activities in the food and fiber system is another aspect that merits attention. Because of increased mechanization of farms during the last half of the 20th century, farm labor requirements have declined tremendously, forcing displaced farm workers to seek off-farm employment. In many cases, local employment opportunities were not readily available, forcing farm workers to relocate. As farm workers vacate an area, local consumer demand for many goods and services decline, creating a ripple effect of declining economic activity within the region. Many rural areas heavily dependent on agricultural production have been, and continue to be, adversely affected by reductions in farm labor requirements and the subsequent exodus of farm labor.

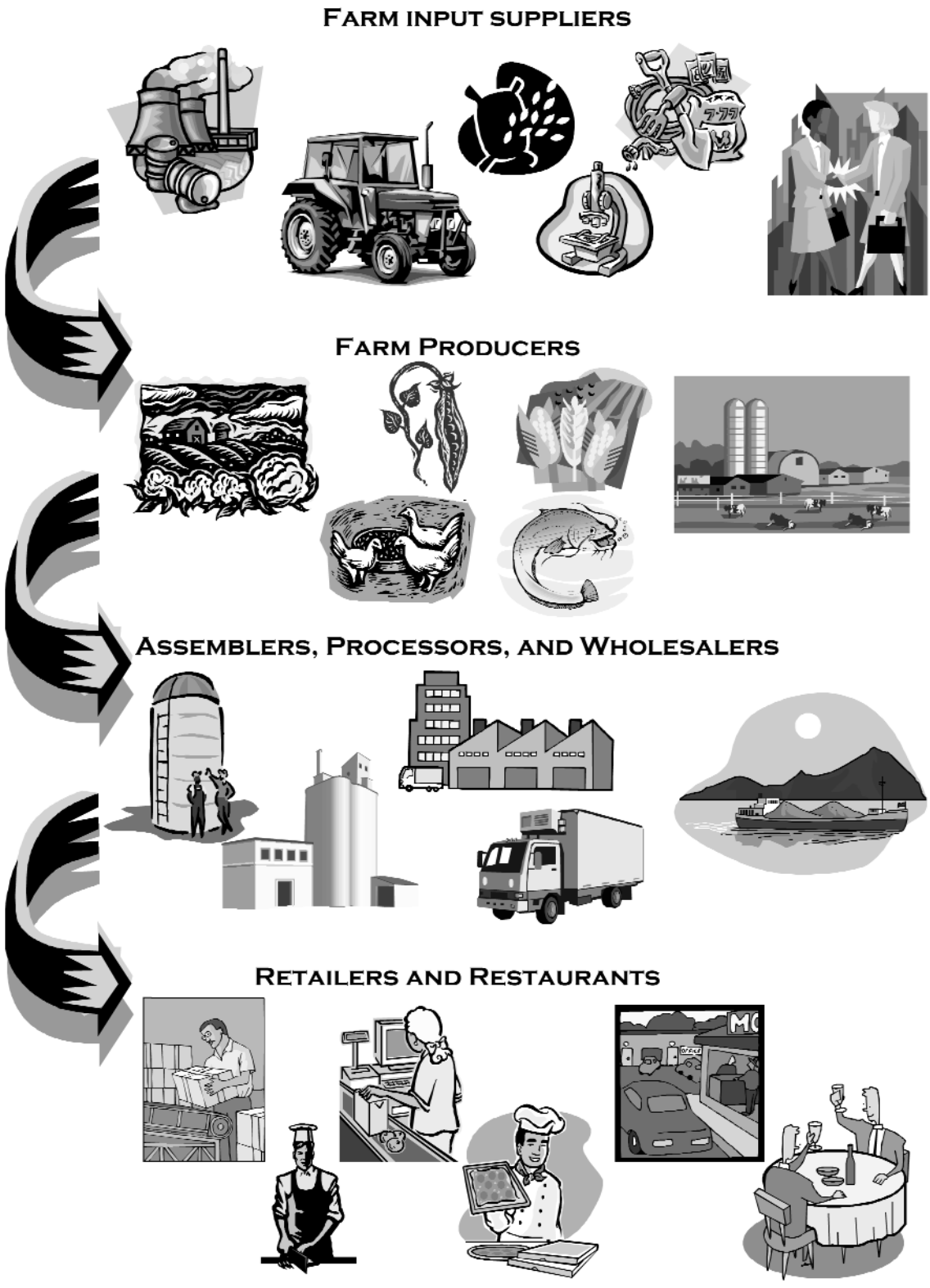

Figure 1. Flow of goods and services in the food and fiber system.

Performance Measures in an Economy

To obtain a quantitative assessment of an economy's business activities, several different factors may be measured, evaluated over time, and compared with other economies. Common items to evaluate include various measures of production, income, and employment. When the analysis is focused on the whole economy, it is important to understand the meaning of several financial accounting concepts. Every time a firm transfers ownership of goods or services at the end of a production or marketing stage, the amount of money the buyer pays the seller provides a measure of the product's value to society at that point in time. In the financial accounts of a buyer and a seller, the monetary value of a transaction is counted as an expense for the buyer and as income for the seller. If all financial accounts balance throughout the entire economy, total income must equal total expenses. However, simply summing all firms' incomes or expenses overstates the true societal value of goods and services that were traded. This situation occurs because some transactions involve intermediate goods and services (i.e., goods and services that businesses purchase and then use as inputs to produce other goods and services).

Each firm produces and sells goods and services during a given time period (usually 1 year is used for accounting purposes). A firm's revenue from the sale of its products could be used as a measure of that firm's contribution to the regional economy. However, the value of total output may not be a reliable measure of societal benefits because some goods may simply be transferred to other firms and transformed through more than one stage in the supply chain. For example, suppose Firm X produces some products and sells them to Firm Y for $100. Firm Y then transforms these goods into higher-valued products and sells them to final consumers for $150. Adding the sales values of the two transactions results in $250, but the total value to society is, in reality, only $150. This is because Firm X's $100 in sales is actually embedded in Firm Y's sales value of $150. If Firm X's value is added to Firm Y's value, then an error has been made because Firm X's value has been counted twice. If Firm X and Firm Y were combined into one firm, then the only observable transaction would be $150 of sales to final consumers, and double-counting errors would not be possible. Analysts and others must be aware of the potential problems caused by overestimating the true value of an economy's output whenever embedded values of intermediate products are significant.

Table 7. Value of commodities produced in Mississippi, by source, 2000.

Commodity	Sales of commodities produced by MS . . .		
	Industries (X $1 million)	Institutions (X $1 million)	Total (X $1 million)
Poultry & eggs	1,371.283	0.570	1,371.852
Cotton	399.192	0.000	399.192
Miscellaneous livestock (catfish et al.)	276.660	1.363	278.023
Oil-bearing crops (soybeans et al.)	181.186	1.464	182.650
Ranch-fed cattle	172.646	1.241	173.887
Feed grains (corn, grain sorghum, et al.)	133.594	19.102	152.696
Food grains (wheat, rice, et al.)	109.700	6.666	116.367
Hay & pasture	67.593	10.090	77.683
Dairy farm products	72.696	0.072	72.768
Hogs & pigs	52.438	0.324	52.762
Greenhouse & nursery products	47.714	0.113	47.827
Vegetables	38.355	0.005	38.361
Range-fed cattle	16.936	0.089	17.025
Cattle feedlots	6.569	0.044	6.613
Fruits	5.125	0.017	5.142
Miscellaneous crops	3.769	0.173	3.942
Tree nuts	3.734	0.002	3.736
Sheep, lambs, & goats	0.272	0.002	0.275
Grass seeds	0.244	0.000	0.244
Subtotal of agricultural products	**2,959.707**	**41.337**	**3,001.044**
Manufacturing	23,923.257	64.853	23,988.109
Services	20,163.368	2,645.785	22,809.153
Finance, insurance, & real estate	13,367.894	0.000	13,367.894
Government	11,642.919	18.036	11,660.956
Transportation, communications, & utilities	10,325.301	31.320	10,356.621
Construction	10,174.045	0.000	10,174.045
Forestry & products	9,388.580	104.619	9,493.198
Retail trade	8,974.402	166.185	9,140.587
Food preparation & processing	5,556.411	25.553	5,581.964
Wholesale trade	4,694.359	0.000	4,694.359
Textiles	2,235.913	3.453	2,239.366
Agricultural inputs	879.086	11.847	890.933
Mining	690.215	26.439	716.654
Miscellaneous	-259.109	910.399	651.291
Subtotal of rest of state economy	**121,756.641**	**4,008.489**	**125,765.130**
Total state economy	**124,716.348**	**4,049.826**	**128,766.174**

Various sources of industry-level data are available for individual states. However, the level of detail needed for specific types of agricultural production is often unavailable. The Minnesota IMPLAN Group (MIG) is a private venture that maintains a software program and sells databases that are capable of capturing many aspects of a state's production and trade activities. The database used in this study has economic information about the production of 400 private industries, 10 government categories, and 510 commodities traded in Mississippi in 2000. The following results were obtained from the MIG database.

Tables 7–12 summarize data on a commodity basis. A commodity is a good or service that is traded. Its selling price is a measure of its value. Tables 13–19 provide data that are grouped by industries rather than commodities. An industry is a collection of private businesses that produce similar commodities. An industry produces one primary commodity and may produce one or more secondary commodities, or byproducts.

In this study, agricultural commodities (i.e., products produced on traditional farms) have been grouped into 19 categories. The "ranch-fed cattle" category represents a high-capacity management system, while the "range-fed cattle" category represents a low-capacity management system. The primary commodity in the "miscellaneous livestock" category is catfish, but other aquacultural products, horses, rabbits, and bees are also included.

Nonfarm commodities have been grouped into 14 categories, one of which is called "agricultural inputs." This group contains the following commodities that are produced by Mississippi businesses: nitrogenous and phosphatic fertilizers; agricultural chemicals; farm machinery and equipment; agricultural, forestry, and fishing services; and landscape and horticultural services. Another nonfarm commodity group called "forestry and products" includes forestry products produced by both farm and nonfarm businesses, logging, sawmills, pulp mills, paper mills, wood products (including furniture), and paper products. Two other nonfarm categories that are primary users of farm products are "food preparation and processing" and "textiles."

Table 7 presents sales values of commodities (i.e., goods and services) that were produced within Mississippi in 2000. The MIG database identifies the seller of a commodity as either an industry or an institution. Institutional sales, which made up only about 3% of the state's commodity sales, are made by, in order of magnitude, the following four entities:

1. Nonenterprise state and local government agencies (e.g., hospitals and health services, education, and campgrounds) and nonenterprise federal agencies;

Table 8. Sales of commodities produced in Mississippi, by place of purchase, 2000.

Commodity	MS commodities sold to . . .		
	MS buyers (X $1 million)	Other U.S. buyers (X $1 million)	Foreign buyers (X $1 million)
Poultry & eggs	1,170.209	186.321	15.322
Cotton	18.865	274.864	105.463
Miscellaneous livestock (catfish et al.)	74.320	156.033	47.669
Oil-bearing crops (soybeans et al.)	103.704	1.253	77.693
Ranch-fed cattle	172.646	0.000	1.241
Feed grains (corn, grain sorghum, et al.)	25.359	95.340	31.997
Food grains (wheat, rice, et al.)	5.883	33.661	76.822
Hay & pasture	15.856	60.094	1.734
Dairy farm products	30.588	42.091	0.089
Hogs & pigs	52.660	0.000	0.101
Greenhouse & nursery products	47.320	0.000	0.507
Vegetables	33.480	0.000	4.880
Range-fed cattle	16.936	0.000	0.089
Cattle feedlots	6.569	0.000	0.044
Fruits	3.947	0.000	1.196
Miscellaneous crops	2.439	0.000	1.503
Tree nuts	2.964	0.296	0.476
Sheep, lambs, & goats	0.259	0.000	0.016
Grass seeds	0.177	0.009	0.058
Subtotal of agricultural products	**1,784.180**	**849.963**	**366.901**
Manufacturing	7,365.946	13,209.052	3,413.112
Services	16,464.522	6,199.069	145.563
Finance, insurance, & real estate	9,860.447	3,218.638	288.809
Government	11,503.396	155.382	2.177
Transportation, communications, & utilities	8,194.300	1,468.998	693.322
Construction	9,708.280	465.766	0.000
Forestry & products	2,686.049	6,000.500	806.649
Retail trade	8,275.856	860.114	4.616
Food preparation & processing	1,696.339	3,414.897	470.728
Wholesale trade	4,293.906	0.000	400.453
Textiles	696.080	1,251.988	291.298
Agricultural inputs	583.611	160.553	146.768
Mining	591.457	100.212	24.985
Miscellaneous	255.805	144.314	251.171
Subtotal of rest of state economy	**82,175.994**	**36,649.483**	**6,939.652**
Total state economy	**83,960.175**	**37,499.446**	**7,306.554**

2. Disinvestments of capital goods (e.g., used and secondhand goods and scrap materials);
3. Inventory reductions (e.g., a category called "inventory valuation adjustment" and sales of commodities that were produced in previous years); and
4. Households (e.g., a category called "rest of the world industry" and scrap materials).

As seen in Table 7, the "poultry and eggs" commodity had, by far, the largest sales value of the farm products produced in Mississippi, accounting for about 46% of the value of the state's farm products. Cotton was the state's most valuable crop. "Manufacturing" and "services" were the top two nonfarm categories.

Table 8 shows the location of the buyers of the commodities that were produced in Mississippi. Instate buyers purchased a very large portion of the "poultry and eggs" commodity. However, a large portion of the state's major crops was transported out of the state. Other commodity categories that had large purchases from out-of-state buyers were manufacturing, forestry and products, food preparation and processing, and textiles.

Tables 9–11 show the values of commodities purchased by Mississippi industries and institutions. Note that three new agricultural commodity categories are now included: other meat animal products, sugar crops, and tobacco. These were not included in Tables 7 and 8 because they are not produced in Mississippi; however, small amounts are purchased by Mississippi entities. Table 9 shows purchases of commodities produced either instate or out-of-state, while Table 10 shows purchases of commodities produced instate and Table 11 shows purchases of commodities produced out-of-state. As expected, industries, rather than institutions, purchased most of the agricultural commodities. After leaving the farm, most farm products are processed into final consumer goods. Exceptions are vegetables, fruits, and tree nuts. However, institutions purchased the majority of the nonagricultural commodities.

Comparing Tables 10 and 11, it is evident that the vast majority of the "poultry and eggs" purchases were produced in Mississippi. However, much of the state's other agricultural commodity purchases were produced by out-of-state sources. About 61% of the state's agricultural commodity purchases originated inside the state. However, excluding the "poultry and eggs" commodity gives a value of only 35%. Thus, about 65% of agricultural commodities, excluding poultry and eggs,

Table 9. Value of all commodities purchased in Mississippi, by source, 2000.

Commodity	Purchases of commodities produced anywhere by MS . . .		
	Industries (X $1 million)	Institutions (X $1 million)	Total (X $1 million)
Poultry & eggs	1,145.599	30.312	1,175.912
Cattle feedlots	273.976	0.000	273.976
Ranch-fed cattle	201.969	0.000	201.969
Hogs & pigs	161.764	0.000	161.764
Feed grains (corn, grain sorghum, et al.)	155.563	4.211	159.773
Vegetables	16.401	105.006	121.407
Oil-bearing crops (soybeans et al.)	112.633	0.402	113.035
Greenhouse & nursery products	43.676	69.354	113.031
Miscellaneous livestock (catfish et al.)	82.889	19.844	102.734
Hay & pasture	97.643	2.130	99.773
Fruits	0.347	96.449	96.797
Dairy farm products	82.499	1.192	83.691
Range-fed cattle	82.475	0.000	82.475
Cotton	55.361	10.495	65.856
Food grains (wheat, rice, et al.)	33.632	0.000	33.632
Miscellaneous crops	13.985	0.095	14.079
Sheep, lambs, & goats	6.729	0.000	6.729
Tree nuts	0.286	5.601	5.887
Grass seeds	4.571	0.594	5.166
Other meat animal products	0.648	0.000	0.648
Sugar crops	0.406	0.000	0.406
Tobacco	0.050	0.000	0.050
Subtotal of agricultural products	**2,573.103**	**345.686**	**2,918.789**
Services	11,355.114	16,851.516	28,206.630
Manufacturing	15,151.937	10,507.393	25,659.330
Finance, insurance, & real estate	5,754.944	13,247.187	19,002.131
Transportation, communications, & utilities	6,451.493	5,309.592	11,761.085
Government	486.867	11,202.225	11,689.092
Construction	1,455.290	9,660.652	11,115.941
Retail trade	793.059	9,097.883	9,890.942
Wholesale trade	4,610.007	2,813.232	7,423.239
Food preparation & processing	1,938.791	3,628.167	5,566.958
Forestry & products	4,181.302	1,378.594	5,559.895
Mining	3,786.272	6.328	3,792.600
Textiles	1,235.486	1,265.484	2,500.970
Miscellaneous	497.392	1,289.105	1,786.497
Agricultural inputs	811.174	134.417	945.591
Subtotal of rest of state economy	**58,509.127**	**86,391.774**	**144,900.901**
Total state economy	**61,082.230**	**86,737.460**	**147,819.690**

came from out-of-state sources. About 57% of the state's $147.8 billion in all commodity purchases originated in Mississippi.

Table 12 presents values of outputs sold and inputs purchased by Mississippi industries. Recall that an industry produces a primary commodity and usually produces one or more byproducts. Thus, a commodity value from the "industries" column in Table 7 would not usually be equal to its industry output value in Table 12. There is normally a small difference in the two values because a commodity's sales value is obtained by summing commodity sales across industries, while an industry's output value is obtained by summing all commodities (i.e., the primary product and any byproducts) produced by that industry. However, the state total value from the industry column in Table 7 ($124,716.348 million) should equal the state total output value from Table 12 ($125,002.353 million). The small difference in these two values is due to the "inventory valuation adjustment." The inventory valuation adjustment of $286.005 million was included in the "miscellaneous" category in Table 7 but was not included in Table 12 since it is not really a measure of any industry's output.

Note that Table 12 contains 20 agricultural production industries. The names of 19 of these industries were also used as names of agricultural commodities in Tables 7–11. When data are summarized by industry (as in Table 12), an agricultural production industry called "forest products" is used for farms that produce a primary product described as stumpage, pulpwood, fuel wood, Christmas trees, or fence posts. However, the IMPLAN database does not use "forest products" for the name of a commodity. Instead, IMPLAN uses a category called "forestry products" to capture all products of this type, whether produced by farms or nonfarm businesses. Since the commodity "forestry products" includes nonfarm production, it was omitted from the agricultural products sections of Tables 7–11, but it was included in the "forestry and products" group that is listed in the nonfarm sections. The IMPLAN database also uses the name "forestry products" as an industry to capture the activities of nonfarm businesses engaged in the operation of timber tracts, tree farms, and forest nurseries, as well as activities including reforestation and the growing of Christmas trees. This forestry product industry is included in the "forestry and products" category listed in the nonfarm section of Table 12.

Table 12 shows the sales values of commodities produced by Mississippi industries, the purchase values

Table 10. Value of instate commodities purchased in Mississippi, by source, 2000.

Commodity	Purchases of commodities produced instate by MS . . .		
	Industries (X $1 million)	Institutions (X $1 million)	Total (X $1 million)
Poultry & eggs	1,140.044	30.165	1,170.209
Cattle feedlots	6.569	0.000	6.569
Ranch-fed cattle	172.646	0.000	172.646
Hogs & pigs	52.660	0.000	52.660
Feed grains (corn, grain sorghum, et al.)	24.690	0.668	25.359
Vegetables	4.523	28.958	33.480
Oil-bearing crops (soybeans et al.)	103.336	0.369	103.704
Greenhouse & nursery products	18.285	29.035	47.320
Miscellaneous livestock (catfish et al.)	59.964	14.356	74.320
Hay & pasture	15.517	0.339	15.856
Fruits	0.014	3.933	3.947
Dairy farm products	30.152	0.436	30.588
Range-fed cattle	16.936	0.000	16.936
Cotton	15.859	3.006	18.865
Food grains (wheat, rice, et al.)	5.883	0.000	5.883
Miscellaneous crops	2.422	0.016	2.439
Sheep, lambs, & goats	0.259	0.000	0.259
Tree nuts	0.144	2.820	2.964
Grass seeds	0.156	0.020	0.177
Other meat animal products	0.000	0.000	0.000
Sugar crops	0.000	0.000	0.000
Tobacco	0.000	0.000	0.000
Subtotal of agricultural products	**1,670.060**	**114.086**	**1,784.180**
Services	5,048.122	11,416.400	16,464.522
Manufacturing	4,098.198	3,267.748	7,365.946
Finance, insurance, & real estate	2,502.032	7,358.415	9,860.447
Transportation, communications, & utilities	4,624.080	3,570.220	8,194.301
Government	359.347	11,144.049	11,503.396
Construction	1,208.587	8,499.692	9,708.280
Retail trade	681.522	7,594.334	8,275.856
Wholesale trade	2,666.617	1,627.289	4,293.906
Food preparation & processing	574.028	1,122.311	1,696.339
Forestry & products	1,912.505	773.544	2,686.049
Mining	591.329	0.128	591.457
Textiles	260.612	435.468	696.080
Miscellaneous	97.831	157.974	255.805
Agricultural inputs	501.950	81.661	583.611
Subtotal of rest of state economy	**25,126.760**	**57,049.235**	**82,175.995**
Total state economy	**26,796.820**	**57,163.355**	**83,960.175**

of commodities used by industries, and the origin of the inputs (either in-state or out-of-state). Again, the poultry and egg industry is by far the largest farm industry in terms of output value. It also purchases more than $1.1 billion in input commodities, the majority from outside Mississippi. Six other agricultural industries purchase the majority of their inputs from outside the state. All nonagricultural industries together purchase about 56% of input commodities from outside the state.

As noted previously, summing the values of all commodities generated within an economy may be somewhat misleading since intermediate goods may be counted more than once. To avoid this potential problem, measures such as gross domestic product (GDP) and gross state product (GSP) have been developed. A region's gross product is a measure of the amount of new goods and services produced and made available to final consumers. To avoid counting the value of a product at every stage in its supply chain, the value of intermediate products is not included in gross product accounting – only the values of final products are counted. Thus, an economy's gross product is the sum of the monetary values of all final (not intermediate) goods and services produced.

Another often-used measure, net product, is obtained by subtracting the value of worn-out machinery and buildings (depreciation) from gross product. A region's aggregate income, another performance measure, is obtained by subtracting indirect business taxes (e.g., sales taxes, excise taxes, etc.) from net product. Other income measures, such as personal income and disposable income, may be computed from a region's aggregate income if necessary data are available.

A region's aggregate income may also be derived from some of the expenditures made by businesses and governments. In addition to buying intermediate products (as inputs) from other businesses, firms make payments to people for the use of their labor, financial capital, or real capital; these payments are called wages, interest, and rent, respectively. The recipients consider these types of payments as income. In addition to these types of income, business owners receive profits, which are the residual amounts of revenues left after paying all expenses (of course, if expenses are greater than revenues, a loss, or a negative profit, would result). Thus, a region's aggregate income may be computed by adding together payments made in the form of wages, interest, rent, and profits by all firms (i.e., firms that produce either intermediate or final products).

Table 11. Value of out-of-state commodities purchased in Mississippi, by source, 2000.

Commodity	Purchases of commodities produced out-of-state by MS . . .		
	Industries (X $1 million)	Institutions (X $1 million)	Total (X $1 million)
Poultry & eggs	5.556	0.147	5.703
Cattle feedlots	267.407	0.000	267.407
Ranch-fed cattle	29.323	0.000	29.323
Hogs & pigs	109.103	0.000	109.103
Feed grains (corn, grain sorghum, et al.)	130.872	3.542	134.414
Vegetables	11.878	76.049	87.926
Oil-bearing crops (soybeans et al.)	9.297	0.033	9.331
Greenhouse & nursery products	25.391	40.319	65.710
Miscellaneous livestock (catfish et al.)	22.925	5.488	28.414
Hay & pasture	82.126	1.792	83.917
Fruits	0.333	92.516	92.850
Dairy farm products	52.347	0.756	53.103
Range-fed cattle	65.539	0.000	65.539
Cotton	39.502	7.489	46.991
Food grains (wheat, rice, et al.)	27.749	0.000	27.749
Miscellaneous crops	11.562	0.078	11.641
Sheep, lambs, & goats	6.470	0.000	6.470
Tree nuts	0.142	2.781	2.923
Grass seeds	4.415	0.574	4.989
Other meat animal products	0.648	0.000	0.648
Sugar crops	0.406	0.000	0.406
Tobacco	0.050	0.000	0.050
Subtotal of agricultural products	**903.043**	**231.565**	**1,134.608**
Services	6,306.992	5,435.116	11,742.108
Manufacturing	11,053.739	7,239.645	18,293.384
Finance, insurance, & real estate	3,252.913	5,888.771	9,141.684
Transportation, communications, & utilities	1,827.413	1,739.372	3,566.784
Government	127.520	58.176	185.696
Construction	246.702	1,160.960	1,407.662
Retail trade	111.537	1,503.549	1,615.085
Wholesale trade	1,943.390	1,185.943	3,129.333
Food preparation & processing	1,364.763	2,505.856	3,870.619
Forestry & products	2,268.796	605.050	2,873.846
Mining	3,194.943	6.200	3,201.143
Textiles	974.875	830.016	1,804.891
Miscellaneous	399.561	1,131.130	1,530.692
Agricultural inputs	309.224	52.756	361.980
Subtotal of rest of state economy	**33,382.367**	**29,342.539**	**62,724.906**
Total state economy	**34,285.410**	**29,574.105**	**63,859.515**

Table 12. Value of outputs produced and inputs purchased by Mississippi industries, 2000.

Industry	Outputs produced (X $1 million)	Inputs purchased (X $1 million)	Instate inputs (X $1 million)	Out-of-state inputs (X $1 million)
Poultry & eggs	1,379.856	1,128.429	420.292	708.137
Cotton	405.699	240.267	135.692	104.576
Miscellaneous livestock (catfish et al.)	308.230	223.518	89.808	133.710
Oil-bearing crops (soybeans et al.)	184.856	80.313	46.488	33.825
Ranch-fed cattle	176.142	117.696	49.780	67.916
Food grains (wheat, rice, et al.)	111.834	62.042	34.810	27.231
Feed grains (corn, grain sorghum, et al.)	108.957	52.059	28.254	23.805
Forest products	100.913	49.527	26.880	22.647
Hay & pasture	94.950	45.910	24.917	20.993
Dairy farm products	75.060	45.263	14.864	30.400
Hogs & pigs	53.500	42.180	13.879	28.300
Greenhouse & nursery products	47.963	17.691	10.552	7.140
Vegetables	38.774	20.749	13.034	7.716
Range-fed cattle	17.279	11.303	3.186	8.117
Cattle feedlots	6.702	4.416	1.206	3.211
Fruits	5.228	2.814	1.795	1.019
Miscellaneous crops	3.807	2.494	1.403	1.091
Tree nuts	3.792	1.599	1.070	0.529
Sheep, lambs, & goats	0.278	0.173	0.048	0.124
Grass seeds	0.245	0.106	0.070	0.036
Subtotal of agricultural production	**3,124.065**	**2,148.550**	**918.030**	**1,230.520**
Manufacturing	24,292.589	17,477.604	6,143.971	11,333.632
Services	19,235.656	7,481.779	3,206.580	4,275.199
Finance, insurance, & real estate	13,384.578	4,038.200	1,893.904	2,144.296
Government	12,404.430	971.211	596.956	374.254
Construction	10,174.045	6,646.690	2,842.122	3,804.568
Transportation, communications, & utilities	10,064.626	5,141.224	2,719.226	2,421.997
Forestry & products	9,311.015	6,069.969	2,943.816	3,126.153
Retail trade	8,944.162	2,500.242	1,134.439	1,365.802
Food processing & preparation	5,550.457	4,591.982	2,705.649	1,886.333
Wholesale trade	4,694.359	1,475.237	661.682	813.555
Textiles	2,242.529	1,656.475	631.249	1,025.226
Agricultural inputs	847.655	469.809	225.316	244.493
Mining	732.186	413.259	173.878	239.381
Subtotal of rest of state economy	**121,878.288**	**58,933.679**	**25,878.789**	**33,054.890**
Total state economy	**125,002.353**	**61,082.229**	**26,796.819**	**34,285.410**

A concept related to income is value added, which is defined as a firm's revenue from selling its products minus the amount it paid for intermediate goods and services that it purchased from other firms. For example, a firm purchases a "raw product" for $7 from an "upstream" firm, purchases other inputs for $3 from other "upstream" firms, uses other factors of production (e.g., labor and capital) to transform the raw product into a finished product, and then sells the finished product for $15 to a "downstream" buyer. The production activities of this firm resulted in a value added of $5, which is computed as $15 less $7 less $3. The firm will then distribute its value added ($5) to cover expenses in the form of (1) payments to its factors of production (labor and capital), (2) indirect business taxes, and (3) profits. If value added is computed for each firm in every stage in the supply chain, the total value added throughout the supply chain will be equal to the sales value of the final (consumer) product. Thus, a region's gross product may be computed by summing the value added derived from the production of all products, both intermediate and final.

Table 13 presents total value added and its components for agricultural industries and other industries in Mississippi. Note that the poultry and egg industry has the largest value added among the farm industries, but its value added is much closer to the other farm industries than its output value. The largest component of value added in agricultural industries is proprietor income (income retained by self-employed business people). The component called "other property income" includes corporate profits, rental payments, and interest payments. "Employee compensation" includes wages and salaries to hired workers as well as

the value of benefits. In nonagricultural industries, employee compensation is the largest component of value added.

Table 14 presents value added, earnings (the total of employee compensation and proprietor income), employment (jobs held by hired and self-employed people), and earnings per employee. Across the agricultural industries, there is a wide variation in earnings per employee. This is partly a reflection of the variation in hours per year actually worked. Many agricultural industries do not require year-round work but may provide useful part-time work to many people. For instance, the hay and pasture industry generated the most jobs among all farm industries (9,796) in 2000, but its average income was only $2,874, one of the lowest in the state. The average annual income for an agricultural employee ($11,309) was only 40% of that of a nonfarm employee ($28,119). Again, this is a reflection of the time spent working during the year. In the nonfarm groups, "agricultural inputs" and "retail trade" were the two lowest in terms of average earnings. Farms generate about 3.6% of the state's jobs, but farm's value added and earnings are only about 1.5% of the state total.

Table 13. Value added by Mississippi industries and its four components, 2000.

Industry	Total value added (X $1 million)	Employee compensation (X $1 million)	Proprietor income (X $1 million)	Other property income (X $1 million)	Indirect business taxes (X $1 million)
Poultry & eggs	251.427	51.403	126.094	67.846	6.084
Cotton	165.432	42.491	58.386	49.626	14.929
Oil-bearing crops (soybeans et al.)	104.543	11.695	45.790	35.676	11.382
Miscellaneous livestock (catfish et al.)	84.712	17.001	43.574	20.430	3.707
Ranch-fed cattle	58.445	14.525	32.619	6.404	4.898
Feed grains (corn, grain sorghum, et al.)	56.898	3.714	26.514	19.712	6.959
Forest products	51.387	4.046	15.475	29.406	2.460
Food grains (wheat, rice, et al.)	49.793	2.154	21.414	20.755	5.469
Hay & pasture	49.040	4.146	24.007	15.437	5.450
Greenhouse & nursery products	30.271	12.588	6.734	10.538	0.410
Dairy farm products	29.797	6.592	19.528	3.392	0.285
Vegetables	18.025	5.720	6.206	5.356	0.743
Hogs & pigs	11.321	3.430	4.834	1.732	1.325
Range-fed cattle	5.976	1.430	3.503	0.591	0.452
Fruits	2.414	1.522	0.345	0.424	0.123
Cattle feedlots	2.286	0.545	1.315	0.241	0.185
Tree nuts	2.192	1.087	0.553	0.480	0.073
Miscellaneous crops	1.313	0.173	0.637	0.408	0.095
Grass seeds	0.139	0.003	0.075	0.058	0.002
Sheep, lambs, & goats	0.105	0.022	0.065	0.011	0.008
Subtotal of agricultural production	**975.515**	**184.286**	**437.667**	**288.522**	**65.040**
Services	11,753.878	7,924.962	1,852.155	1,505.813	470.948
Government	11,433.220	9,255.158	0.000	2,178.062	0.000
Finance, insurance, & real estate	9,346.378	1,632.081	290.240	6,297.771	1,126.286
Manufacturing	6,814.986	4,547.352	92.022	1,964.090	211.522
Retail trade	6,443.921	3,640.046	418.200	1,205.482	1,180.193
Transportation, comm., & utilities	4,923.402	2,285.011	253.506	1,913.905	470.980
Construction	3,527.355	2,279.451	830.982	345.805	71.117
Forestry & products	3,241.046	2,162.057	159.271	822.116	97.603
Wholesale trade	3,219.122	1,844.810	106.109	603.769	664.435
Food processing & preparation	958.475	704.373	19.501	198.843	35.758
Textiles	586.053	452.040	1.410	120.057	12.547
Agricultural inputs	377.846	183.107	73.900	105.888	14.950
Mining	318.927	94.502	36.838	156.374	31.213
Subtotal of rest of state economy	**62,944.609**	**37,004.951**	**4,134.134**	**17,417.974**	**4,387.550**
Total state economy	**63,920.123**	**37,189.237**	**4,571.800**	**17,706.496**	**4,452.590**

Table 14. Value added, earnings, and employment by Mississippi industries, 2000.

Industry	Value added (X $1 million)	Earnings (X $1 million)	Employment (jobs)	Earnings per employee ($)
Poultry & eggs	251.427	177.497	9,392	18,898
Cotton	165.432	100.877	4,096	24,629
Oil-bearing crops (soybeans et al.)	104.543	57.485	4,872	11,799
Miscellaneous livestock (catfish et al.)	84.712	60.575	7,026	8,622
Ranch-fed cattle	58.445	47.144	6,439	7,322
Feed grains (corn, grain sorghum, et al.)	56.898	30.227	2,737	11,044
Forest products	51.387	19.521	2,892	6,750
Food grains (wheat, rice, et al.)	49.793	23.568	2,246	10,494
Hay & pasture	49.040	28.153	9,796	2,874
Greenhouse & nursery products	30.271	19.323	1,457	13,262
Dairy farm products	29.797	26.120	928	28,147
Vegetables	18.025	11.926	666	17,907
Hogs & pigs	11.321	8.264	1,163	7,106
Range-fed cattle	5.976	4.932	675	7,307
Fruits	2.414	1.867	193	9,671
Cattle feedlots	2.286	1.860	83	22,410
Tree nuts	2.192	1.640	115	14,263
Miscellaneous crops	1.313	0.810	140	5,801
Grass seeds	0.139	0.078	28	2,818
Sheep, lambs, & goats	0.105	0.087	55	1,581
Subtotal of agricultural production	**975.515**	**621.953**	**54,998**	**11,309**
Services	11,753.878	9,777.117	378,959	25,800
Government	11,433.220	9,255.158	281,515	32,876
Finance, insurance, & real estate	9,346.378	1,922.321	73,740	26,069
Manufacturing	6,814.986	4,639.374	120,995	38,344
Retail trade	6,443.921	4,058.246	244,391	16,606
Transportation, communications, & utilities	4,923.402	2,538.518	65,566	38,717
Construction	3,527.355	3,110.433	103,482	30,058
Forestry & products	3,241.046	2,321.327	70,889	32,746
Wholesale trade	3,219.122	1,950.919	50,930	38,306
Food preparation & processing	958.475	723.874	31,608	22,901
Textiles	586.053	453.449	19,416	23,355
Agricultural inputs	377.846	257.007	18,283	14,057
Mining	318.927	131.341	3,281	40,031
Subtotal of rest of state economy	**62,944.609**	**41,139.085**	**1,463,055**	**28,119**
Total state economy	**63,920.124**	**41,761.038**	**1,518,053**	**27,510**
Ag production as pct. of state total (%)	**1.526**	**1.489**	**3.623**	

MULTIPLIERS AND IMPACT ANALYSIS

An input-output model is designed to capture the financial linkages among the many participants residing within a regional economy. The "IMPLAN Professional™ Version 2.0 Social Accounting and Impact Analysis Software" package was used to evaluate the economic impacts of the major agricultural production industries in Mississippi using financial transactions data for the calendar year 2000. The IMPLAN (IMpact analysis for PLANning) model was first developed by the USDA Forest Service to assist in land and resource management planning. The current version allows the user more flexibility in selecting methods and assumptions when computing social accounts and input-output multipliers.

As mentioned previously, changes in the economic activity of any one industry will result in changes throughout the whole economy. The magnitude of these "spillover" impacts should increase as the degree of interdependence within the economy increases. If an industry purchases many of its inputs from other local industries and creates many local jobs, then the spillover impacts within the local economy should be relatively large. Conversely, if the industry relies on imported inputs, produces commodities that are exported, or is not very labor intensive, then the spillover impacts would be relatively small. There are two sources for spillover impacts: (1) "indirect" impacts reflect the many interindustry relationships

Table 15. Value-added multipliers for Mississippi's agricultural production industries, 2000.

Industry	Type I multiplier	Type SAM multiplier
Poultry & eggs	2.032855	3.300958
Hogs & pigs	1.733784	2.854255
Miscellaneous crops	1.696126	2.753930
Miscellaneous livestock (catfish et al.)	1.612261	2.610084
Cotton	1.544973	2.497608
Ranch-fed cattle	1.509194	2.482712
Vegetables	1.458141	2.347272
Fruits	1.444477	2.345369
Food grains (wheat, rice, et al.)	1.413466	2.255842
Cattle feedlots	1.343313	2.208913
Range-fed cattle	1.318763	2.167919
Dairy farm products	1.326050	2.161041
Sheep, lambs, & goats	1.298266	2.134600
Hay & pasture	1.316422	2.123770
Feed grains (corn, grain sorghum, et al.)	1.309255	2.108885
Oil-bearing crops (soybeans et al.)	1.300810	2.090144
Forest products	1.325919	2.069637
Tree nuts	1.264735	2.038863
Grass seeds	1.241225	1.955798
Greenhouse & nursery products	1.228248	1.945517

involved in "upstream" production processes; and (2) "induced" impacts are generated by the extra spending of households and governments stemming from the additional income that is generated through direct and indirect impacts on production.

An IMPLAN model is capable of measuring some of the spillover impacts from an assumed initial change in one or more industries of the local economy. However, the IMPLAN model is capable of capturing impacts only in the "upstream" direction of the supply chain, not in the "downstream" direction. That is, suppose the analyst wishes to estimate the economy-wide impacts related to an increase in an industry's production. The IMPLAN model will capture any changes in that industry's input requirements (i.e., its "backward" linkages) and in subsequent "backward" linkages in related industries, but it will not capture the impacts of any changes that might take place as the original industry's output passes "downstream" through the supply chain (i.e., the "forward" linkages) to the final consumers. This feature of IMPLAN models must be taken into account when interpreting results.

Several types of "multipliers" may be estimated for a particular performance measure for an industry. A "Type I" multiplier reflects the direct impact plus any indirect effects, or changes in economic activity from interindustry transactions related through all backward linkages in production processes. A "Type SAM (Social Accounts Matrix)" multiplier includes the direct and indirect effects and adds any induced effects stemming from changes in household and government spending. In this study, Type SAM multipliers were computed with all institutions included (i.e., all institutions were selected in the "Construct Model" routine within the IMPLAN software package). Depending on the purpose of the study, one or both of these multipliers may be useful.

Table 15 presents value added multipliers for the 20 agricultural production industries under study. The industries are listed in descending order of Type SAM multipliers. Production of poultry and eggs provides the largest multiplier impact per dollar of value added, while greenhouse and nursery products has the smallest value-added multiplier. Based on an estimated Type I multiplier of 2.03, it may be stated that, for every $1.00 increase in value added generated by the poultry and eggs industry, then the rest of the state's industries will have an increase in value added of $1.03, giving a total of $2.03 in value added throughout the state's industries.

The poultry and eggs industry's Type SAM multiplier of 3.30 has a similar interpretation. That is, for every $1.00 increase in value added in the poultry and egg industry, other industries in the state will generate an additional $2.30 of value added. The difference between the two multipliers is due to induced effects, or changes in household and government spending. Thus, induced impacts from the poultry and egg industry equal $1.27 per $1.00 of value added.

Table 16. Employment multipliers for Mississippi's agricultural production industries, 2000.

Industry	Type I multiplier	Type SAM multiplier
Poultry & eggs	2.120877	2.938445
Cotton	1.757337	2.687339
Dairy farm products	1.457048	2.098880
Vegetables	1.505619	2.084794
Cattle feedlots	1.369127	1.942989
Food grains (wheat, rice, et al.)	1.197240	1.650112
Oil-bearing crops (soybeans et al.)	1.186668	1.596889
Feed grains (corn, grain sorghum, et al.)	1.190614	1.593603
Hogs & pigs	1.311281	1.574653
Miscellaneous crops	1.327947	1.568104
Miscellaneous livestock (catfish et al.)	1.275158	1.564589
Tree nuts	1.177917	1.532180
Greenhouse & nursery products	1.142770	1.500308
Forest products	1.164927	1.484266
Fruits	1.194782	1.465513
Ranch-fed cattle	1.252686	1.465439
Range-fed cattle	1.145747	1.326568
Hay & pasture	1.046966	1.144817
Grass seeds	1.024229	1.109979
Sheep, lambs, & goats	1.026079	1.064675

Table 17. Contribution of agricultural production to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Agricultural production	**975,532,101**	**54,999**
Impacts from above sector on:		
Government	253,137,272	6,144
Services	211,205,678	6,561
Finance, insurance, & real estate	201,410,432	1,977
Agricultural inputs	155,814,319	10,571
Transportation, communications, & utilities	144,544,682	1,831
Retail trade	136,717,084	5,306
Wholesale trade	126,911,112	2,008
Construction	79,483,522	2,307
Manufacturing	46,391,417	622
Food preparation & processing	18,150,395	381
Forestry & products	9,992,889	258
Mining	6,017,207	57
Textiles	3,430,173	122
Subtotal of above industries	**1,393,206,179**	**38,144**
Total contribution	**2,368,738,280**	**93,143**
Multiplier	**2.428150**	**1.693539**

Table 16 presents employment multipliers for the 20 agricultural production industries under study. The industries are listed in descending order of Type SAM multipliers. The poultry and egg industry provides the largest multiplier impact per job, while the sheep, lamb, and goat industry has the smallest employment multiplier. The poultry and egg industry has a Type I multiplier of 2.121, meaning that for every one-job increase in the poultry and egg industry, other industries in the state will generate an additional 1.121 jobs. The Type SAM multiplier of 2.938 means that for every one-job increase in the poultry and egg industry, other industries in the state will generate an additional 1.938 jobs. Again, the difference between the two multipliers is due to induced effects, or changes in household and government spending. Thus, induced impacts from the poultry and egg industry generate 0.817 jobs.

One question of interest is, "How much does an industry contribute to the state's economy?" This question could be answered in terms of direct impacts only or could include spillover impacts (indirect plus induced). Even though input-output models have limitations, they may provide some relevant information with respect to spillover impacts. In the IMPLAN software package, the "Impacts" routine allows the modeler to specify a change in the employment level for one industry or a group of industries taken together. The financial linkages embedded in the model's data are used to compute not only the direct impacts imposed by the modeler, but also the spillover impacts generated throughout the regional economy. Impact analysis was conducted by grouping all 20 agricultural production industries together. The results are presented in Table 17. Agricultural production has a direct contribution of more than $975 million in value added and about 55,000 jobs. Spillover impacts add about $1.39 billion in value added and about 38,000 jobs. About 65% and 57% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by these businesses, the rest of the state's economy generates an additional $1.43 of value added. For every job created by these businesses, the rest of the state's economy generates another 0.7 jobs.

As mentioned previously, an IMPLAN model captures only backward linkages from a proposed change in an industry's output or employment. One way to capture a portion of the forward linkages from changes in a production industry is to include its major industrial customer(s) as part of a group within IMPLAN's Impact routine. A processing industry is usually the major purchaser of a farm production industry. By grouping a processing industry with a production industry, the input-output model is able to capture

Table 18. Contribution of poultry and egg production and processing to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Poultry processing	427,025,920	17,744
Poultry & eggs	251,429,616	9,392
Subtotal of above industries	**678,455,536**	**27,136**
Impacts from above sector on:		
Services	184,898,173	5,890
Government	181,950,356	4,351
Finance, insurance, & real estate	145,974,959	1,275
Transportation, communications, & utilities	124,203,548	1,588
Retail trade	108,803,719	4,275
Wholesale trade	100,847,328	1,596
Agricultural inputs	94,524,902	6,781
Construction	55,643,988	1,614
Manufacturing	31,364,520	448
Forestry & products	22,479,977	476
Rest of agricultural production	20,380,711	1,288
Food preparation & processing	13,571,413	256
Mining	3,930,228	37
Textiles	2,593,770	92
Subtotal of above industries	**1,091,167,591**	**29,966**
Total contribution	**1,769,623,127**	**57,102**
Multiplier	**2.608311**	**2.104263**

backward linkages from both industries as a group. However, impacts on other important downstream industries, such as transportation and trade, are not captured by this approach. Thus, only a partial impact will be estimated for a given change in the production and processing of a particular commodity. The impact analysis results for the state's eight largest agricultural production and processing industries are presented in Tables 18–25. The poultry and egg group has the largest impact on value added and is listed first (Table 18). Other industry groups are then listed in descending order of their contribution to the state's value added.

The poultry and egg group has a direct contribution of almost $680 million in value added and about 27,000 jobs. Spillover impacts add about $1 billion in value added and almost 30,000 jobs. About 62% and 54% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by these businesses, the rest of the state's economy generates an additional $1.61 of value added. For every job in this group, the rest of the state's economy generates another 1.1 jobs.

The meat group directly contributes about $200 million in value added and about 11,200 jobs. Spillover impacts add about $278 million in value added and about 7,000 jobs. About 67% and 63% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by this group, the rest of the state's economy generates an additional $1.38 of value added. For every job in this group, the rest of the state's economy generates another 0.62 jobs.

The miscellaneous livestock group, which includes catfish production, was defined to include the fish processing industry. This group has a direct contribution of about $191.5 million in value added and about 11,500 jobs. Spillover impacts add about $279 million in value added and about 7,000 jobs. About 65% and 61% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of this group's value added, the rest of the state's economy generates an additional $1.46 of value added. For every job in this group, the rest of the state's economy generates another 0.61 jobs.

Table 19. Contribution of meat production and processing to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Meat packing plants	104,036,696	2,379
Ranch-fed cattle	58,445,548	6,439
Sausages & other prepared meats	18,978,906	535
Hogs & pigs	11,320,198	1,163
Range-fed cattle	5,975,830	675
Cattle feedlots	2,285,224	83
Subtotal of above industries	**201,042,402**	**11,274**
Impacts from above industries on:		
Government	50,938,112	1,230
Services	50,315,865	1,639
Finance, insurance, & real estate	45,615,237	420
Transportation, communications, & utilities	31,598,600	457
Wholesale trade	30,216,120	478
Retail trade	29,158,845	1,137
Construction	13,923,223	402
Manufacturing	7,584,656	126
Rest of agricultural production	7,062,668	724
Forestry & products	4,930,836	106
Agricultural inputs	3,647,152	227
Food preparation & processing	1,735,207	53
Mining	843,320	8
Textiles	698,134	25
Subtotal of above industries	**278,267,977**	**7,033**
Total contribution	**479,310,379**	**18,307**
Multiplier	**2.384126**	**1.623846**

Table 20. Contribution of the miscellaneous livestock group to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Prepared fresh or frozen fish or seafood	106,864,008	4,475
Miscellaneous livestock (catfish et al.)	84,712,136	7,026
Subtotal of above industries	**191,576,144**	**11,501**
Impacts from above sector on:		
Government	49,730,317	1,189
Services	46,860,933	1,480
Wholesale trade	39,977,136	632
Finance, insurance, & real estate	38,387,018	348
Retail trade	29,014,475	1,130
Transportation, communication, & utilities	27,720,417	346
Construction	12,795,640	370
Rest of agricultural production	9,011,691	749
Manufacturing	8,421,210	131
Food preparation & processing	6,384,489	244
Agricultural inputs	5,240,078	313
Forestry & products	3,785,447	85
Mining	988,742	9
Textiles	695,726	25
Subtotal of above industries	**279,013,319**	**7,052**
Total contribution	**470,589,463**	**18,553**
Multiplier	**2.456410**	**1.613148**

Table 21. Contribution of cotton production and processing to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Cotton	165,431,248	4,096
Cottonseed oil mills	7,379,196	193
Subtotal of above industries	**172,810,444**	**4,289**
Impacts from above sector on:		
Government	48,586,788	1,187
Finance, insurance, & real estate	40,676,132	427
Services	39,071,764	1,210
Agricultural inputs	30,153,701	1,933
Wholesale trade	28,674,138	454
Retail trade	24,845,542	966
Transportation, communications, & utilities	24,087,387	305
Construction	14,583,071	422
Manufacturing	7,841,588	109
Rest of agricultural production	2,262,257	140
Forestry & products	1,703,869	45
Mining	1,065,889	10
Food preparation & processing	990,165	25
Textiles	604,429	22
Subtotal of above industries	**265,146,719**	**7,254**
Total contribution	**437,957,163**	**11,543**
Multiplier	**2.534321**	**2.691553**

Table 22. Contribution of the feed group to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Feed grains (corn, grain sorghum, et al.)	56,897,320	2,737
Hay and pasture	49,040,248	9,796
Prepared feeds (not elsewhere classified)	30,077,698	630
Subtotal of above industries	**136,015,266**	**13,163**
Impacts from above industries on:		
Government	38,820,903	949
Services	32,277,756	992
Finance, insurance, & real estate	29,083,139	280
Wholesale trade	22,161,052	351
Transportation, communications, & utilities	21,357,524	296
Retail trade	19,630,726	765
Construction	10,972,746	318
Manufacturing	10,137,391	139
Agricultural inputs	9,842,396	548
Rest of agricultural production	9,318,374	454
Food preparation & processing	4,784,524	94
Forestry & products	1,372,027	36
Mining	872,904	8
Textiles	479,873	17
Subtotal of above industries	**211,111,336**	**5,245**
Total contribution	**347,126,602**	**18,408**
Multiplier	**2.552115**	**1.398493**

The cotton group has a direct contribution of almost $173 million in value added and about 4,300 jobs. Spillover impacts add about $265 million in value added and about 7,250 jobs. About 63% and 56% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added in this group, the rest of the state's economy generates an additional $1.53 of value added. For every job in this group, the rest of the state's economy generates another 1.7 jobs.

The feed group was defined to include three industries. This group has a direct contribution of about $136 million in value added and almost 13,200 jobs. Spillover impacts add about $211 million in value added and about 5,200 jobs. About 63% and 61% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by this group, the rest of the state's economy generates an additional $1.55 of value added. For every job in this group, the rest of the state's economy generates another 0.4 jobs.

The oilseed (primarily soybeans) production and processing group has a direct contribution of about $115 million in value added and almost 5,100 jobs. Spillover impacts add about $161.5 million in value added and about 3,800 jobs. About 65% and 67% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by this group, the rest of the state's economy generates an additional $1.40 of value added. For every job in this group, the rest of the state's economy generates another 0.75 jobs.

The ornamental horticulture group was defined to include two industries having a direct contribution of about $137 million in value added and almost 7,300 jobs. Spillover impacts add about $115 million in value added and about 2,700 jobs. About 81% and 82% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by this group, the rest of the state's economy generates an additional $0.84 of value added. For every job in this group, the rest of the state's economy generates another 0.38 jobs.

Dairy production and processing includes three industries having a direct contribution of about $56 million in value added and about 1,400 jobs. Spillover

impacts add almost $83 million in value added and about 2,100 jobs. About 64% and 60% of value added and employment spillover impacts, respectively, are attributed to induced impacts. For every $1 of value added by these businesses, the rest of the state's economy generates an additional $1.47 of value added. For every job in this group, the rest of the state's economy generates another 1.47 jobs.

Businesses and households pay various types of taxes, duties, and fees to local, state, and federal governments. The Impact routine in IMPLAN also provides estimates of these payments as a result of an industry's direct and spillover effects. Table 26 presents the estimated taxes, duties, and fees paid to local and state governments and the federal government arising from the economic activity generated by the eight agricultural production and processing groups under study. These payments stem from all direct impacts within a group as well as backward linkages that result in indirect and induced impacts. As expected, a group's payments are generally correlated with its value added. The reader should note that it is not proper to sum these payments across groups because the impact analysis was performed on an individual group basis; that is, adding the payments from two or more groups would result in double-counting errors. Based on the impact analysis conducted on the 20 agricultural production industries as a group, it was estimated that this sector generated $173,904,009 in payments to state and local governments and $353,747,591 in payments to the federal government, for a total of $527,651,600.

Table 23. Contribution of oilseed production and processing to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Oil-bearing crops (soybeans et al.)	104,543,112	4,872
Soybean oil mills	10,900,228	195
Subtotal of above industries	**115,443,340**	**5,067**
Impacts from above sector on:		
Government	31,503,741	774
Wholesale trade	26,178,710	414
Services	25,042,495	789
Finance, insurance, & real estate	25,029,980	251
Transportation, communications, & utilities	15,609,881	204
Retail trade	15,563,570	607
Construction	8,942,622	259
Agricultural inputs	5,625,987	315
Manufacturing	4,496,254	67
Forestry & products	1,131,136	29
Rest of agricultural production	833,861	59
Food preparation & processing	615,342	16
Mining	566,865	5
Textiles	374,881	13
Subtotal of above industries	**161,515,326**	**3,804**
Total contribution	**276,958,666**	**8,871**
Multiplier	**2.399987**	**1.750741**

Table 24. Contribution of the ornamental horticulture group to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Landscape & horticultural services	106,879,760	5,826
Greenhouse & nursery products	30,271,544	1,457
Subtotal of above industries	**137,151,304**	**7,283**
Impacts from above industries on:		
Government	24,843,647	594
Services	23,894,278	716
Finance, insurance, & real estate	18,646,430	180
Retail trade	14,497,855	563
Transportation, communications, & utilities	10,201,415	122
Wholesale trade	8,097,457	128
Construction	7,184,617	210
Manufacturing	3,478,202	54
Rest of agricultural inputs	1,723,651	96
Forestry & products	881,025	23
Food preparation & processing	558,797	14
Mining	421,553	4
Rest of agricultural production	397,063	26
Textiles	344,239	12
Subtotal of above industries	**115,170,228**	**2,742**
Total contribution	**252,321,532**	**10,025**
Multiplier	**1.839731**	**1.376431**

Table 25. Contribution of dairy production and processing to Mississippi's economy, 2000.

Industry	Value-added ($)	Employment (jobs)
Initial values in:		
Dairy farm products	29,796,122	928
Fluid milk	21,695,430	474
Condensed & evaporated milk	4,798,264	29
Subtotal of above industries	**56,289,816**	**1,431**
Impacts from above industries on:		
Services	14,875,991	473
Government	14,146,610	338
Finance, insurance, & real estate	12,000,496	112
Wholesale trade	10,539,492	167
Retail trade	8,692,814	341
Transportation, communications, & utilities	8,483,559	106
Construction	4,135,332	120
Manufacturing	3,321,987	49
Rest of agricultural production	2,294,367	236
Forestry & products	1,962,726	41
Agricultural inputs	1,584,353	106
Food preparation & processing	392,722	10
Mining	280,496	3
Textiles	204,261	7
Subtotal of above industries	**82,915,206**	**2,108**
Total contribution	**139,205,022**	**3,539**
Multiplier	**2.473005**	**2.473209**

Table 26. Taxes, duties, and fees generated from direct and backward linkage spillover impacts for selected agricultural production and processing groups, Mississippi, 2000.

Group	State & local ($)	Federal ($)	Total ($)
Poultry & eggs	112,988,749	284,579,599	397,568,348
Meat	37,143,563	78,852,642	115,996,205
Miscellaneous livestock (catfish et al.)	33,082,804	75,481,211	108,564,015
Cotton	35,662,671	66,999,144	102,661,815
Feed	29,696,229	52,779,311	82,475,540
Oilseeds (soybeans et al.)	25,242,774	41,911,218	67,153,992
Ornamental horticulture	14,954,243	38,117,035	53,071,278
Dairy	9,005,589	21,638,270	30,643,859

SUMMARY AND CONCLUSIONS

Producers of agricultural commodities (defined in this study to include crops and livestock produced on farms and ranches, but not to include nonfarm forestry products) in Mississippi have been important contributors to the state's economy. Mississippi currently has about 43,000 farms that control about 11 million acres. However, about 70% of these farms have annual sales of less than $10,000 and control a total of 3.3 million acres.

This study focused on 20 agricultural production industries for which data sufficient for use in an input-output model were acquired. These 20 agricultural industries create about 55,000 jobs in Mississippi. About 42,000 of these jobs are for the production of hay and pasture, poultry and eggs, miscellaneous livestock (primarily catfish), beef cattle, soybeans, and cotton. The average annual income per employee exhibited a wide range of variability across the 20 agricultural industries. The average annual income per employee was $11,309 for agricultural production industries and $28,119 for the rest of the state's industries. This difference between agricultural and nonagricultural industries is partly due to the part-time nature of many agricultural jobs.

The sales value of Mississippi's agricultural commodities (excluding farm-produced forestry products) totaled almost $3 billion in 2000. The rest of the state had sales valued at almost $122 billion. Poultry and egg production has continued its upward trend, generating, by far, the largest sales value among the state's agricultural commodities. Cotton, catfish, soybeans, beef cattle, and grain crops were some of the state's other high-valued commodities. Instate firms purchased a very large portion of Mississippi's poultry products, but out-of-state businesses bought a very large percentage of Mississippi's cotton.

Mississippi industries and institutions purchased about $2.9 billion of agricultural commodities in 2000. Nonagricultural commodity purchases amounted to about $144.9 billion. Poultry and eggs purchases totaled about $1.176 billion, accounting for about 40% of the state's agricultural commodities. About 61% of the state's total agricultural commodity purchases originated in Mississippi. This percentage is weighted

heavily by the extremely high percentage of poultry and eggs purchases that were produced instate.

Agricultural producers had an output value of more than $3.1 billion in 2000. The rest of the state's industries produced an output worth almost $122 billion. Agricultural industries purchased about $2.1 billion in inputs (with about 43% of this coming from instate sources), leaving a value added of about $975 million. This value added was distributed as follows: $437.7 million to proprietors, $288.5 as other property income, $184.3 million to employees, and $65 million as indirect business taxes. The rest of the state's industries purchased about $59 billion in inputs (about 44% coming from instate sources) and created a value added of almost $63 billion. This value added was distributed as follows: $37 billion to employees, $17.4 billion as other property income, $4.4 billion as indirect business taxes, and $4.1 billion to proprietors. Proprietor income was the largest component of value added in Mississippi's agricultural production industries, but it was the smallest component in the state's other industries.

Table 27. Estimated impacts on value added from selected agricultural production and processing industries in Mississippi, 2000.

Group	Type SAM multiplier (X $1 million)	Direct impact (X $1 million)	Spillover impact (X $1 million)	Total impact (X $1 million)
Poultry & eggs	2.608311	678.5	1,091.2	1,769.6
Meat	2.384126	201.0	278.3	479.3
Miscellaneous livestock (catfish et al.)	2.456410	191.6	279.0	470.6
Cotton	2.534321	172.8	265.1	438.0
Feed	2.552115	136.0	211.1	347.1
Oilseeds (soybeans et al.)	2.399087	115.4	161.5	277.0
Horticulture	1.839731	137.1	115.2	252.3
Dairy	2.473005	56.3	82.9	139.2

Table 28. Estimated impacts on employment from selected agricultural production and processing industries in Mississippi, 2000.

Group	Type SAM multiplier (jobs)	Direct impact (jobs)	Spillover impact (jobs)	Total impact (jobs)
Poultry & eggs	2.104263	27,136	29,966	57,102
Miscellaneous livestock (catfish et al.)	1.613148	11,501	7,052	18,553
Feed	1.398493	13,163	5,245	18,408
Meat	1.623846	11,274	7,033	18,307
Cotton	2.691553	4,289	7,254	11,543
Ornamental horticulture	1.376431	7,283	2,742	10,025
Oilseeds (soybeans et al.)	1.750741	5,067	3,804	8,871
Dairy	2.473209	1,431	2,108	3,539

An IMPLAN model is capable of estimating some of the spillover effects from a change in an industry's output. Specifically, the model is used to measure an industry's interactions with other "upstream" industries. Impact analysis was used on the group of 20 agricultural production industries. This group directly contributed more than $975 million in value added and 55,000 jobs and had a value added multiplier of 2.428150 and an employment multiplier of 1.693539.

Impact analysis was also conducted for the state's eight largest agricultural production and processing industries. Results from the impact analysis for value added and employment are presented in Tables 27 and 28, respectively. A value-added multiplier for a group measures the total impact on the state's value added (i.e., gross state product) from a $1 change in the group's value added. For instance, if the cotton group (defined to include cotton production and cottonseed oil mills) increased its production such that its value added increased by $100,000, then the total impact at the state level would be an increase in value added of $253,432 (i.e., $100,000 from the cotton group and $153,432 from the rest of the state's industries). This impact assumes that the increase in the cotton group's production does not come at the expense of production of other crops in the state.

An employment multiplier measures the total impact on the state's employment when an industry changes its employment by one job. For instance, if the poultry and egg group employs 1,000 more people in order to increase its output, then the final statewide impact on employment would be 2,104 new jobs (i.e., 1,000 jobs created in the poultry and egg group and another 1,104 jobs created in the rest of the state's industries). This impact assumes that the 2,104 new

employees did not leave their existing jobs within the region (i.e., they were either unemployed prior to the change or came from outside the state).

As seen in Tables 27 and 28, a group has a direct impact (actual values for the businesses assigned to that group) and a spillover impact (estimated values due to the group's backward linkages throughout the state's economy). The sum of these two types of impacts is the group's estimated total contribution to the state's economy. As noted in many sections of this bulletin, Mississippi's poultry and egg group generated much more economic activity than any other agricultural group. Readers should note that it is not proper to add the spillover (or total) impacts from one or more groups together because spillover impacts from one group were estimated separately from all other groups. Double-counting errors would occur if spillover values from different groups were added together.

REFERENCES

Barnett, Barry, and Lynn Reinschmiedt. "Agriculture and Forestry in Mississippi – An Analysis of the Impacts of Food and Fiber Related Sectors on the Mississippi Economy." Agricultural Economics Technical Bulletin 95. Mississippi State University. November 1996.

Edmondson, William, Mindy Petrulis, and Agapi Somwaru. "Measuring the Economywide Effect of the Farm Sector: Two Methods." USDA/ERS Technical Bulletin 1843. July 1995.

Goodwin, H.L., Jr., Jennie Popp, Wayne Miller, Gina Vickery, and Z. Clayton-Niederman. "Impact of the Agricultural Sector on the Arkansas Economy." Arkansas Agricultural Experiment Station Research Report 969. University of Arkansas. October 2002.

Hughes, David W. "Measuring the Effect of Louisiana Agriculture on the State Economy Through Multiplier and Impact Analysis." Louisiana Agricultural Experiment Station Research Bulletin 849. Louisiana State University. October 1995.

Lipton, Kathryn L., William Edmondson, and Alden Manchester. "The Food and Fiber System: Contributing to the U.S. and World Economies." USDA/ERS Agriculture Information Bulletin 742. July 1998.

Minnesota IMPLAN Group, Inc. *IMPLAN Professional ™ Version 2.0 Social Accounting and Impact Analysis Software.* First Edition. Stillwater, Minnesota. April 1999.

Munn, Ian A., and James E. Henderson. "Forestry and Forest Products – The Impact of the Industry on the Mississippi Economy: An Input-Output Analysis." Forest and Wildlife Research Center Research Bulletin FO 206. Mississippi State University. 2002.

Spurlock, Stan, Ian Munn, and John Anderson. "The Contribution of Agriculture and forestry to Mississippi's Economy." Department of Agricultural Economics Information Sheet 2002-001. Mississippi State University. April 2002.

Appendix – Methods Used to Perform Impact Analysis

After selecting the state-level data file, the user must create the state's industry multipliers by using IMPLAN's Construct Model routine. After selecting the Type SAM (Social Accounts Matrix) multipliers, the user is allowed to select one or more of the following institutions for inclusion in this routine: nine household income categories, three federal government categories, three state/local government categories, and three other categories in the social accounts matrix. All 18 of these institutions were included for this analysis.

After constructing the predictive model (as described above), the Impact routine within IMPLAN allows the user to specify a group of industries to be analyzed. In this procedure, the user must specify the amount of employment or the value of output to change in each industry in the group. After specifying the appropriate agricultural production and processing industries as a group, each industry's actual employment (listed in the IMPLAN database) is entered. Then the Analyze subroutine is used to make an initial run with the "level" for each industry set equal to 1.0.

The Analyze subroutine computes direct, indirect, induced, and total impacts (i.e., the sum of the three types of impacts) on the original group of industries and all other related industries in the state. With the "level" for an industry set to 1.0, the direct impact in that industry is equal to the initial employment value previously specified. Thus, when an industry's indirect and induced impacts are added to its direct impact, the resulting total employment impact will be greater than its actual employment level. Thus, an adjustment in the industry's initially specified "level" is needed to make its total employment impact equal to its actual employment value. To make this adjustment, the user must rerun the Analyze subroutine for the original group of industries and reduce the "level" for each industry to some number less than 1.0. This procedure must be repeated (using a trial-and-error approach) until the estimated total employment impact is equal to the initial employment value in each of the industries in the original group.

After obtaining satisfactory total employment impacts on the original industries in the group, the impact analysis results for every performance measure (value added, employment, value of output, etc.) may be saved for subsequent analysis. Saving the results to a spreadsheet file allows for easy manipulation. For instance, similar industries may be grouped together and their values may be summed. The resulting sum for the whole group is then presented instead of the many individual industry values. By aggregating individual industries into meaningful groups, results may be condensed to facilitate exposition.

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