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The U.S. And Eighth District Agricultural Economies in 1989: Building on Past Strength

THE U.S. AGRICULTURAL economy showed continued strength in 1989 as real net farm income rose to its highest level since 1975. This article examines the factors behind last year's agricultural expansion in the United States and analyzes the 1989 agricultural economy in the Eighth Federal Reserve District. Issues of importance to agriculture in the new decade are also discussed briefly.

THE U.S. AGRICULTURAL ECONOMY

Farm Finances

Real net farm income, the difference between gross farm income and total expenses, was estimated to be \$39 billion in 1989, its highest level since 1975 when it was \$43.1 billion.¹ As table 1 shows, the \$3.8 billion increase in real

net farm income over 1988 was the fourth rise in the last six years. The rise in real net farm income in 1989 resulted from a rise in crop and livestock receipts, in conjunction with a build-up in agricultural commodity inventories, that outweighed declining government receipts and higher expenses.²

Increased crop receipts and higher inventory values in 1989 were largely due to agriculture's recovery from the 1988 drought. As the drought reduced crop production in 1988, grain stocks dwindled and crop prices rose. Crop prices remained relatively strong throughout 1989, while crop production rebounded sharply. U.S. corn production, for example, jumped nearly 53 percent over 1988 production, while soybean production rose 24 percent. This combination of higher production and relatively high crop prices allowed farmers to take in larger crop receipts. Similarly, increased production allowed

¹Forecast values are from the U.S. Department of Agriculture's *Agricultural Outlook* (March 1990).

²Net farm income approximates the net value of agricultural production in a calendar year plus government payments, less total expenses. Net farm income is equal to gross farm income less total expenses. Gross farm income includes farm receipts from commodity sales, government payments and the value of inventory changes. Farm

receipts represent the value of commodities that are produced and sold, while changes in the value of inventories captures the value of commodities that are produced, but not sold. Therefore, a build-up in inventories leads to higher net farm income.

Table 1
Farm Sector Income Statement (billions of 1982 dollars)

	1981	1982	1983	1984	1985	1986	1987	1988	1989 ¹
Farm receipts	\$153.2	\$147.1	\$135.5	\$136.3	\$134.4	\$123.6	\$124.0	\$129.6	\$129.7
Government payments	2.0	3.5	8.9	7.8	6.9	10.4	14.2	12.0	8.8
Gross farm income	176.9	163.5	147.1	162.4	150.0	141.0	146.4	146.4	152.8
Total expenses	148.2	140.0	134.9	132.5	120.8	107.6	109.2	111.3	113.8
Net farm income ²	28.6	23.5	12.2	29.9	29.2	33.4	37.2	35.2	39.0
Net cash income	34.9	37.8	35.4	35.8	42.1	45.5	46.5	47.2	42.0

¹Values for 1989 are forecasts.

²Net farm income includes the value of inventory changes. Data are rounded.

SOURCE: *Agricultural Outlook* (March 1990).

more grain to be stored at higher prices, raising the value of farm inventories.

Adding support to net farm income were higher prices for cattle, hogs, broilers and milk. Milk and livestock production, except for cattle, were also higher. Nominal livestock receipts in 1989, it appears, have risen 5.2 percent over 1988 to \$83 billion, the highest level of the decade.

While real net farm income rose 11 percent in 1989, real net cash income dropped 11 percent (see table 1).³ The difference between the two is this: net farm income represents income largely generated from a given calendar year's production, whether the commodities are sold, fed or placed in inventory during the year. Net cash income measures the total income that farmers receive from their operation in a given calendar year, regardless of how much they produced or when they actually produced it. It approximates the income stream available to farmers for purchasing assets or paying off debt. The \$5.2 billion drop in real net cash income in 1989 was a result of falling government payments and rising cash expenditures, which outweighed increased commodity receipts.

³Net cash income is equal to farm receipts plus government payments less cash expenses. Cash expenses exclude depreciation, perquisites to hired labor, and farm household expenses.

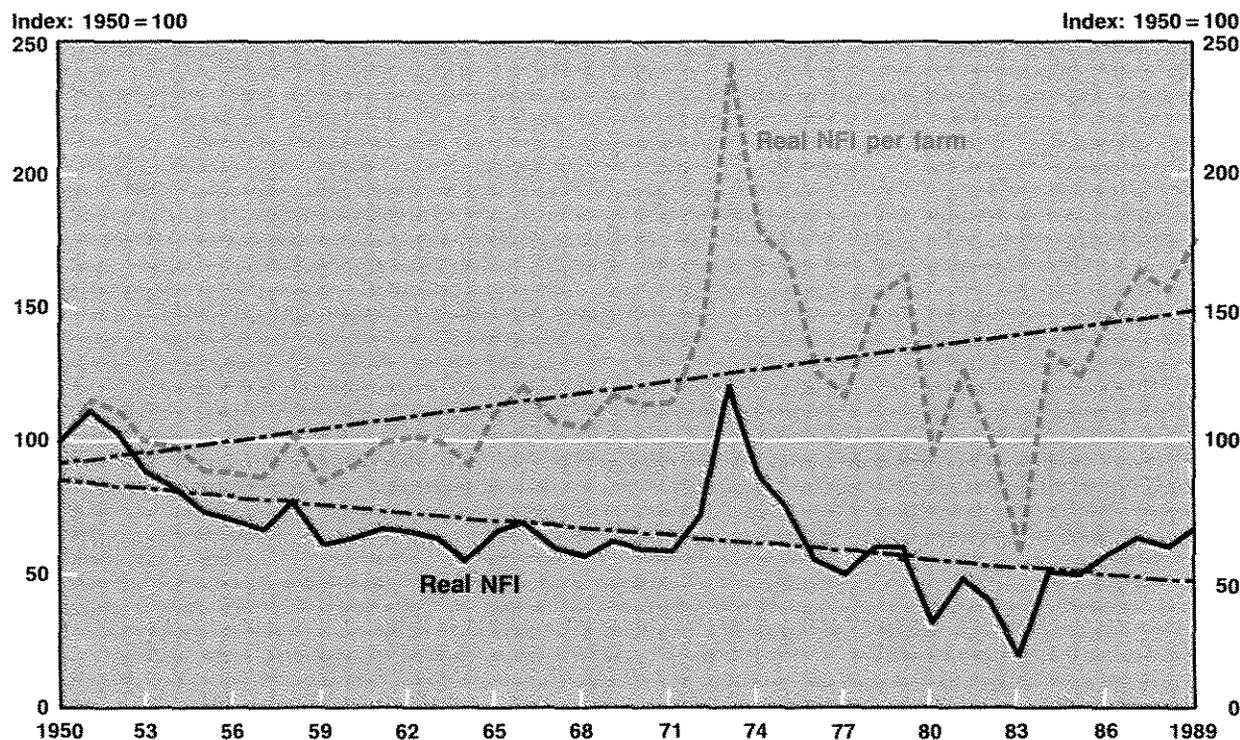
As the number of farms continues to decline, the use of either real net farm or cash income as indicators of the income position of the average farm can be misleading.⁴ The reason is that total farm income is being divided among fewer farms. Indexes representing real net farm income and real net farm income per farm are shown in figure 1. While real net farm income generally has trended downward since 1950, real net farm income per farm has moved in the opposite direction. Indeed, while real net farm income declined 32 percent between 1950 and 1989, real net farm income per farm increased 77 percent. Similarly, real net cash income declined 21 percent between 1950 and 1989, while real net cash income per farm increased 105 percent. In 1989, real net farm income per farm rose 12 percent over 1988, while real net farm income rose 11 percent. Real net cash income per farm fell 13.8 percent and real net cash income fell 11 percent below 1988.

Farm Balance Sheet

The farm sector's balance sheet improved again in 1989, as exemplified by the lower debt-to-asset and debt-to-equity ratios shown in fig-

⁴See Karrenbrock (June 1990) for a detailed discussion of some of the problems associated with different farm income series.

Figure 1
U.S. Real Net Farm Income Indexes



SOURCES: USDA, *Economic Indicators of the Farm Sector, National Financial Summary, 1988*, and *Agricultural Outlook*.

ure 2. A primary reason for this improvement is rising real estate values.⁵ Strong returns in the agricultural sector over the past several years have encouraged investors to pay more for agricultural real estate. In 1989, farm real estate values rose \$40 billion, or 6.6 percent, while real estate debt fell \$1.7 billion, or 2.2 percent. The decline in non-real-estate debt experienced throughout the 1983-89 period appears to be bottoming out. Between 1983 and 1987, non-real-estate debt dropped an average of 7.2 percent per year, but between 1987 and 1989, that same figure fell by an average of less than 0.1 percent per year.

Agricultural Trade

U.S. agricultural exports reached their highest level since 1984, standing at nearly \$39.7 billion for fiscal year 1989.⁶ Most of the \$4.3 billion, or

12 percent, increase in agricultural exports was due to a rise in the value of grain exports. Although the quantity of grain exports increased overall, higher prices also played a significant role in increasing the value of grain exports. In fact, higher wheat prices allowed the value of wheat exports to rise 34 percent, despite a 7 percent decline in the quantity of wheat exports. Also adding to the increase in agricultural exports were meat exports, which rose about \$558 million, or 31 percent. U.S. agricultural imports were up only slightly in 1989, leaving net agricultural exports at \$18.1 billion, the highest agricultural trade surplus since 1984.

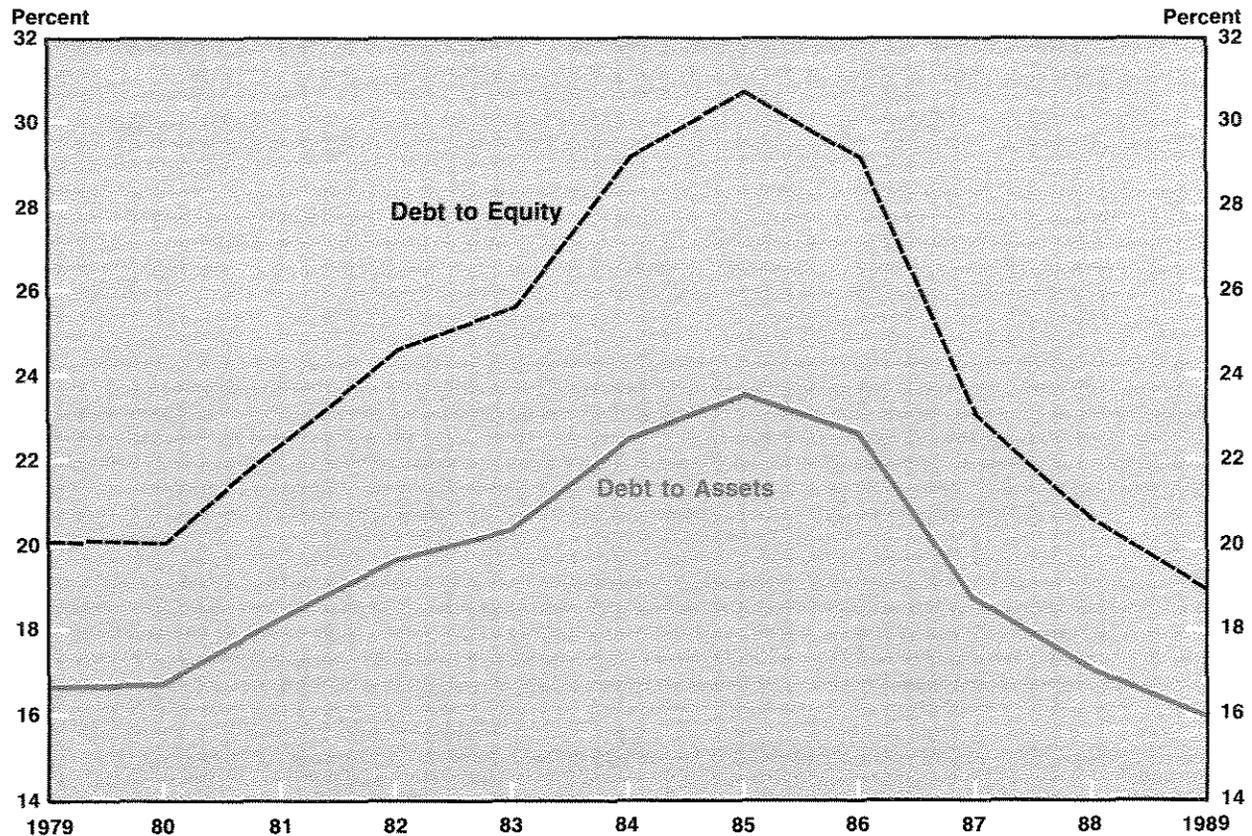
Government Support

Direct government payments to farmers fell \$3.5 billion in 1989 to \$11 billion. Although down from the record direct government pay-

⁵1989 ratios and real estate figures are forecasted values as reported in USDA's *Agricultural Outlook* (March 1990).

⁶Real agricultural exports for fiscal year 1989 were about \$31.4 billion, their highest level since 1984.

Figure 2
U.S. Agricultural Balance Sheet Ratios



SOURCE: USDA, *Agricultural Outlook* (March 1990).

ments of \$16.7 billion in 1987, the \$11 billion payments are still relatively high compared to past payments. For example, direct government payments to farmers as a percent of net farm income averaged 4 percent during the 1950s, 19 percent during the 1960s and 11 percent during the 1970s. In the 1980s, direct government payments to farmers as a percent of net farm income have averaged almost 28 percent.⁷ In 1989, this figure was 23 percent, the seventh consecutive year in which it topped 20 percent. The 1989 direct government payments include about \$2.1 billion in disaster payments stemming from the 1988 drought.

⁷The 1980s figure is skewed by the huge amount of payments made to farmers in 1983 during the Payment-in-Kind program. During 1983, direct government payments to farmers as a percent of net farm income was 73.2 percent.

⁸The FAMC is similar to other government-sponsored agencies such as the Governmental National Mortgage Associ-

Agricultural Lenders

In 1989, the Federal Agricultural Mortgage Corporation (FAMC) moved closer to opening a secondary market for agricultural loans.⁸ When "Farmer Mac" becomes fully operational, financial institutions, such as banks, insurance companies and the Farm Credit Banks, that choose to become members will be able to originate, pool and underwrite agricultural loans.⁹ Agricultural real estate loans and rural housing loans, both with certain restrictions, are eligible to be pooled. Once the loans are pooled, the financial institutions will be able to offer farm mortgage-backed securities. Farmer Mac, owned by its

ation (Ginnie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac).

⁹Much of the information in this section was taken from Booth (1990) and various issues of the *National Farm Finance News*.

Table 2
U.S. and District Agricultural Banking Data

	United States		District	
	1988	1989	1988	1989
Return on assets	0.91%	1.03%	1.05%	1.10%
Return on equity	9.64	10.68	11.10	11.25
Agricultural loan losses/Total agricultural loans	0.60	0.35	0.45	0.27
Agricultural nonpf loans/Total agricultural loans ¹	3.76	3.15	4.99	3.76
Primary capital ratio	10.33	10.50	10.26	10.49

NOTE: An agricultural bank is defined as a bank that has at least 25 percent of its loan portfolio in agricultural loans.

¹Nonperforming loans are defined as those loans that are 90 days or more delinquent.

SOURCE: Fourth-quarter FDIC Reports of Condition and Income for Insured Commercial Banks.

member institutions, will guarantee the timely payment of principal and interest to investors.

To obtain this Farmer Mac guarantee, the issuers of the farm mortgage-debt must pay both an initial and an annual fee based on the size of the issue. In addition, issuers must stand ready to cover at least 10 percent of any losses that occur as a result of delinquencies and default on the underlying loans. A final factor, perhaps the most important in allowing it to guarantee its members' issues, is FAMC's guaranteed \$1.5 billion line of credit at the U.S. Treasury.

To limit the U.S. government's exposure, the amount of loans eligible for Farmer Mac guarantees will be limited and relaxed progressively in the first three years of operation to 2 percent, 4 percent and 8 percent of the total outstanding supply of non-FmHA agricultural mortgage loans. Farmer Mac is also establishing underwriting standards for issuing institutions. These standards include such items as a minimum number of loans in a pool and guidelines for both geographical and agricultural enterprise diversity. Observers expect the first pool of farm mortgage-backed debt to be issued this year.

In part, because of the improved performance of the agricultural economy in 1989, U.S. com-

mercial agricultural banks improved their financial performance during the year.¹⁰ Selected performance ratios for U.S. agricultural banks are shown in table 2. These banks, on average, increased their return on assets from 0.91 percent in 1988 to 1.03 percent in 1989 and their return on equity from 9.64 percent to 10.68 percent. Agricultural loan losses as a percent of total agricultural loans fell from 0.6 percent to 0.35 percent. Agricultural non-performing loans (those delinquent 90 days or more) as a percent of total agricultural loans fell from 3.76 percent to 3.15 percent. The primary capital ratio of U.S. agricultural banks improved as well to 10.5 percent, well above the 5.5 percent level required by law.¹¹

Finally, the Farm Credit System's financial position remained relatively stable in 1989.¹² Net income for 1989 was \$695 million compared with that in 1988 of \$704 million. There were significant improvements, however, in two income components. First, net interest income increased \$219 million in 1988 to a level of \$1.006 billion for 1989. This was in part due to the System's efforts to reduce non-earning assets and improve asset and liability management. Second, loan loss reversals played a smaller role in accounting for the System's profitability in 1989, as the negative provision for loan losses

¹⁰See Clark (1990) for a more extensive analysis of the commercial banking sector.

¹¹Starting in 1991, banks will be required to meet two new capital requirements. One capital standard will be based on core capital as a percent of total assets and the other based on qualifying capital as a percent of risk adjusted

assets. See Clark (1990) for a more detailed discussion of the new capital requirements.

¹²The Farm Credit System is a nationwide system of federally chartered agricultural lending institutions cooperatively owned by their borrowers.

Table 3
Percentage of Farm Cash Receipts from Commodity Sales

	United States	Eighth District	Arkansas	Kentucky	Missouri	Tennessee
Livestock products	53.0%	58.3%	62.6%	59.6%	55.2%	54.8%
Cattle & calves	23.1	18.7	10.0	19.0	22.8	25.8
Hogs	6.9	8.2	2.8	6.6	14.9	7.4
Dairy products	12.5	8.8	3.0	11.5	9.7	13.8
Broilers	4.8	10.2	34.6	0.1	0.0	0.0
Other	5.8	12.3	12.3	22.4	7.8	7.8
Crops	47.0	41.7	37.4	40.4	44.8	45.2
Rice	0.6	3.1	9.6	1.6	0.7	1.9
Wheat	3.8	2.6	3.4	8.0	3.0	5.2
Corn	7.3	4.7	0.3	6.4	8.5	11.7
Cotton	2.9	4.4	7.6	0.0	2.3	8.4
Tobacco	1.4	5.5	0.0	19.8	0.2	7.1
Soybeans	7.4	14.4	12.7	7.0	23.4	10.0
Vegetables	6.7	0.9	0.6	1.0	0.3	2.4
Fruits	5.7	0.4	0.2	0.4	0.4	0.5
Other	11.2	5.7	2.8	4.2	6.1	11.6

NOTE: All figures represent the average percent of total commodity cash receipts for the years 1986-88. Each region is calculated independently of the others.

SOURCE: Derived from data obtained from the *Economic Indicators of the Farm Sector: State Financial Summary, 1988*. USDA, Economic Research Service.

of \$285 million was \$395 million lower than the 1988 negative provision of \$680 million.¹³

THE EIGHTH DISTRICT AGRICULTURAL ECONOMY

The diversity of the agricultural economy of the Eighth Federal Reserve District, highlighted in table 3, and the uneven effects of the 1988 drought suggest the presence of noteworthy differences in agricultural performance between the Eighth District and the nation, as well as among Eighth District states.¹⁴ As in the nation, livestock products account for the majority of farm receipts in District states, with cattle and calves being relatively important to all District states. Hogs are important in Missouri and dairy products are important to all District states, except Arkansas. Arkansas, on the other hand, is

the nation's largest broiler producer, and most of its livestock receipts are concentrated in that industry. Kentucky's livestock receipts are dominated by the horse industry.

Soybeans are by far the District's most important crop. Corn receipts are significant in Missouri and Tennessee, while cotton plays a key role in Arkansas and Tennessee. Rice is also important in Arkansas, while Kentucky's crop receipts are led by tobacco. Fruits and vegetables account for a minor portion of District crop receipts, especially when compared with the roles these crops play in the nation's agricultural economy.

District Weather

Despite excellent weather for corn production in most of the District, lingering drought condi-

¹³Loan loss reversals occur when firms lower the amount of money they have set aside to cover loan losses.

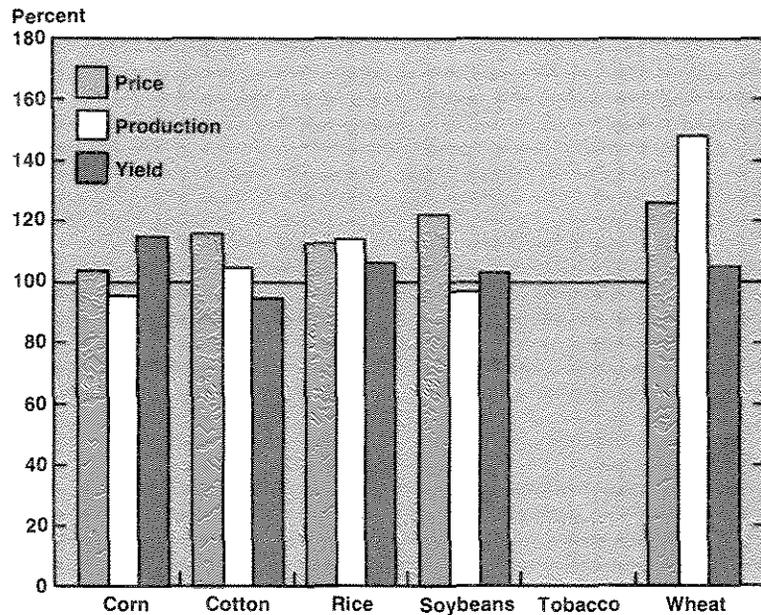
¹⁴The Eighth Federal Reserve District includes all of Arkansas and parts of Illinois, Indiana, Kentucky, Mississippi,

Missouri and Tennessee. The majority of this report, however, focuses only on the entire states of Arkansas, Kentucky, Missouri and Tennessee.

Figure 3 State Agricultural Indicators

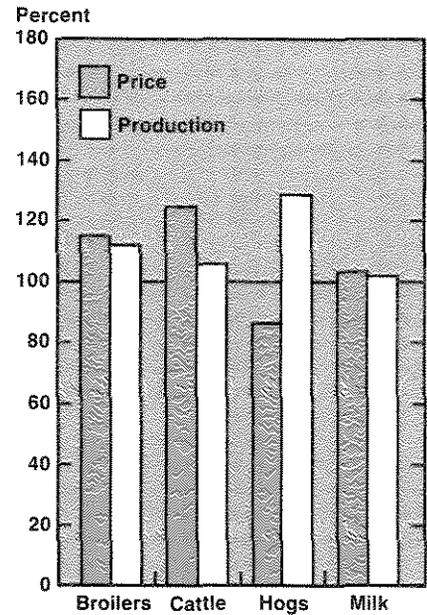
Arkansas Crop Indicators

1989 as a percent of 1985-88 average



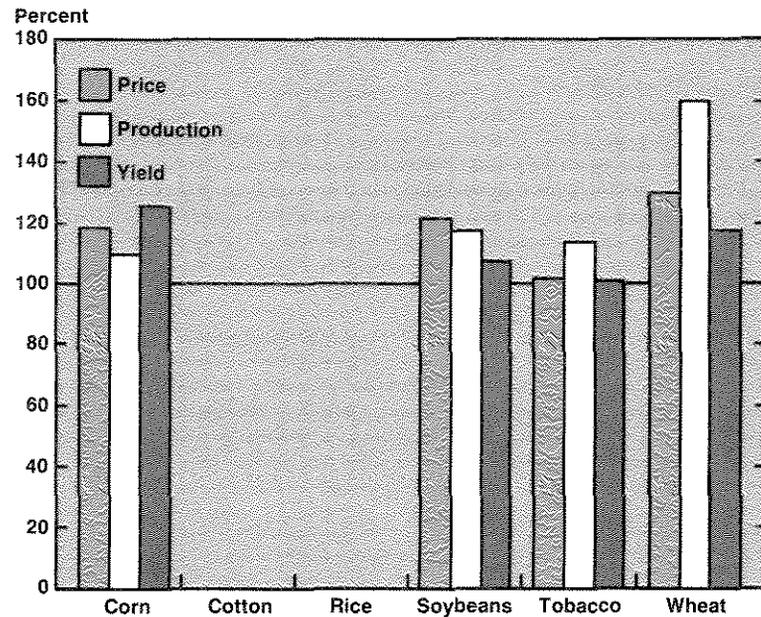
Arkansas Livestock Indicators

1989 as a percent of 1985-88 average



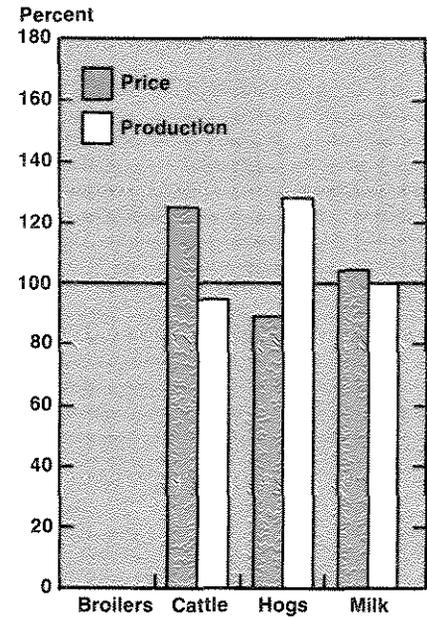
Kentucky Crop Indicators

1989 as a percent of 1985-88 average



Kentucky Livestock Indicators

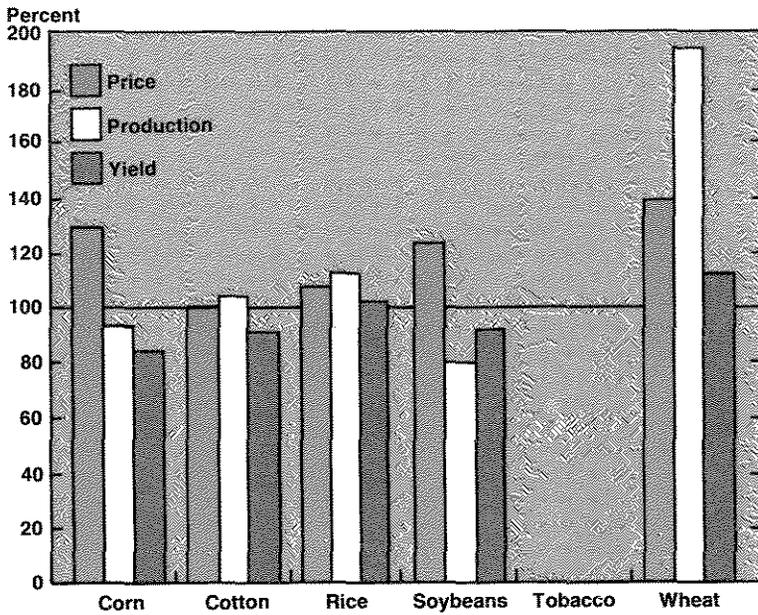
1989 as a percent of 1985-88 average



SOURCE: Derived from data provided by the Agricultural Statistical Service of the four states and USDA, *Agricultural Prices*.

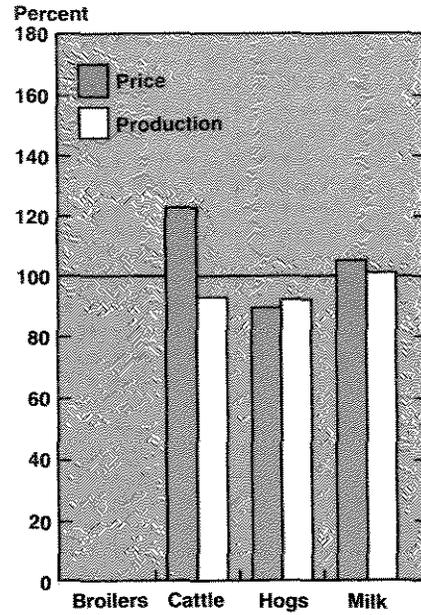
Missouri Crop Indicators

1989 as a percent of 1985-88 average



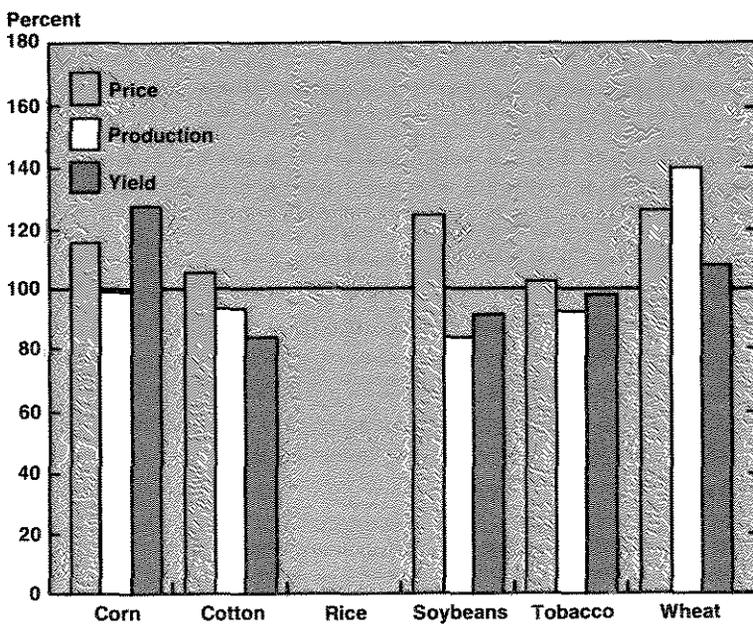
Missouri Livestock Indicators

1989 as a percent of 1985-88 average



Tennessee Crop Indicators

1989 as a percent of 1985-88 average



Tennessee Livestock Indicators

1989 as a percent of 1985-88 average

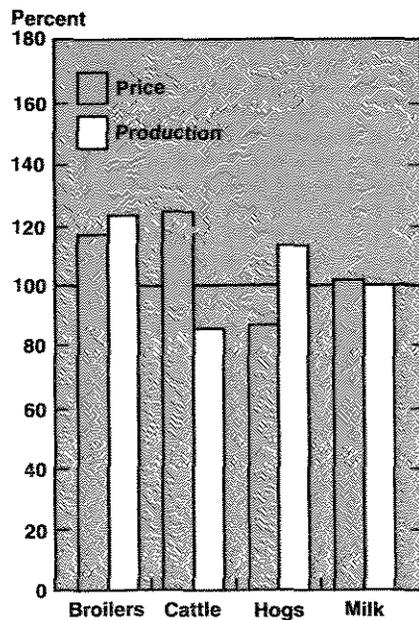
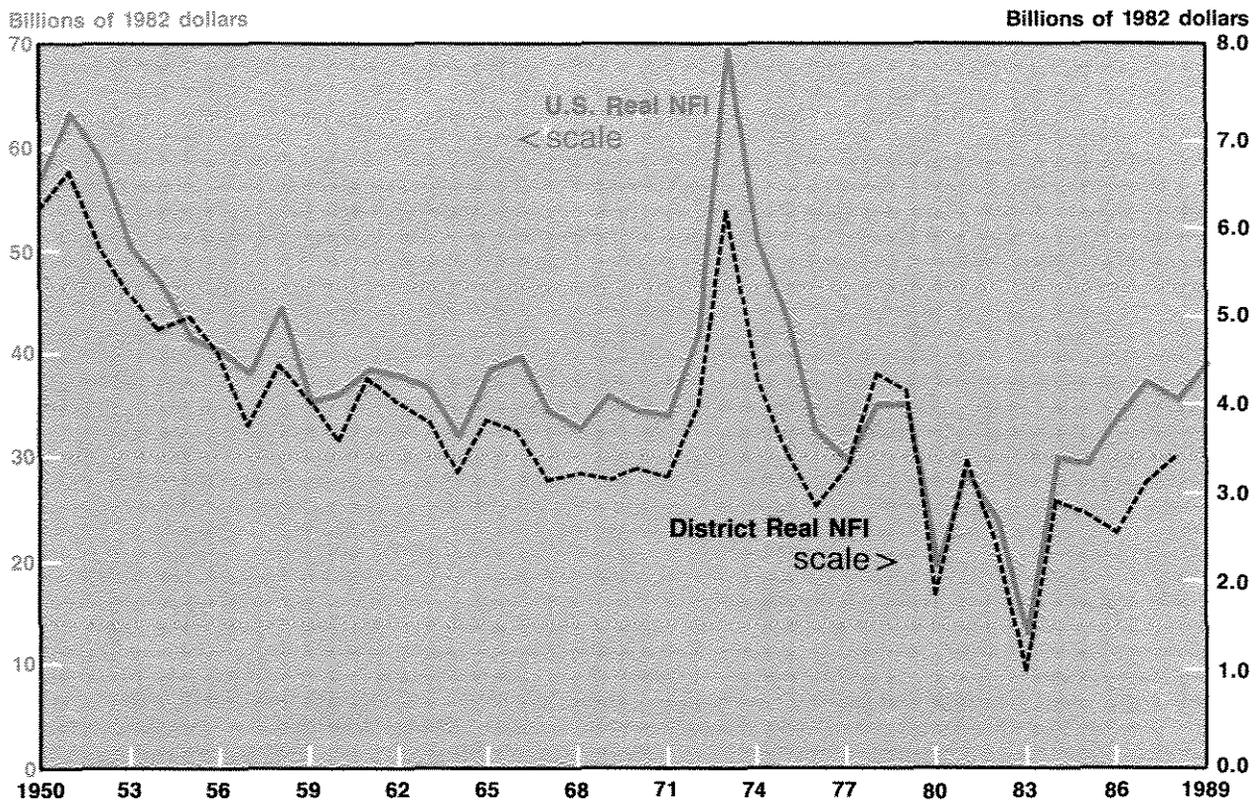


Figure 4
U.S. and District Real Net Farm Income



SOURCES: USDA, *Economic Indicators of the Farm Sector, National Financial Summary and State Financial Summary.*

District Net Farm Income

Net farm income figures for District states are available with a one year lag; therefore, 1989 figures are not yet available. Movements in District real net farm income, as shown in figure 4, have generally paralleled movements in U.S. real net farm income. The drought of 1988, however, hit other regions more severely than it did the Eighth District, and the District's real net farm income actually increased in 1988, while U.S. real net farm income fell. The latest available state farm income data indicate that 1988 real net farm income in Arkansas, Kentucky and Tennessee rose 28 percent, 3 percent and 17 percent over their 1987 figures, while U.S. real net farm income fell 5.1 percent. Missouri's real net farm income fell 10 percent in 1988, as its agricultural production more closely

followed the drought-stricken pattern of the rest of the United States.

Since the District was not as severely affected by the drought as other regions of the nation, District farm income growth in 1989 may not have paralleled the income rebound induced by the drought recovery in the rest of the nation. In fact, it may have fallen in 1989. 1989 cash receipts from commodity sales were down 2 percent, 3.7 percent, and 7.8 percent in Arkansas, Missouri and Tennessee, respectively, from a year ago. To match the expected 12.4 percent increase in U.S. net farm income, these states will have to have seen higher government payments, increased their agricultural inventory values, and/or reduced farm expenses in 1989. Kentucky differs from the other District states with cash receipts up 12.7 percent over a year ago.

District Agricultural Lenders

Agricultural banks in the Eighth District showed continued strength in 1989.¹⁵ As shown in table 2, District institutions, on average, obtained higher returns on assets and higher returns on equity in 1989, although the gains were not as large as those experienced in 1988. Similarly, both agricultural loan losses and non-performing loans as a percent of total agricultural loans declined in 1989. Again, however, the improvements in 1989 were not as dramatic as those in 1988.

Like the national Farm Credit System, both Farm Credit Banks in the Eighth District reported improved financial conditions in 1989. The Farm Credit Bank of St. Louis reported net earnings of \$81.2 million, marking the third consecutive year of positive earnings. The bank's 1988 earnings stood at \$99.8 million. The Louisville Farm Credit Bank posted 1989 earnings of \$83.2 million, up from \$3.6 million in 1988. Both banks had lower loan-loss reversals in 1989, meaning that the banks are deriving less income from the reversal of loan-loss provisions and more from normal lending operations. Net interest income was also up at both banks. The St. Louis Farm Credit Bank reported a significant increase in new farm real estate loan volume during the year, and the Louisville Bank's gross loans outstanding increased for the first time in eight years.

AGRICULTURAL ISSUES FOR THE 1990S

U.S. farmers are leaving the 1980s in better financial condition than they were in the first half of the decade. As farmers move into the 1990s, several important issues will affect the profitability of their operations. These issues include the adoption of new technology, environmental concerns, increased consumer protection, agricultural trade and the 1990 farm bill. Perhaps the most important long-term issues are what role technology will play and how environmental concerns will be addressed. This section briefly discusses these two issues.¹⁶

Technology

Technological change has long been labeled the "treadmill" of agriculture. Farmers have adopted new technologies that have expanded agricultural supplies faster than the growth in demand for agricultural products. As a result, real agricultural prices have declined. These falling prices pushed farmers to continually adopt new technology in an attempt to lower production costs more rapidly than their product prices were falling. The new technology, of course, would again increase agricultural supplies and the cycle would continue. Such a cycle, despite necessitating adjustments in agriculture, does have the positive benefit of lower food prices for consumers.¹⁷

The initial rounds of technological advancement in agriculture began with the adoption of mechanized equipment, then later took the form of hi-bred crops and livestock and increased use of fertilizer. The next wave will be biotechnology, which is broadly defined as applied biological science. One of the benefits of biotechnology is its ability to reduce the amount of time needed to develop more productive crops and livestock. For example, biotechnology has allowed researchers to mass produce hormones that are found naturally in livestock. One such hormone, bovine somatotropin (BST), increases the output of milk cows. By using this hormone, dairy farmers can increase the output of their livestock within days by an amount that would have taken several years to accomplish using traditional genetic breeding.

The rate at which biotechnology is adopted will depend, in part, on consumer acceptance of the products produced under its use. If consumers are hesitant to consume food produced with biotechnology, farmers will not produce it. Some dairy farmers, for example, are concerned about BST because some consumers have indicated that they will not drink milk produced using it. Policymakers will also resist the adoption of new agricultural technology, as it will undoubtedly drive some of their farm constituents out of business. In the long run, how-

¹⁵Banking data is for all agricultural banks located within the Eighth District and not just those located in Arkansas, Kentucky, Missouri and Tennessee.

¹⁶See Drabenstott and Barkema (1990) for a more detailed discussion of these and other issues facing agriculture in the 1990s.

¹⁷This, of course, assumes a stable or very slow growing demand for agricultural products.

ever, the potential benefits for consumers and the competitive disadvantages for farmers electing to use less technologically advanced production methods suggests that the technology will be adopted.¹⁸ Farmers who adopt it early are likely to reap the largest profits.

Environmental Issues

A second agricultural issue of the 1990s will be how to deal with the declining quality of our natural resources. Environmental issues that will be important to agriculture in the 1990s include soil erosion, water quality and conservation and chemical use.

As technology has advanced, farmers have been able to farm more marginal land by making more intensive use of tillage, chemicals and irrigation in crop production. These practices have accelerated wind and water erosion and damaged water quality; crop farming, however, has not been the sole cause of environmental damage. Overgrazing on range land causes soil erosion, and livestock confinement operations sometimes have trouble preventing animal waste from entering the drinking water supply. Soil erosion, in conjunction with chemical and waste run-off, has damaged water quality throughout the country.

Some actions are already being taken to reduce environmental damage stemming from agricultural production. The Conservation Reserve Program, instituted by the USDA, takes highly erodible land out of production in return for annual payments to farmers. Farmers also have started to use reduced tillage techniques to limit erosion and have made more extensive use of natural predators, now called integrated pest management, to decrease the amount of chemicals needed to raise a good crop. In the future, biotechnology that makes plants and animals more resistant to insects and diseases may reduce the need for agricultural chemicals.

Though some actions have already been taken to reduce the damage to the environment, further action will be implemented in the 1990s. The decade will see a push for tighter control and monitoring of chemical use in agriculture. As population growth in the West competes

with agriculture for water, irrigation will perhaps decline. Programs also will likely be continued or expanded to take highly erodible land out of agricultural production.

While these measures will potentially improve the environment, they will also raise the cost of producing food.¹⁹ Society will have to decide how much it is willing to pay for food to either improve or limit the damage to the environment. Farmers will have to adapt to new restrictions on production techniques and will be forced to decide whether they can adjust to increasing environmental restrictions and remain profitable.

SUMMARY

Largely because of continued strong livestock returns and a rebound in crop production from last year's drought, U.S. net farm income in 1989 reached its highest level since 1975. The farm sector's balance sheet and agricultural exports also improved last year. While fundamental measures of the agricultural economy generally have improved in recent years, U.S. farmers remain dependent on government payments for a large portion of their income. Buoyed by the strong returns to farmers, agricultural financial institutions also bettered their performance during the year. District farmers received relatively high prices for their crops and livestock in 1989, but some District farmers faced disappointing weather conditions during the year.

Although farm returns have been relatively strong during the second half of the 1980s, it is unlikely that this trend will continue throughout the 1990s. In addition to dealing with the customary challenges of weather, price and income volatility, farmers will face several new challenges in the 1990s, including tighter environmental controls and the adoption of new production technologies.

REFERENCES

- Booth, James R. "Farmer Mac and the Secondary Market," Federal Reserve Bank of San Francisco *Weekly Letter*, January 5, 1990.
- Clark, Michelle A. "Eighth District Banks in 1989: In the Eye of A Storm?" this *Review* (May/June 1990), pp. 3-17.

¹⁸This, of course, assumes that consumers will readily accept biotechnologically produced products. While this may not hold true in the short run, continued consumer education will likely ease the resistance to biotechnology in the long run.

¹⁹The increased costs associated with tighter environmental controls may be offset somewhat by increased production efficiency stemming from the use of biotechnology.

Drabenstott, Mark, and Alan D. Barkema. "U.S. Agriculture Charts a New Course for the 1990s," Federal Reserve Bank of Kansas City, *Economic Review* (January/February 1990), pp. 32-49.

Karrenbrock, Jeffrey D. "Potential Pitfalls in Interpreting Farm Income Data," *Pieces of Eight: An Economic Perspective on the 8th District* Federal Reserve Bank of St. Louis (June 1990), pp. 10-13.

National Farm Finance News. Various issues (Dorset Group, Inc.).

U.S. Department of Agriculture. *Agricultural Outlook*, various issues.

_____. *Agricultural Prices*, various issues.

_____. *Economic Indicators of the Farm Sector: National Financial Summary, 1988*.

_____. *Economic Indicators of the Farm Sector: State Financial Summary, 1988*.