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APPRAISING THE EFFECTS OF THE AGRICULTURAL ACT OF 1970 UPON OKLAHOMA'S ECONOMY

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The Agricultural Act of 1970 embodies a new approach to supply adjustment policy, swinging away from acreage allotment and diversion provisions of the previous Act. Employing a "set-aside" provision, cotton, feed grains or wheat land is diverted, or set aside, in order that producers may become eligible for support payments. The allotment no longer serves as an upper limit on the permitted acreage of these crops nor, cotton excepted, is planting of a specific crop necessary for a producer to become eligible for price support benefits. Flexibilities have been written into the program whereby the Secretary may make participation more or less attractive to the producer in accordance with needs.

The announced goals of the new legislation are to: (1) give farmers more flexibility in making their operating decisions, (2) protect farm income, (3) keep our agricultural production in line with anticipated needs and (4) put greater reliance on the market place as the principal source of farm income. These goals provide a satisfactory set of hypotheses against which to test the accomplishments of the Act to date.

Advocates of particular changes in farm legislation frequently overlook the indirect nonfarm effects such changes may cause. Macroeconomic theory indicates a multiplier effect from changes in economic conditions. This paper utilizes both Economic Research Service programming techniques and two interindustry models for Oklahoma to examine both farm and nonfarm effects of the 1970 Farm Act upon Oklahoma's economy.

ESTIMATION DIFFICULTIES PECULIAR TO THE 1970 FARM ACT

An estimation of the response to the present legislation cannot borrow very heavily from experience used in making previous estimates for several reasons [5]. First, the commodity program of 1961 through 1970 relied heavily on allotments and bases that curtailed acreages of cotton, feed grains and wheat. The present Act makes production control dependent upon conserving use requirements. That is, it is essentially an annual land retirement program. In addition, recent Farm Acts required that substantial amounts of the three major crops be planted in order to qualify for farm program payments. Under the 1970 Farm Act, this is true only for cotton. Another reason concerns conserving use requirements. Conserving use is not a new concept; rather it has been expanded with the present set-aside provisions. However, statistical inquiry in the past has shown little relation between conserving use requirements or adjustments and cropland use [5]. Indeed, county-by-county comparisons of ASCS conserving bases as a proportion of total cultivated cropland show little consistency.

NATURE OF APAS PROGRAMMING MODELS

The ERS research effort noted above is termed the Aggregate Production Analysis System (APAS)[1] and is designed to provide production adjustment research and policy guidance on a continuing basis. The analysis emphasizes projection of basic

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[1] For a description of APAS and its organization, see [7].

agricultural performance variables over the near term (1 to 3 years), placing considerable reliance on aggregated linear programming results of representative resource situations.

The analytical framework used in this analysis included two APAS linear programming formulations. The first, the 1970 model, incorporated the provisions of the 1965 Farm Act as they applied to the 1970 production year. The 1971 model reflected the features of the set-aside legislation which became law in 1970 but first became effective for the 1971 production year.

Actual levels of organization and production in Oklahoma for 1970 were known. This allowed a test of the 1970 model. The optimal values were determined to be representative. The 1970 results were then used to compare against like output for the 1971 model.

To contend that the two models were completely consistent except for institutional constraints would be a misrepresentation. It was indicated above that the Agricultural Act of 1970 presented peculiar problems that had not previously been encountered. Therefore, whenever structural parameters could be included in the programming framework, this was done. For example, participation levels in all commodity programs for both years were known and utilized.

Livestock activities were not included except where they directly affected the profitability of a crop. For instance, the value of grazing obtained in connection with wheat producing activities was included. Herein lies a limitation of the model. Substitutions between livestock and cropping activities, as a result of changing land use patterns, go undetected.

DELINEATIONS OF RESOURCE SITUATIONS FOR OKLAHOMA

Figure 1 pictures the areas within Oklahoma which were programmed as separate resource situations. Total production from these areas represents approximately 87 percent of the state's output of cotton, 91 percent of the feed grains and 92 percent of the wheat. The aggregated solutions were thus expanded to compensate for unprogrammed activity.

In general, Area P is a heavy producer of wheat with minor emphasis on feed grains. Area R is a transitional region, with wheat and feed grains of importance of about a 3/4 and 1/4 ratio, respectively. Feed grain is cropped intensively in the irrigated portion of Area S, making it about equal in importance to wheat in terms of value of produce. Most cotton production in Oklahoma occurs in Area H. Though less important than wheat, cotton replaces feed grains as the second crop and accounts for about 32 percent of the gross sales in this locality.

EFFECTS ON ACREAGE AND PRODUCTION OF THE MAJOR CROPS

The model results predicted seeded acreage of cotton, feed grains and wheat in Oklahoma to increase under the influence of the 1970 Farm Act. Also, that intersectional shifts will occur within the state in accordance with the competitive advantages held by certain crops. Table 1 shows statewide projections for both acreage and production of cotton, feed grains and wheat for 1970 and 1971.

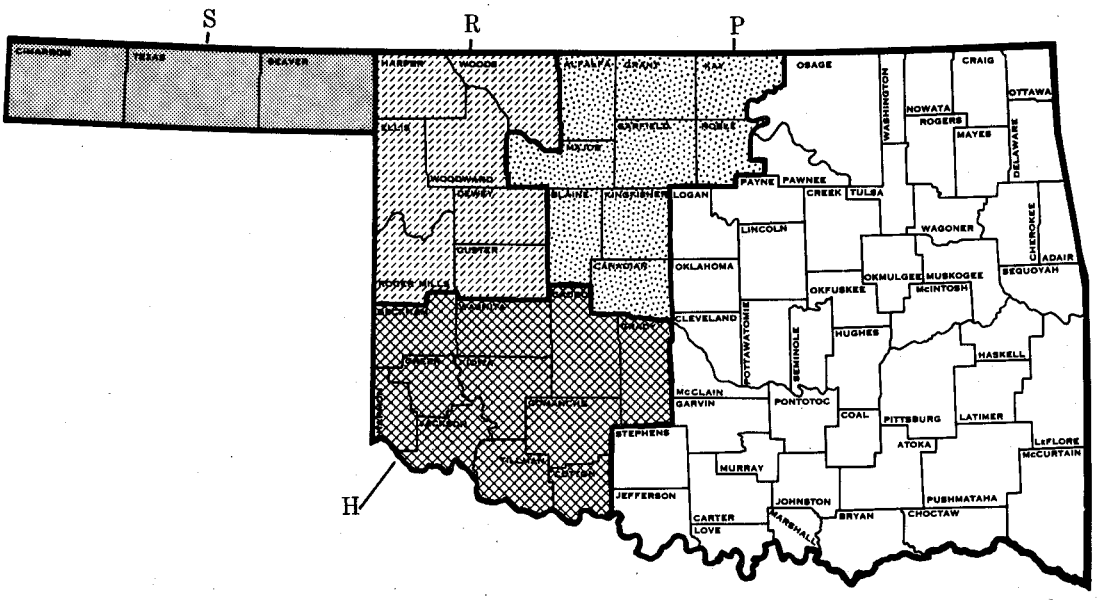
Oklahoma cotton production comes mainly from the southwest corner of the state (Area H). Model results indicated an increase of about 15 percent in cotton acreage. Cotton production showed an even greater response. The production figure is excessive, however, because of aggregation error and also because of the influence of skip-row cotton.[2]

An interregional adjustment of feed grain acreages was indicated. The main thrust of this movement was to the irrigated lands of the Panhandle (Area S). Feed grain acreage and production in this area has increased markedly during the past decade; the model indicates that the 1970 Farm Act will add impetus to this movement. However, feed grain production was not predicted to increase on a par with acreage (7 percent as opposed to 16 percent). At least two factors influenced this. First, increased feed grain plantings were designated for traditional wheat areas (Area P) where feed grain production levels are not so high and second, because removal of allotment limitations called in less intensive irrigation water activities in Area S.

Oklahoma wheat production is most important in the north central (Area P) and northwestern (Area R) portions of the state. Both wheat acreage and wheat production were predicted to be higher in those localities, whereas declines were evident in the Panhandle as a result of increased feed grains. Wheat activity was also suggested to be greater in the southwest. Overall, estimated Oklahoma wheat

[2]By virtue of the provision in the new legislation allowing both conserving base and set-aside requirements to be satisfied with the "skipped" rows, there is economic incentive to adopt such a practice.

FIGURE 1. ERS Resource Areas for Oklahoma.



OKLAHOMA

Table 1. ESTIMATED ACREAGE AND PRODUCTION OF MAJOR CROPS IN OKLAHOMA, 1970 AND 1971.

Item	1970	1971	Change	
			Actual	Percent
Cotton				
Acreage	501,975	575,000	73,025	14.55
Production	300,348	373,606	73,258	24.39
Government Expense	17,953.17	18,449.42	496.25	2.76
Feed Grain				
Acreage	1,194,998	1,390,235	195,237	16.34
Production	36,551.75	39,099.53	2,547.78	6.97
Government Expense	7,681.65	6,933.04	-748.61	-9.75
Wheat				
Acreage	4,704,272	5,751,270	1,046,998	22.26
Production	110,569.63	139,534.86	28,965.23	26.20
Government Expense	73,609.12	70,495.30	-3,113.82	-4.23

TABLE 2. INCOME STATEMENT FOR CROP SECTOR IN OKLAHOMA, 1970 AND 1971[a]

Item		Returns Over Variable Cost	Government Expenditure	Variable Cost	Gross Sales
		(— — — — — — — — — — — — $1000 dollars — — — — — — — — — — — —)			
1970		207,651.61	99,243.94	167,617.21	276,024.88
1971		214,878.69	95,877.76	199,960.49	318,961.42
Change:	Actual	7,227.08	-3,366.18	32,343.28	42,936.54
	Percent	3.48	-3.39	19.30	15.56

[a]Gross sales is a residual value. That is, returns over variable cost minus government expenditure plus variable costs equal gross sales.

acreage increased 22 percent while wheat production was 26 percent greater.

THE CROP SECTOR INCOME STATEMENT

Table 2 presents a predicted income statement for Oklahoma's major crop sector. Returns in excess of variable costs for the state as a whole (that is, returns to management, operator and family labor and land) are indicated to be somewhat higher under the 1970 Farm Act. The model showed a modest statewide increase of about 3 1/2 percent. However, this was not true for each individual area. The returns value for the area where feed grains are most important (Area S) showed more improvement than the area emphasizing cotton (Area H). Those areas stressing wheat production (Areas R and P) showed small declines in returns.

Estimated total statewide farm program costs were 3 percent higher for cotton, 10 percent lower for feed grains and 2 percent lower for wheat. The overall expenditure for Oklahoma was indicated to be about 3 percent less than under the previous Farm Act. Thus, the additional cotton costs were predicted to be more than offset by savings in the feed grains and wheat sectors.

Expected variable costs of production were substantially higher in all producing areas, complementing the increased acreages of all three crops. The overall gain in investment for variable inputs was nearly 20 percent. Also, gross sales of major farm crops were suggested to increase over 15 percent as a result of the 1970 Farm Act. On a crop basis, this value was tied closely to production increases of particular crops. That is, increases in cotton sales were substantial, wheat somewhat less so, while sales of feed grains inclined only slightly.

In general, the results of the analysis indicate that the predicted modest increases in farm income were achieved only through substantial increases in sales and production costs. This raises the disturbing possibility of weaker market prices and increased surplus problems for the future. On a crop basis, the model results indicate that feed grains producers' profit positions improved relative to cotton and wheat producers. Several factors contributed to this: (1) increased feed grain acreage occurred in areas where feed grain is a high profit competitor for resources, (2) increased cotton returns came mainly from higher total cotton payments and (3) increased returns generated by the sales of additional wheat were more than offset by lower wheat payments.

Does the Agricultural Act of 1970 appear to be designed to meet its objectives in Oklahoma? Assuming the set-aside and support levels announced for 1971, the model suggests that the goals of producer flexibility, protection of farm income and greater reliance on the market place will be met in the short term. However, production is not indicated to be in line with needs and this raises serious questions about farm income levels in the future. In short, farm program restraints will need to be firmer in ensuing years. This will mean increased federal expenditure if voluntary production control is used as the primary method of restraining output. Recent policy announcements covering the 1972 production year are consistent with this finding.

NONFARM EFFECTS

Nonfarm effects of the 1970 Farm Act were estimated by a Doeksen simulation model which utilizes a social accounting system for the state of Oklahoma [1]. The accounting system consists of an interindustry account, a capital account and a social account. Inclusion of the two latter accounts assures that both capital and human resources are available for estimates of production.[3] Short run income

[3]For an explanation of the procedure and methodology used, see [3].

multipliers have also been estimated for each industry subsector.

The Doeksen model is built around the basic Leontief input-output system. Certain restrictive assumptions normally associated with such a system of fixed technical coefficients describe an economy that has a fixed physical structure and linear homogeneous production functions. However, the model is dynamic and incorporates capital-output ratios, labor-output ratios and annual changes in these ratios. Thus, to a degree, estimation problems associated with an assumption of a constant product mix are compensated for, but those related to fixed technical coefficients remain.

The Oklahoma short run income multiplier for the crop sector was derived in the following manner: (1) A one million dollar investment was assumed to have occurred in the crop sector in 1970. (2) The appropriate capital-output ratio was applied to determine the amount of increased production resulting from the added investment. (3) The impact on income from the new investment and the additional income generated was measured as to direct income effects, direct and indirect effects and capital effects. (4) The income multiplier was calculated from the direct, and direct and indirect effects.

The short run income multiplier for Oklahoma is 1.49. The multiplier is defined as the change in income generated directly and indirectly throughout the Oklahoma economy by a one unit change in production income in the crop sector. Computed in this manner, the income multiplier is the conventional Type I input-output multiplier. This multiplier does not include the reaction of the consumer to a change in income. This consumer reaction, often referred to as the induced effect, is included in Type II multipliers. Type II multipliers were not estimated in this study. However, a Type II short run income multiplier of 2.59 was computed in an earlier study of the Oklahoma economy [2].[4] The magnitude of these two income multipliers reflect the low level of interaction between the crop sector and other sectors of Oklahoma's economy.[5]

Table 2 shows that returns over variable costs increased $7,227,080 with the advent of the new farm legislation. Assuming that fixed costs were unchanged, the latter value represents the change in net farm income in Oklahoma. Applying the income multipliers, the original $7,227,080 change has a total direct and indirect impact on Oklahoma's economy of $10,768,349 and a total direct, indirect and induced effect of $18,847,637. Table 3 shows how the effects of this change is spread among producing sectors.

The service-type sectors[6] receive most of the indirect and induced benefits. These sectors are more likely to be represented in rural communities than manufacturing sectors. Thus, not only is the income of the crop sector of direct benefit to agricultural people, substantial parts of the direct benefits are retained in the rural community through consumption patterns.

TABLE 3. ESTIMATED SHORT RUN INCOME CHANGES BY SECTOR RESULTING FROM A $7,227,080 CHANGE IN THE CROP SECTOR, OKLAHOMA

Sector	Direct and Indirect Change in Income	Direct, Indirect and Induced Change in Income
Livestock and Livestock Products	$ 31,228	$ 249,368
Crops	7,503,386	7,891,192
Agricultural Processing	61,380	408,789
Petroleum and Coal Products	91,531	156,003
Machinery, Except Electrical	31,228	204,230
Other Manufacturing	396,276	931,399
Mining	183,062	902,119
Transportation, Communication and Public Utilities	427,503	1,267,749
Real Estate, Finance and Insurance	701,020	1,234,253
Services	579,337	2,041,689
Wholesale and Retail Trade	701,019	3,197,519
Construction	61,379	363,327
Total	$ 10,768,349	$ 18,847,637

[4]The recent study [1] had a short run Type I income multiplier of 1.49, whereas the earlier study [2] derived a Type I income multiplier of 1.40 and a Type II multiplier of 2.59.

[5]The magnitude of the income multiplier for the crop sector is somewhat similar to multipliers for other states with similar economic structures. As an example, see [4].

[6]Service-type sectors include wholesale and retail trade; real estate, finance and insurance; transportation, communication and public utilities; and construction.

SUMMARY

Modest increases in farm income (about 3 percent) and modest savings in federal expenditures (also about 3 percent) are indicated in Oklahoma as a result of the Agricultural Act of 1970. However, these gains are achieved only through substantial production increases. Both variable costs and gross sales are indicated to be over 15 percent higher. Thus, assuming 1971 levels of price support and set-aside, the short run effects appear beneficial to Oklahoma's economy but longer run effects raise serious questions. The short run income multipliers for the crop sector, when applied to the increased farm income of over 7 million dollars, estimate a direct and indirect benefit of nearly 11 million dollars throughout Oklahoma's economy, and a direct, indirect and induced effect of over 18 million dollars.

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