THE COMPETITIVE POSITION OF THE SOUTHEAST IN NATIONAL AND INTERNATIONAL MARKETS FOR CORN, SOYBEANS, AND WHEAT

Stephen L. Ott, John R. Allison and George A. Shumaker

INTRODUCTION

In a previous article in this _Journal_, Robinson (1) discusses the Southeast's competitive position for several commodities. He notes that the Southeast is a marginal production area for some crops, as the Region has high costs and low yields due to poor soils and hot summers with variable rainfall. In terms of grain and soybean production Robinson concludes that the Southeast is at a disadvantage when compared to the rest of the United States and is more vulnerable to weak and declining markets. The only possible exception noted by Robinson may be wheat and soybeans in a double cropping pattern. The purpose of this paper is to provide further insight into the competitive position of the Southeast in corn, soybean, and wheat production by providing budgeting comparisons.

Despite being designated as a marginal grain and soybean producing area by Purcell and associates (2, 3, 4), these commodities are important in the Southeast. Twenty million acres, which represents almost two-thirds of the area's cropland, were devoted to corn, soybeans, or wheat in 1984 (5). Thus, in crop production the Southeast is similar to the rest of the country, producing corn, soybeans, or wheat. How the Southeast differs is that it is a "swing" production area. When grain prices are favorable expansion occurs in the Southeast at a higher rate than the rest of the country and when they are not favorable contraction occurs in the Southeast at a faster rate than the country as a whole. For example, in 1972, a low year in acres harvested, the share of corn, soybeans, and wheat cropland harvested in the Southeast was 9%. After 1972 grain exports and prices increased. National grain and soybean producers responded by harvesting 48% more acres of corn, soybean, and wheat by 1981. The increase in the Southeast was even greater (78%) and the Southeast's share of national grain acreage grew by 20% to over 11%. Since 1981 United States' cropland harvested for corn, soybeans, and wheat has declined 9% as export demand for these commodities have decreased. Almost 30% of this acreage decline came from the Southeast as its harvested grain and soybean acreage fell by 24% (table 1).

The present outlook for grain and soybean producers is not promising. Commodity prices are expected to remain "soft" due to an expanding inventory and a declining export market (6,7,8). With a continued softening in export demand, the prospects for improved farm financial conditions of grain and soybean producers appears bleak. Because of the poor profit prospect from grain and soybean production, resource adjustments will occur reducing both the number of farmers and the amount of land in grains and soybeans. This analysis for grain and soybean production provides insight as to how the Southeast will fare in this adjustment process.

Regional Economic Competition

The continued reduction in agricultural resources brings into sharper focus the concept of regional competition, or the economic advantage of disadvantage of a region in producing goods or services. An area will produce a commodity if two conditions are met. First, costs must be covered. In the short run, only operating costs must be met, but to remain in production over time all costs must be paid. Second, the commodity must provide producers with a return greater than could be received producing another commodity. Although the concept of competitive position can be easily explained, it can be difficult to provide data for precise comparisons because of variability in costs among producers and difficulties in measuring or estimating producers' perceived returns from alternative resource use. Thus, the analysis will necessarily in some cases use proxy measures for comparisons.

To determine the Southeast's competitive economic position in corn, soybean, and wheat production, its yields, costs of production, and prices received at harvest, and percent return on investment are compared with other major grain producing regions. The first step in analyzing regional economic competition in crop production is to calculate regional yields. Regional yields provide a measure for comparing physical competition among regions and they form a basis for analyzing regional economic competition. For this study regional yields are the 1980-1984 average yield per planted acre based on USDA-SRS Crop Reporting Service data (5).

The next step in analyzing regional economic competition is to compare per unit cost. Three types of costs are used in this study. The first cost is a modified operating cost or the expense of non-fixed inputs. Included in operating costs are production

expenses for seed, fertilizer, and fuel; general farm overhead; property taxes and insurance; paid labor; and interest on operating capital. The general farm overhead, property taxes and insurance are costs generally not included in operating but require cash outlays each year. In the short-run, expected prices must be equal to operating costs or production will cease. The second cost classification is nonland cost which is defined as operating cost plus the cost of owning farm machinery (depreciation and interest). Total cost is the third cost classification for this analysis and it is estimated by adding cash land rents to nonland costs. To maintain production over time, prices received must cover total cost. However, land rental rates and/or land values change in accordance with product prices and/or opportunity costs. Per bushel costs of production are based on the USDA-ERS 1984 cost of production studies (9). These are per acre costs and are converted to per bushel cost by dividing the per acre costs by the 1980-1984 mean yields.

Differences in per unit cost and differences in per bushel price received are necessary to the analysis. Prices received during the harvest period are used in this study. This simplifies the analysis as the costs and returns to storage are ignored. Due to location and timing of harvest, prices received at harvest can vary among regions and thus modify differences in per unit production costs.

The final step in this analysis is to compare return on investment. Percent return on machinery and land investment is used to provide a measure of relative returns among corn, soybeans, and wheat and among the different regions. Percent return on investment can also be used to compare resource returns from other agricultural commodities and non-agricultural alternatives. This measure allows for differences in yields, land values, and machinery investment per unit of output.

The other major grain producing regions which compete with the Southeast in corn production are the Lake States (MN, WI, MI), the Corn Belt (MO, IA, IL, IN, OH), and the Central Plains (KS, NE, SD). For soybeans, the Delta region (AR, LA, MS) is added to the regions used in corn comparisons. The wheat production area was divided into six regions for comparison: 1) Lake States and Corn Belt; 2) Southeast; 3) Delta; 4) Central Plains (KS, NE, SD, CO); 5) Northern Plains (ID, MT, WY); and 6) Southern Plains (TX, OK). In this division the Central Plains includes the additional state of Colorado over the Central Plain region in the corn and soybean comparison.

Results

Average yield by region and average yield differential from the Southeast are listed in

table 2. The Southeast is at a significant yield disadvantage for all three crops with the exception of winter wheat production in the Southern Plains and in the Central Plains.

The Southeast's yield disadvantage translates into a cost of production disadvantage. In corn and soybean production the Southeast has significantly higher production costs. For example, when compared to the Corn Belt, the major corn and soybean producing area, the Southeast has an operating cost disadvantage of $1.08 per bushel for corn and $1.81 per bushel for soybeans (table 3). The cost disadvantage widens when machinery costs are included. The Corn Belt has an operating and machinery cost advantage of $1.13 per bushel in corn and $2.15 per bushel in soybeans. The Southeast has a relatively low cash land rent (table 4) as its ratio of rent to land value has declined relative to other regions (10). Given this relative low cash rent cost, the Southeast's total cost disadvantage shrinks to $0.81 per bushel for corn and $1.09 per bushel for soybeans when compared to the Corn Belt. In winter wheat production the Southeast is not the highest cost region as it has a $0.32 per bushel advantage over the Southern Plains in operating costs. When compared to the major wheat producing area of the Central Plains it has an operating cost disadvantage of $0.73 per bushel and a nonland cost disadvantage of $0.61 per bushel. When total costs are compared the Southeast has an advantage over the Lake States and Corn Belt as well as the Southern Plains and the cost advantage enjoyed by the Central Plains is reduced to $0.25 per bushel.

The Southeast's cost disadvantage in corn can in part be overcome by its harvest price advantage (table 5). Corn harvesting in the Southeast starts in late July or early August, two months ahead of the Corn Belt. By harvesting earlier, the Southeast's harvest price averages $0.33 per bushel greater than the harvest price in the Corn Belt. However, this still leaves the Southeast with a net disadvantage of almost $0.50 per bushel when compared with the Corn Belt. The harvest price differences for soybeans generally favors the Southeast, but the differences are not appreciable. The largest geographic price difference is with the Delta region which has a greater harvest price than the Southeast. Wheat prices at harvest are lower in the Southeast than in other regions of the country.

Two production practices have been touted as increasing the competitive advantage (or decreasing the competitive disadvantage), double cropping of wheat and soybeans and the use of irrigation. Double cropping of wheat does not change the cost of producing wheat and therefore does not change the cost disadvantage of wheat. Adding negative returns from wheat to low returns from soybeans augments the disadvantage of soybeans. Thus, double cropping soybeans and wheat is profitable only when wheat is a profitable enterprise. Irrigation can improve corn yields in

some years but at a cost very close to the cost of irrigation (11, 12, 13). Although some southeastern corn producers earned returns on their irrigation investment, irrigation has not reduced the disadvantage of corn in the Southeast.

Return on investment can be used to combine the effects of different yields, costs, prices received, and asset value in evaluating competitive position. Per acre asset value is listed in table 4. In the production of all three commodities, the Southeast has the second highest asset value due to its high land value. With higher costs, it is not surprising to find that rates of return in the Southeast are among the lowest rates of return for all three commodities (table 6). One difficulty in calculating the rates of return was what price or prices should be used. With a declining export market demand and continued outlook for relatively low prices it was felt that past prices would be too high to use for realistic comparisons. However, no attempt was made as to project future prices. The base prices selected were the 1985 harvest prices from the major producing areas (the Corn Belt for corn and soybeans and the Central Plains for wheat). Prices received in the other regions are equal to this base price plus any historical price difference from the main producing region. In order to establish a range of returns, prices were increased and decreased by 10% from the 1985 base. In analyzing the rates of returns the following can be observed:

1. The Southeast in general has the lowest rates of return.

2. Negative returns for all three crops were realized in the Southeast, i.e. at 1985 prices, all production costs are not being covered.

3. The returns to double cropping wheat and soybeans are less than the return of soybeans alone for the Southeast and equal to the returns from single crop soybeans in the Delta.

4. For the regions that grow all three commodities, soybeans produce the highest rate of return.

5. At the 1985 harvest price, the Lake States, Central Plains and Southeast have negative rate of returns from corn and Lake States and Corn Belt, Southeast, Delta and Northern Plains have negative returns from wheat production.

6. At 1985 harvest prices, only soybeans in the Lake States, Corn Belt, and Central Plains, and wheat in the Northern Plains provide producers with an investment return equal to their 20 year average rate of 4.33% (9).

The comparative disadvantage of the Southeast can further be illustrated by estimating the yields necessary for the Southeast to realize per unit costs of production equal to the averages of the minimum cost production areas (Corn Belt for corn and soybeans and Central Plains for wheat) table 7. These breakeven yields have been determined by cost levels (operating costs, non-land costs, and total costs) and utilizing the price advantages or disadvantages of the Southeast. The increase required corn yields for breakeven yields is 31 to 36% for non-land and operating costs respectively.

The comparison of total costs would provide the best estimate of long run comparative advantage if the costs of acquiring the input of land reflect current economic conditions and projections. Unfortunately during economics changes land rental values are thought to lag one year, thus using 1985 cash land rentals may be misleading. Therefore, the total cost comparisons should be used with caution since 1985 corn belt cash rents may not have adjusted sufficiently to reflect current economic expectations.

Although the Southeast has comparative disadvantages in the production of corn, soybeans and wheat, some individual growers could be competitive. We estimated the percent of the producers in the Southeast who realized costs equal to or less than the average costs in the areas of highest comparative advantages. These estimates were made by using standard deviations estimated from ratios of standard deviations to yield means from samples of 1974 Georgia corn and soybean producers (14) and assuming normal distribution for the average Southeast yields of corn, soybeans, and wheat. The ratio of the standard deviation and mean yield for corn was used for wheat. These estimates show that less than 20% of Southeast corn and soybean producers have operating and non-land costs equal to or less than the average of the Corn Belt (table 8). A slightly higher percent of wheat producers realize costs equal to or less than the average of the Central Plains (18 and 29% respectively for operating and non-land costs). If cash land rents are included in the costs these proportions increase drastically (36, 40 and 44% for corn, soybeans, and wheat respectively) but are still below 50%.

SUMMARY

The Southeast is at a competitive disadvantage in corn, soybean, and wheat production when compared with the rest of the United States. Its yields for these commodities are generally lower than those of other regions. These lower yields result in higher per unit costs which negate any price advantage the Southeast has. The costs are so high for all three commodities, that current harvest prices are less than operating costs for a large proportion of Southeast producers, a condition which warrants discontinuing production. The relatively high land values are also working

against the Southeast. Of the regions compared, only the Corn Belt has higher land values. When high production costs and high land values are combined they result in the Southeast having the lowest rate of return on investment for these commodities. Another measure of the Southeast's relative high land value is that it has the lowest rent to land value ratio. This may be a sign that land values in the Southeast have not adjusted downward as much as the other regions or other factors such as urbanization, recreation and forestry are affecting land values.

Two production practices that might eliminate the Southeast's disadvantage are not that encouraging. Irrigating corn does increase yield, but it also raises costs which cancels most of the benefits of a yield increase. Second, at current commodity prices, the double cropping of wheat and soybeans produces lower return than a single soybean crop because double cropped wheat has very similar costs to single cropped wheat thus increasing the losses incurred per acre.

Finally, the rates of return on investment in Southeast grain and soybean production are low not only compared with other regions, but they are low when compared to other crops that can be grown in the Southeast. Both cotton and peanuts provide producers the opportunity for positive rates of return. Thus, if present prices continue the Southeast will find it difficult to remain in corn, soybean, and wheat production. The absolute and relative decline in acreage of these commodities that started in 1981 will continue, forcing further decline in land values.

Data are inadequate to evaluate the competitive position of the Southeast compared with producing areas outside the United States. Both the comparative advantage (disadvantage), and policies of foreign governments with respect to agriculture, food security, monetary and fiscal policies, trade barriers, etc. are germane to assessing the competitiveness of the Southeast in international markets. Research on the competitiveness of the Southeast in global markets for the major grain and oilseed crops should rank high on the research agenda for the Agricultural Experiment Stations of the Southern Region.

Stephen L. Ott and John R. Allison are Assistant Professor and Professor, respectively, Department of Agricultural Economics, Georgia Experiment Station, University of Georgia, George Shumaker is Associate Professor, Agricultural Economics Extension Service, Statesboro, Georgia.

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Table 1. Harvested acreage in corn, soybeans, and wheat: the Southeast and United States.

Year/crop	Southeast	US	Southeast's share
	- (1000 acres) -		- % -
1972			
Corn	5,640	57,421	9.8
Wheat	1,638	47,284	3.5
Soybeans	6,700	45,698	14.7
Total	13,978	150,403	9.3
1981			
Corn	7,155	74,700	9.5
Wheat	5,021	81,013	6.2
Soybeans	12,655	66,368	19.1
Total	24,841	222,081	11.2
Change in total acres from 1972	+77.7%	+47.7%	+20.4%
1985			
Corn	6,390	74,756	8.5
Wheat	3,275	64,588	5.1
Soybeans	9,145	62,223	14.7
Total	18,810	201,567	9.3
Change in total acres from 1981	-24.2%	-9.2%	-17.0%

Source: (5).

Table 2. Average regional yield and yield difference, for corn, soybeans, and wheat 1980-1984.

Crop/region[a]	Average yield	Average yield difference from SE[b]
	- - bushel/acre - -	
Corn		
Lake States	85.2	21.9
Corn Belt	101.8	38.4
Central Plains	82.5	19.2
Southeast	63.4	-
Soybeans		
Lake States	32.0	11.0
Corn Belt	32.8	11.8
Central Plains	26.2	5.3
Southeast	21.0	-
Delta	21.2	0.3
Winter wheat		
Lake States and Corn Belt	40.5	8.9
Central Plains	30.2	-1.4
Southeast	31.6	-
Delta	34.3	2.7
Southern Plains	22.0	-9.6
Northern Plains	34.8	3.2

a. Lakes States (MN, WI, MI); Corn Belt (MO, IA, IL, IN, OH); Central Plains (KS, NE, SD and CO (wheat only)); Southeast (AL, GA, TN, KY, VA, NC, SC); Northern Plains (ID, MT, WY); Southern Plains (TX, OK).
b. Numbers may not subtract due to rounding error.
Source: (10).

Table 3. Average costs per bushels for corn, wheat, and soybeans.[a]

Crop/region[b]	Avg. operating costs	Avg. nonland cost[c]	Avg. total cost[d]	Cost differences from Southeast		
				Operating	Nonland	Total
	- - - - - - - - - - - - - - - - $/bushel - - - - - - - - - - - - - - - - -					
Corn						
Lake States	2.13	2.72	3.40	-0.73	-0.69	-0.62
Corn Belt	1.78	2.28	3.21	-1.08	-1.13	-0.81
Central Plains	2.31	2.99	3.68	-0.55	-0.42	-0.34
Southeast	2.86	3.41	4.02	-	-	-
Soybeans						
Lake States	3.09	4.25	6.06	-1.88	-2.05	-2.08
Corn Belt	3.01	4.15	7.05	-1.96	-2.15	-1.09
Central Plains	3.16	4.23	6.42	-1.81	-2.07	-1.72
Southeast	4.97	6.30	8.14	-	-	-
Delta	4.27	5.73	7.88	-0.70	-0.57	-0.26
Winter wheat						
Lake States and Corn Belt	2.85	3.64	5.56	-0.26	-0.29	0.43
Central Plains	2.38	3.32	4.88	-0.73	-0.61	-0.25
Southwest	3.11	3.93	5.13	-	-	-
Delta	2.87	3.62	4.92	-0.24	-0.31	-0.21
Southern Plains	3.43	4.51	5.68	0.32	0.58	0.55
Northern Plains	2.19	3.11	NA[e]	-0.92	-0.82	NA

a. 1984 per acre costs with 1980-1984 average yields.
b. For lists of states, see table 2.
c. Operating cost plus machinery cost.
d. Nonland cost plus cash land rent.
e. Data not available
Sources: (5) and (9).

Table 4. Cash land rents, asset value, and land value, 1985.

Region[a]	Land rent		Asset value			Land value	
	Corn-soybeans	Wheat	Corn	Soybeans	Wheat	Corn-soybeans	Wheat
				---($/acre)---			
Lake States	58.03	-b	1,185	1,088	-b	873	-b
Corn Belt	95.18	77.87	1,443	1,346	1,240	1,131	1,037
Central Plains	57.25	47.14	753	573	611	395	439
Southeast	38.63	37.97	1,192	1,134	1,107	978	962
Southeast Irrigated	38.63	-	1,567	1,119	-	978	-
Delta	45.59	44.60	-	-	1,050	946	905
Southern Plains	-	25.72	-	-	741	-	608
Northern Plains	-	-	-	-	554	-	365

a. For list of states see table 2.
b. Combined with Corn Belt.
Sources: (9) and (10).

Table 5. Average prices received at harvest, for corn, soybeans and wheat, 1980-1984.

Crop/region	Average price at harvest	Average price difference from SE
	--- $/bushel ---	
Corn		
Lake States	2.58	-0.43**
Corn Belt	2.68	-0.33**
Central Plains	2.70	-0.31**
Southeast	3.01	-
Soybeans		
Lake States	6.56	-0.13
Corn Belt	6.61	-0.08
Central Plains	6.44	-0.24**
Southeast	6.68	-
Delta	6.76	0.08*
Wheat		
Lake States and Corn Belt	3.33	-0.01
Central Plains	3.42	0.07**
Southeast	3.34	-
Delta	NA	
Southern Plains	3.47	0.13**
Northern Plains	3.51	0.17**

*20% significant level
**10% significant level
NA Data not available - Southern price was assumed for the Delta region.
Source: USDA, SRA. Agricultural Prices (Pr-1), Washington, D.C., various issues.

Table 6. Percent return on investment; corn, soybeans, and wheat, 1985.

Crop/region[a]	Base prices[b]		
Corn ($/bu)	1.94	2.16	2.38
	--- % return ---		
Lake States	*c	*	1.1
Corn Belt	1.1	2.7	4.2
Central Plains	*	*	0.7
Southeast	*	*	*
Soybeans ($/bu)	4.41	4.90	5.39
	--- % return ---		
Lake States	3.9	5.3	6.8
Corn Belt	3.4	4.6	5.8
Central Plains	5.0	7.2	9.5
Southeast	*	*	0.8
Delta	0.6	1.5	2.4
Wheat ($/bu)	2.58	2.87	3.16
	--- % return ---		
Lake States & Corn Belt	*	*	0.8
Central Plains	1.0	2.4	3.8
Southeast	*	*	*
Delta	*	*	0.7
Southern Plains	*	*	*
Northern Plains	2.5	4.3	6.1
Double Crop			
Wheat ($/bu)	2.58	2.87	3.16
Soybeans ($/bu)	4.41	4.90	5.39
	--- % return ---		
Southeast	*	*	0.7
Delta	*	1.3	3.1

a. See table 2 for list of states.
b. Price at harvest, 1985 in major production regions (corn and soybeans: Corn Belt, wheat; Central Plains) and ± 10% of harvest price.
c. Negative return.
Source: Tables 2, 3, 4, and 5.

Table 7. Breakeven yields for Southeast.[a,b]

Crop/cost	Nonirrigated[c]		Irrigated[d]	
	- - - - - bushels/acre - - -			
Corn				
Operating	86.0	(36)[e]	134.2	(112)
Non-land	82.8	(31)	156.4	(147)
Total	72.0	(14)	126.9	(100)
Internal rate of return[f]	99.7	(57)	129.1	(104)
Soybeans				
Operating	34.7	(65)	62.1	(196)
Non-land	31.9	(52)	75.1	(258)
Total	24.3	(16)	49.7	(137)
Internal rate of return	39.3	(87)	77.1	(267)
Wheat				
Operating	42.6	(35)		
Non-land	38.0	(20)		
Total	33.7	(7)		
Internal rate of return	53.2	(68)		

a. Breakeven yields when compared to the Corn Belt for corn and soybeans and the Central Plains for wheat.
b. Difference in harvest price among regions included see table 5. Note: soybeans price difference was not significant.
c. Assumes no adjustment in fertilizer or after operating cost from base.
d. Base yields for cost calculation: corn, 150 bu/a; soybeans, 50 bu/a from Clemson University budgets.
e. Number in parentheses is the percent increase in yield over non-irrigated.
f. Yield for breakeven to provide same internal rate of return as listed in table 7.
Sources: (13) and tables 2, 3, 4, and 5.

Table 8. Estimated Percent of Southeastern Producers realizing per unit cost of corn, soybean and wheat production equal to or less than the average of the U.S. region with the competitive advantage for the respective crops.[a,b]

Cost class	Corn	Crop Soybeans	Wheat
	- - - - - - - - % - - - - - - - -		
Operating	14	11	18
Non-Land	18	16	29
TOTAL	36	40	44

a. Regions with competitive advantage were Corn Belt – corn and soybeans and Central Plains – wheat.
b. Used estimated standard deviations of 21.0, 11.2 and 10.5 bu/acre for corn soybeans and wheat respectively.
Sources: (14) and table 3.