

Chapter 3

Cost-Competitiveness of U.S. Agriculture

Cost-Competitiveness of U.S. Agriculture

This chapter addresses the cost of producing crops in the United States and in other nations. Though such comparisons are fraught with difficulties, many U.S. producer areas are cost-competitive with similar areas in other countries. However, the United States does not appear to enjoy a large cost advantage over its major competitors in several key markets.

Also, the chapter focuses on an aspect of international competitiveness that has received relatively little attention: policy problems posed by the wide range of production costs associated with U.S. agriculture. As a result, many U.S. producers and farming areas may not perform at the level of better growing regions in other parts of the world.

INTERNATIONAL COMPARISONS OF PRODUCTION COSTS

Ideally, the competitive standing of U.S. agriculture could be gauged by comparing full production and marketing costs in the United States with those in competitor nations. But it may not be possible to obtain reliable and comparable production cost data for many other countries. A dearth of information is not unusual in international trade analysis; nevertheless, this handicaps evaluation of America's competitive standing in world agriculture.

Even if reliable on-farm cost data were available, they would reveal only the absolute advantage that the United States enjoys at the farm level in the production of specific crops. A complete treatment of absolute advantage would require comparison of costs associated with the marketing of farm goods, such as transportation—a major issue in the 1985 farm bill, raised by “cargo preference” provisions—and a range of important but indirect government expenditures, such as subsidies, research and development, education, and soil and water conservation. To examine the U.S. final comparative advantage as an agricultural exporter would require even more extensive analysis, which would determine whether land, labor, and capital devoted to the production of a specific crop might suit other agricultural products more effectively,

In 1985, U.S. Department of Agriculture (USDA) analysts attempted to duplicate U.S. on-farm “cost

of production” (COP) budgets in other countries for key commodities. The USDA found, however, that the foreign data were not comparable. Several commodities and countries were examined: wheat—the U. S. S. R., Argentina, France, and People's Republic of China; rice—Thailand; soybeans—Brazil; and cotton—Pakistan. In a staff memorandum dated June 4, 1985, the USDA concluded that:

In no country except the U.S. could [crop] budgets be developed using data collected by statistically reliable survey techniques and procedures. Sketchy budgets from other countries come from data collected from a few select farmers in the better producing areas. These budgets more nearly represent what extension farm management specialists at the universities [in the United States] put together using data provided by experiment station researchers and lead farmers. '

Even the limited number of crop budgets that were obtained from other countries did not compare to the USDA's COP data. Nor could analysts systematically isolate the impact of subsidies provided by various governments that affect input use or prices.

¹“Foreign COP Data, ” unpublished staffpaper prepared for the Economic Research Service, U. S. Department of Agriculture, June 1985,

Particular problems that USDA encountered in gathering data for individual countries demonstrate the overall difficulty involved in this process. In the appraisal of Soviet production costs for wheat, for example, USDA analysts note that:

... the Soviet agricultural sector is characterized by extensive direct budgetary subsidies to farms, extremely lenient State credit policies, a complicated system of administered prices, no direct land rents, and other factors which not only make international cost of production analysis highly problematic, but also make meaningful internal Soviet cost-accounting an elusive goal, . . . **in no case were actual wheat cost of production data available** [emphasis in original].²

Different but equally confounding problems arose in assessing wheat production costs in China:

Much of the inputs are not purchased and carry an imputed value . . . the reported labor expense item is "standard labor days" valued at a uniform rate of 0.80 yuan per day for all years since 1956. The cost of labor certainly increased between 1956 and 1979, so this is a questionable measure of labor cost . . . Nothing is known about other critical components of total cost. Depreciation and return to collectively or individually owned assets are important but unknown. Estimation of many of these items would be very difficult . . . How do we estimate cost of land in an economy in which there is no market for land?³

Conversion of foreign currency values to U.S. dollars was necessary, in order to compare input costs and crop prices. However, some of these calculations were influenced by shifting exchange rates, government exchange rate policies, or financial conditions in certain nations. For instance, the dollar appreciated by 40 percent in value against the French franc over the 3 years for which wheat production cost data were obtained for selected farms in France—the exchange rate went from 5.43 francs per dollar in 1981 to 7.62 francs per dollar in 1982. "The strengthening dollar was a major contributor to the decline in French production costs,"⁴ when those costs were denomi-

nated in U.S. dollars. Because Soviet rubles are not conversable, analysts resorted to the exchange rate set by the Soviet Government. The official exchange rate also had to be used to denominate Chinese costs and prices for wheat, which overvalued the yuan "to a significant but unknown extent." In Brazil, financial analysis was complicated by inflation rates of approximately 10 percent per month:

Since the devaluation of the cruzero is linked to inflation, conversion of Brazilian estimates to U.S. dollars effectively deflates production costs, . . . it is necessary to assume that a given input is used in a given month during the production cycle . . . adjustment is important because payment at harvest may be in cruzeros that have inflated [by] 100 percent since soil preparation costs were incurred.⁵

USDA analysts have recently evaluated variable production costs for major producing regions in the United States and competing nations from 1980 to 1982 (see table 3-1). In theory, a farmer will continue to produce an agricultural commodity, in the short term, for as long as variable production costs can be recouped. Over the long

²Ibid.

³Ibid.

Table 3-1.—Average Variable Costs of Production for Wheat, Corn, and Soybeans, Selected Countries and Regions, 1980-82

Crop and region	1980-82 average	Percent of U.S. average
Wheat:		
U.S. average.	1.56	100
Corn Belt/Lake States	1.65	106
North Plains.	1.29	83
Central Plains	1.28	82
Canada (Saskatchewan)	1.28	82
Australia.	2.06	132
Corn:		
U.S. average.	1.22	100
Corn Belt/Lake States	1.13	93
Argentina (Pergamino)	0.87	71
Soybeans:		
U.S. average.	1.97	100
Corn Belt/Lake States	1.46	74
Brazil (Southeast)	1.84	93
Argentina (Pergamino)	1.72	88

SOURCE: "The U.S. Competitive Position in World Commodity Trade," *Agricultural-Food Policy Review* Commodity Program Perspectives, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985

¹Ibid.

²Ibid.

³Ibid.

term, production continues if the farmer can recover fixed costs—primarily associated with land—and earn acceptable returns to labor and management. At that point, fixed costs would begin to resemble variable costs. If prices fall below variable costs, farmers will tend to withdraw productive resources from that enterprise in the short term.

Many of these factors influence the data that USDA collected from other countries. It is not clear, for example, if the data presented for other countries represent average production costs for the nation or the region, or if they are costs for a “typical farm” or an exemplary one. Leaving these problems aside, however, it appears that compared to other countries and regions, the United States—as a whole—was not always the low-cost producer of wheat, corn, and soybeans. For the 1980-82 period, average variable production costs for wheat in the United States exceeded those of Saskatchewan, Canada, by 18 percent;

for corn, the U.S. average exceeded that of Pergamino, Argentina, by 29 percent; and for soybeans, U.S. costs exceeded both those of Southeast Brazil by 7 percent, and Pergamino by 12 percent. When more productive U.S. growing areas—wheat in the two Plains regions, and soybeans in the Corn Belt—are compared individually against foreign regions, U.S. performance improves. In addition, U.S. production costs do fall below some competitors; Australian wheat production costs, for example, topped U.S. levels by almost one-third.

To reemphasize, these data do not provide a complete picture of U.S. cost-competitiveness relative to other countries. Nevertheless, the fact that most variable costs reported for other countries are comparable or below costs in the better U.S. growing regions suggests that this country does not enjoy a significant advantage in on-farm production costs.

TRENDS IN PRICES PAID AND RECEIVED BY FARMERS

International production costs and profits may be compared by examining national trends in prices received for crops and production input payments, and the relationship between these factors. Indexes of those prices are listed for the United States and four competitors in table 3-2. The indexes have been adjusted to a 1976 base year for international price relationships. Prices that farmers received for crops rose in all countries between 1976 and 1981. However, by the end of the 1970s, prices paid were rising even faster in every country but Canada. The ratio of prices received to prices paid suggests that Canadian producers enjoyed a more favorable price regime between 1976 and 1981 than did their counterparts. Even in the hyperinflated Argentine economy, the 1982 ratio of prices received to prices paid was higher than in the United States. Interestingly, prices paid by farmers increased at roughly uniform rates in Canada, France, Australia, and the United States, although updated USDA data indicate that the prices-paid index for the United

States rose to 173 in 1981, a higher level than that of the table. Still, this finding suggests that the United States has not been more vulnerable to cost increases than several major competitors.

U.S. Costs of Production

Discounting the problems of international comparisons, fairly reliable data for U.S. production costs reveal a wide range for most major crops. As a result, the use of a single “national average price” for a particular commodity can be misleading, particularly in the context of international trade. In terms of average costs, U.S. agriculture may be competitive for major traded commodities; however, many U.S. individual farm firms may not be able to compete.

Table 3-3 indicates the regional diversity of U.S. production costs for wheat, corn, and soybeans between 1980 and 1982. Wheat production costs in the Southern Plains topped the national aver-

Table 3“2.—Indexes of Prices Received by Farmers for Crops and Prices Paid for Production Inputs, Selected Countries, 1976-82^a

Country	1976	1977	1978	1979	1980	1981	1982
Canada							
Prices received.	131	124	130	154	181	190	NA
Prices paid	100	104	116	136	149	169	
Ratio	1.31	1.19	1.12	1.13	1.21	1.12	
Argentina							
Prices received.	100	244	634	1,303	2,283	4,814	16,947
Prices paid	100	238	624	1,482	2,903	5,947	19,429
Ratio	1.00	1.03	1.02	0.88	0.79	0.81	0.87
France							
Prices received.	118	120	126	136	143	157	NA
Prices paid	100	108	115	126	145	164	
Ratio	1.18	1.11	1.09	1.08	0.99	0.95	
Australia							
Prices received.	110	110	108	120	146	169	162
Prices paid	100	112	124	132	147	169	188
Ratio	1.10	0.98	0.88	0.91	0.99	1.00	0.86
United States							
Prices received	107	105	110	122	131	141	127
Prices paid	100	105	115	132	146	159	162
Ratio	1.07	1.00	0.96	0.92	0.90	0.88	0.78

^aIndexes constructed from FAO data, 1982 *Production Yearbook*. prices paid indexes were adjusted to a base year of 1976. Prices received index was constructed based on the ratio between prices received and prices paid in 1976

SOURCE FAO *Production Yearbook*, Food and Agriculture Organization of the United Nations, vol. 36, 1982, Rome, Italy

age by over 35 percent 1980; a difference of 56 percent existed that year between the lowest cost region, the Central Plains, and the Southern Plains. Also, considerable annual fluctuation in production costs is evident within wheat producing regions, although the Central and Northern Plains maintain consistently low levels. In the case of corn, the Lake States and Corn Belt regions that dominate U.S. corn production were also the low-cost producers of the early 1980s. The other regions had above-average production costs in all 3 years, which were especially high in the Southeast and Southwest. For soybeans, both the Lake State/Corn Belt and Northern Plains regions hold low costs, and are fairly competitive. A wide gap exists between those two regions and the Delta and Southeast regions.

Several factors contribute to regional differences in cost of production: varying yields, attributable to climate and soil conditions; differences in the amount and cost of inputs like herbicides, insecticides, and fertilizer; and fluctuations in interest rates on loans for land, equipment, and operating expenses.

In addition to differences in production costs between regions, such variation exists within small areas as well. Regional aggregation tends to obscure these developments.

A high cost of production does not always relate to a misallocation of productive resources. In some cases, low financial returns for a particular crop are actually higher than they would be for other enterprises, especially when government subsidies are taken into account. In certain regions, notably the Southeast, Delta, and Corn Belt, wheat and soybean production costs might be affected by double-cropping, in which case wheat returns alone may not accurately measure the economics of a particular farming enterprise. Furthermore, prices received by farmers may vary. In some cases, higher prices result from higher production costs.

These qualifications may reduce the nationwide range of wheat production costs, but actual variation remains wide. Some regions are more efficient than others in wheat production, and are more vulnerable to price changes as a result.

Table 3-3.—Average Variable Cost of Production for Wheat, Corn and Soybeans, U.S. and Selected Regions, 1980-82

	Dollars per bushel			Percent difference from U.S. average		
	1980	1981	1982	1980	1981	1982
Wheat (HRW) ^a						
Central Plains	1.06	1.54	1.25	-20	-9	-16
Northern Plains	1.44	1.20	1.23	9	-29	-17
Southern Plains	1.79	2.12	1.95	36	25	31
Southwest	1.43	1.48	1.69	8	-12	13
U.S. average	1.32	1.69	1.49	0	0	0
Wheat (SRW) ^b						
Lake States/Corn Belt	1.50	1.68	1.78	-10	-7	-9
Northeast	2.09	2.39	2.26	26	33	15
Southeast	2.02	1.93	2.11	22	7	8
U.S. average	1.66	1.80	1.96	0	0	0
Corn						
Lake States/Corn Belt	1.18	1.12	1.09	-9	-7	-6
Northeast	1.49	1.36	1.32	16	13	14
Northern Plains	1.36	1.23	1.26	5	3	9
Southeast	2.33	1.94	1.47	81	62	27
Southwest	1.54	1.44	1.60	19	20	38
U.S. average	1.29	1.20	1.16	0	0	0
Soybeans						
Delta	3.77	3.46	2.66	83	72	45
Lake States/Corn Belt	1.42	1.51	1.46	-31	-25	-20
Northern Plains	1.56	1.28	1.36	-24	-36	-26
Southeast	4.63	3.39	2.90	125	69	58
U.S. average	2.06	2.01	1.83	0	0	0

^a(HRW) = hard red winter.

^b(SRW) = soft red winter.

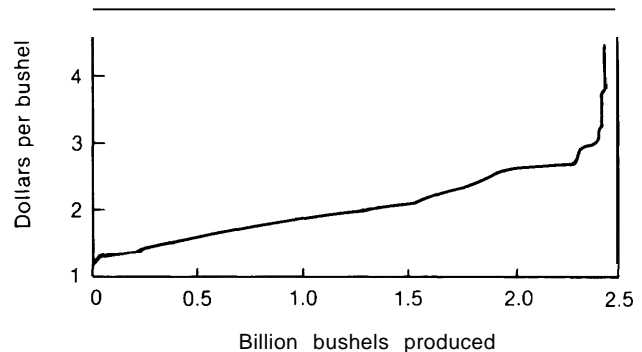
SOURCE "The U.S. Competitive Position in World Commodity Trade," *Agricultural-Food Policy Review Commodity Program Perspectives*, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985.

Moreover, depending on international production costs, certain U.S. regions may be more competitive than others in world markets.

A different perspective on the range of U.S. wheat production costs is presented in figure 3-1 and table 3-4, which show how much of the 1981 U.S. wheat crop was produced at a given variable cost. USDA analysts constructed the graph using the average variable cost of production and the amount of production for wheat in each State, arranging the States from lowest to highest cost of production. Significant variations in costs of production exist within individual States, but were not captured by the graph. Variable costs account for only those items required for production and harvesting; depreciation, taxes, interest on long-term debts, and land charges were not included.

USDA estimates that the national average variable cost for wheat production in 1981 was \$2.04 per bushel. Variable costs were below this level for more than half of all wheat produced in the United States (see table 3-4). About 1 billion

Figure 3-1.—Wheat Produced at Less Than the Specified Variable Cost Per Bushel, 1981



SOURCE "Commodity Price and Income Support Policies in Perspective," *Agricultural-Food Policy Review Commodity Program Perspectives*, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985.

bushels, approximately 40 percent of the crop, were produced at a cost that was above the national average. Significantly, for about 97 percent of the 1981 wheat crop, variable costs were below the government price support, or loan level,

Table 3-4.—Percent of Wheat Crop Produced at Less Than Specified Variable Cost of Production, 1974 and 1981

Cost less than	Percent produced	
	1974	1981
\$0.75/bu	10	0
\$1.00/bu	29	0
\$1.25/bu	45	1
\$1.50/bu	60	16
\$1.75/bu	72	34
\$2.00/bu	79	53
\$2.25/bu	86	66
\$2.50/bu	90	77
\$2.75/bu	92	94
\$3.00/bu	94	97
\$3.25/bu	95	99
\$3.50/bu	96	99
\$3.75/bu	97	99
\$4.00/bu	98	100
\$4.50/bu	98	100

SOURCE: "Commodity Price and Income Support Policies in Perspective," *Agricultural-Food Policy Review: Commodity Program Perspectives*, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985.

set at \$3.20 per bushel. As a result, in 1981, "producers who had a variable cost of less than \$3.20 would have found it to their advantage to plant their maximum acreage, assuming opportunities on other crops were not as profitable."⁷

A similar relationship existed between the government loan rate and variable costs for corn production in 1981. The national average variable cost was \$1.45 per bushel; roughly two-thirds of the U.S. corn crop had variable costs below \$1.50 (see table 3-5). The government loan rate of \$2.40 for corn exceeded variable costs for 98 percent of total corn production that year (see figure 3-2).

High market prices encouraged added production of wheat and corn for much of the 1970s. By 1981, however, government price supports that topped variable production costs provided an incentive to retain large wheat production acreage. As noted earlier, direct income support payments to farmers, via the target price mechanism, offered an additional impetus to expand wheat and feed grain production.

These levels of government protection are significant, because while downward adjustments in

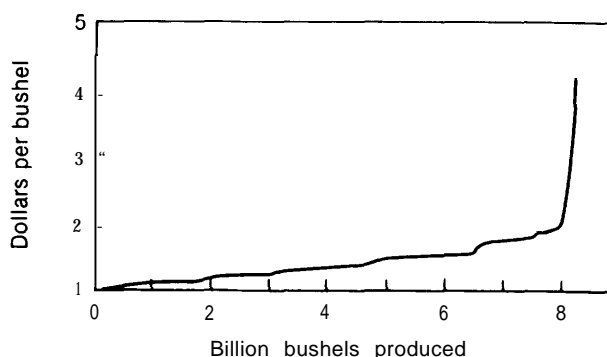
⁷"Commodity Price and Income Support Policies in Perspective," *Agricultural-Food Policy Review: Commodity Program Perspectives*, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985.

Table 3.5.—Percent of Corn Crop Produced at Less Than Specified Variable Cost of Production, 1974 and 1981

Cost less than	Percent produced	
	1974	1981
\$1.00/bu	33	0
\$1.25/bu	62	28
\$1.50/bu	79	66
\$1.75/bu	87	80
\$2.00/bu	93	96
\$2.25/bu	95	98
\$2.50/bu	96	98
\$2.75/bu	97	99
\$3.00/bu	98	99
\$3.25/bu	98	100

SOURCE: "Commodity Price and Income Support Policies in Perspective," *Agricultural-Food Policy Review: Commodity Program Perspectives*, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985.

Figure 3-2.—Corn Produced at Less Than the Specified Variable Cost Per Bushel, 1981



SOURCE: "Commodity Price and Income Support Policies in Perspective," *Agricultural-Food Policy Review: Commodity Program Perspectives*, Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 530, 1985.

price support levels for wheat and feed grains tend to make the United States more competitive in world markets, the impact on high-cost U.S. producers—and on those in other countries—would be significant. For example, if the 1981 loan rate for wheat had been set at \$2.50, in order to stimulate wheat exports and retain U.S. market share, variable costs would have exceeded the loan rate for approximately one-quarter of domestic wheat production. This evidence, together with that which will be presented in the next section, indicates that enterprises and regions that earned acceptable returns under the higher commodity prices of the 1970s could do so in the 1980s only by virtue of U.S. Government price and income

supports. Even with those government supports, cash flow problems associated with high variable production costs would have been more acutely felt were it not for the convention among farm

lenders, including the Farmers Home Administration, of financing farm operation and ownership based on solid assets, such as land, rather than on the basis of cash flow.

REGIONAL PRODUCTION COSTS AND AGRICULTURAL STRUCTURE

The continued concentration of ownership and control of agricultural land and resources, and the *role* of government in this process, has long been a feature of agriculture policy debates. The fate of small and medium-size “family farms” has been of special concern to many policy makers. In assessing international competitiveness, however, it may be just as important to examine differences between high-, medium-, and low-cost producers. Grouping farm enterprises according to production costs would resemble conventional classifications based on annual gross sales or acreage; production costs often decrease as enterprise size grows. The term “enterprise” refers to the resources devoted to production of a particular crop, and is, in many respects, synonymous with the term “farm.”

A recent OTA study described the complex relationships among enterprise size, dynamics of farm expansion, geographic location, and production costs for major crops.⁸ Table 3-6 lists characteristics for representative corn, wheat, and soybean enterprises of three different sizes in four different production areas. The enterprises are arrayed on the basis of unit cost of production, from lowest to highest. The unit cost ranges were grouped in intervals of roughly 10 percent.

Clearly, production costs vary for each crop, even in traditionally “fertile” areas. Corn production costs for the representative enterprises ranged from \$1.67 to \$3.21 per bushel. For wheat, the range was \$2.05 to \$3.91 per bushel, and for soybeans, \$3.32 to \$6.02 per bushel. The difference between the lowest and highest cost enterprises exceeded 90 percent for corn and wheat, and 80 percent for soybeans. These cost ranges are con-

sistent with nationwide variations in unit production costs for major crops, discussed earlier in this chapter.

For each crop, the highest production costs tend to be concentrated in one of the four areas studied: south central Nebraska for corn, central North Dakota for wheat, and the Mississippi Delta for soybeans. At the low-cost end of the spectrum, western Kansas seems to enjoy a comfortable absolute advantage in wheat production. Regional competition is evident in the case of corn and—to a lesser degree—soybeans in the low-cost ranges. Soybean competition appears keenest in the middle range; a measure of competition is also observed in that range for wheat and corn.

As would be expected, what constitutes a “very large” enterprise size in one major producing area may differ from an enterprise of similar size in another. Enterprise sizes in the respective areas are grouped by percentile distribution—based on planted acreage, “very large” enterprises were in the 90th percentile, “large” enterprises in the 70th and 80th percentiles, and “moderate” enterprises the 40th to 60th percentiles. However, in addition to acreage, unit production costs distinguish enterprise size. A 1,283-acre wheat enterprise is “very large” by central North Dakota standards, but its per bushel cost of production might be 85 percent higher than a “very large” enterprise of 3,909 acres in western Kansas, 37 percent higher than a “moderate” enterprise of 753 acres in eastern Washington, 24 percent higher than a “moderate” enterprise of 421 acres in northeast Montana, and 16 percent higher than a “very large” enterprise of 2,388 acres in eastern Washington.

Even more interesting from a national perspective is the diversity of enterprise sizes in the lower and middle ranges of production costs. At the same time, unit production costs for corn and soybeans are similar in enterprises of different sizes

⁸U. S. Congress, Office of Technology Assessment, *Technology, Public Policy, and the Changing Structure of American Agriculture*, OTA-F-285 (Washington, DC: U.S. Government Printing Office, March 1986).

Table 3-6.—Production Costs, Farm Size, and Yields for Corn, Wheat, and Soybean Enterprises in Selected Crop Production Areas, 1983

Crop: Total cost	Production area	Farm size	Acreage	Economies of size rating	Yield (bu/acre)
Corn:					
\$1.67/bu	North central Iowa	VL	576	4	119.0
\$1.67/bu	East central Illinois	VL	1,113	4	130.3
\$1.67/bu	Central Indiana	L	NA	4	125.3
\$1.69/bu	Central Indiana	VL	903	4	125.6
\$1.75/bu	East central Illinois	L	NA	1	128.6
\$1.75/bu	North central Iowa	M	170	2	113.0
\$1.77/bu	Central Indiana	M	271	2	122.4
\$1.80/bu	North central Iowa	L	NA	1	117.4
\$1.991/bu	East central Illinois	M	246	0	123.1
\$2.83/bu	South central Nebraska	VL	1,715	4	118.6
\$3.03/bu	South central Nebraska	L	NA	2	112.6
\$3.21/bu	South central Nebraska	M	266	0	106.2
Wheat					
\$2.05/bu	Western Kansas	VL	3,909	4	33.1
\$2.30/bu	Western Kansas	L	NA	3	33.1
\$2.41/bu	Western Kansas	M	774	2	33.2
\$2.76/bu	East Washington	M	753	1	47.8
\$2.771/bu	Northeast Montana	VL	577	4	31.3
\$2.94/bu	Northeast Montana	L	NA	0	29.9
\$3.05/bu	Northeast Montana	M	421	0	29.2
\$3.26/bu	East Washington	VL	2,388	2	39.9
\$3.60/bu	Central North Dakota...	L	NA	4	30.8
\$3.79/bu	Central North Dakota...	VL	1,283	3	31.7
\$3.86/bu	East Washington	L	NA	2	39.9
\$3.91/bu	Central North Dakota...	M	338	0	29.7
Soybeans:					
\$3.32/bu	North central Iowa	VL	707	3	36.8
\$3.38/bu	East central Illinois...	L	NA	4	38.2
\$3.44/bu	North central Iowa	L	NA	3	36.6
\$3.56/bu	East central Illinois...	VL	684	2	38.2
\$3.58/bu	North central Iowa	M	210	1	36.6
\$3.59/bu	Western Ohio	L	NA	4	34.8
\$3.64/bu	East central Illinois...	M	270	0	37.4
\$3.66/bu	Western Ohio	M	244	1	34.4
\$4.27/bu	Western Ohio	VL	897	2	35.6
\$5.171/bu	Mississippi Delta	M	795	2	23.6
\$5.20/bu	Mississippi Delta	VL	1,262	3	25.0
\$6.02/bu	Mississippi Delta	L	NA	0	23.6

NOTE: Cost of production excludes land charges. Relative farm size within a given area: VL (very large), L (large), and M (moderate). Economies of size rating: 4 (clear advantage for enterprise size relative to other sizes within production area), 0 = no advantage.

SOURCE: US Congress, Office of Technology Assessment, *Technology, Public Policy, and the Changing Structure of American Agriculture*. OTA F-285 (Washington DC: US Government Printing Office, March 1986).

across various regions. For example, the unit production cost of corn on a 1,113-acre corn enterprise in east central Illinois falls within 10 percent of the cost for a 170-acre operation in north central Iowa or a 271-acre enterprise in central Indiana. Costs at 250-acre soybean enterprises in western Ohio resemble those at 700-acre soybean operations in east central Illinois. Furthermore, for every crop, "large" and "very large" enterprises in some regions appear to be less efficient than medium-size farms in others.

Within a particular region, incentives may exist to expand enterprise size, which would lower

unit production costs. Expanding enterprise size may also increase total income, even with little change in unit costs. In contrast, "diseconomies" of scale—rising production costs—tend to discourage expansion. On the whole, regional variation in production costs will remain, due to differences in yields and input costs such as fertilizer, pesticides, and land preparation.

The "economies of size" rating indicates the extent to which a clear advantage exists for one enterprise size versus another within a particular region. The rating was derived from four indicators: production costs, utilization of harvesting equip-

ment, and two measures of changing concentration of production—static for 1982, and dynamic for the period 1978-82. A “4” denotes a “clear advantage”; a “O” implies “no advantage.” Table 3-6 reveals an interesting pattern for corn, wheat, and soybeans: enterprises and regions with lower costs of production tend to have higher ratings for internal economies of size. This relationship seems most compelling for corn, since the enterprises in the lowest range of production costs exhibit exceptionally strong economies of size; for wheat and soybeans, the pattern is more ambiguous.

This complex system of regional production costs and economies of scale raises important policy questions for international competitiveness. A U.S. strategy that calls for downward flexibility in commodity prices, achieved in part by lowering government price support levels, could have important effects on the pace of resource concentration within agriculture, which would differ among crops and regions because of varying cost structures and economies of size. Program participants would still be eligible to receive the higher target price level for wheat and feed grains; in this case, the relationship between target prices and variable costs may be more relevant. However, acreage reduction requirements and limits on government deficiency payments would affect benefits for program participants, influencing their decision to participate.

For example, if 1983 wheat prices had fallen below \$3.60 per bushel in central North Dakota—in fact, the national average market price that year was \$3.55 per bushel, and direct payments to program participants averaged 50 cents per bushel—large enterprises would have been unable to recoup variable costs below this price. Although they exhibited a clear advantage in internal economies of scale, large enterprises would have lost money by expanding in this price regime. In addition, very large and moderate-size enterprises with even higher unit production costs would have no incentive to expand in that region, since they would be unable to cover variable expenses even by remaining the same size. The same could be said for large farms in eastern Washington.

Other enterprises represented in table 3-6, whose production costs are well below \$3.60 per

bushel, would earn returns in excess of their variable costs. Nor would that price affect the dynamics of resource concentration for these areas. Some wheat enterprises might even increase acreage, so as to lower average production costs. Moreover, where unit costs did not differ widely among enterprise sizes, expansion might occur if farmers desired to increase income.

Similar observations apply to the corn and soybean enterprises in table 3-6. All other factors being equal, a low corn price—below \$2.83 per bushel—would affect irrigated corn operations in Nebraska most severely. Likewise, soybean enterprises in the Mississippi Delta would be sensitive to a low-price environment. In lower cost areas, production patterns and resource concentration would not be affected.

If relatively low market prices prevailed for several years, shifts might occur in the geographic location of production, away from high-cost areas and toward those with lower costs. Within high-cost regions, movement toward different types of farming enterprises—such as other crops or livestock—could occur.

The sharp downside in agricultural exports since 1981 has raised concerns about whether U.S. farmers can compete in international markets. However, emphasis on this dimension of the problem alone diverts attention from the competition that U.S. farmers face from one another. U.S. enterprises and farms of different sizes compete within regions, and enterprises and farms of all sizes in one region may compete with those of another.

Few policy debates have focused on this particular type of competition, which may affect the U.S. international agricultural position. Commodity policies designed to favor “moderate” over “very large” enterprises, for example, could have serious effects when viewed across several regions. And downward flexibility of market prices, considered by many analysts to be a prerequisite for a more competitive U.S. agricultural sector, could create new and complex situations between and within regions. Omnibus farm legislation, enacted in 1985, does aim to increase U.S. competitiveness through lower price support loan rates for

major crops, In order to assess the full regional and structural effects of this policy, more thorough analysis of USDA information on farm and enterprise characteristics and production costs is needed.

This discussion is based on limited data. However, current information does suggest that greater

market orientation in government commodity programs could improve the competitiveness of the United States in world markets, but could also slow the concentration of resources in high-cost production areas, which may alter the geography of crop production.