The Impact of Eliminating Farm Price Supports on Net Returns for Major Crops: A Regional Analysis

by:

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INTRODUCTION

World recession in the early 1980s coupled with an appreciation of the U.S. dollar and severe debt problems in many developing country markets has led to a sharp decline in the demand for U.S. agricultural exports as well as a decline in trade in general. Farm prices have fallen and the value of U.S. agricultural exports has declined from $43.8 to $38.0 billion between fiscal year 1981 and 1984. Farm commodity programs have also played a role in the decline as world prices have fallen to the level of U.S. loan rates and forced the U.S. government to purchase commodities for storage that would otherwise have been exported. This has greatly increased the costs of farm programs and, in 1982, made it necessary to impose an even more costly payment-in-kind program to reduce government stocks. With low world prices and a record U.S. grains crop in 1985, the United States again faces the prospect of accumulating huge stocks which will again be as expensive to dispose of as they were to purchase.

From a trade and budgetary standpoint, it would make sense to remove or reduce farm price and income supports. This, however, would exacerbate a financial crisis in the sector which is already the worst since the Great Depression. Between 1981 and 1984, real interest rates have risen sharply and interest expense as a percent of total cash outlays has risen sharply from 10 percent in the early 1970s to almost 20 percent in 1984 (3).[1/] Agricultural land values, which rose throughout the past

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1/ Underscored numerals enclosed in parentheses refer to entries in the Reference section.

decade, have fallen by 23 percent in real terms since 1980 (6). A recent study by the Economic Research Service (ERS)(8) estimated that as of January 1985, one third of the family-sized commercial farms in the Unites States were experiencing some financial difficulty.

The stress currently experienced by the agricultural sector, however, must be recognized as part of an adjustment process. It is an adjustment to a lower level of exports at lower prices. In order to compete in the slow growth markets of 1980s, U.S. agriculture must lower its costs. This is occurring in two ways. First, many of the higher cost producers are being forced into bankruptcy and are going out of business. Second, costs themselves are falling as the demand for the factors of production has declined. The principal adjustment in costs appears to have been in land values, but prices for farm machinery and the returns to farm management have also fallen.

Loan rates and deficiency payments inhibit this adjustment process and prevent the United States from maintaining the price competitiveness of its agricultural products in world markets. A key question confronting policy makers as they consider the possibility of lowering loan rates, is which regions of the country and which commodities will undergo the greatest adjustment.

This information is essential if alternative programs are to be designed which address the financial problems of agriculture without inhibiting the adjustments crucial to its long term competitiveness on world markets. The Economic Research Service (7) has already evaluated many of the consequences of eliminating price and income supports but the study did not consider region-specific commodity impacts. This paper provides a "first cut" static analysis using a regionalized linear programming (LP) model to estimate commodity-by-region adjustments to the lower farm prices which would result in the absence of government price and income support programs.

This paper examines the distribution of the resulting financial distress across major export crops and producing regions, ~~will be examined.~~

PROCEDURES AND ANALYSIS

Estimates of Crop Prices Under No Price and Income Support Scenario

The immediate effect of eliminating price and income supports on the agricultrual sector is to cause the market prices of program commodities to fall. Six of seven major field crops - wheat, corn, cotton, sorghum, barley, and oats are covered by commodity programs. Although soybeans are not a program crop, soybean prices are linked closely to other crop prices - particularly the corn price. Hence, the elimination of price and income supports will affect soybean prices and producers as well. This paper will emphasize only four of the major crops - wheat, corn, soybeans and cotton. Together these account for about 90 percent of the total acreage in the seven major crops and 63 percent of the value of U.S. exports in calendar year 1984.

ERS (7) estimated a set of crop prices associated with a no support scenario. These price forecasts are shown in Table 1. Prices assume that U.S. and world agricultural economies recover from the slump of the early 1980s but do not grow fast enough to put upward pressure on agricultural commodity prices. Price projections are intended to reflect cross-commodity substitution in production and consumption.

Table 1. Price Forecasts Under No Support Scenario

Crop		Year 1984	1985	1986	1987	1988	1989	1990
Corn:	$/bu	2.85	2.65	2.40	2.60	2.65	2.75	2.85
Soybean:	$/bu	7.00	6.50	6.25	6.50	6.80	7.15	7.40
Cotton:	¢/lb	64	60	58	61	63	69	75
Wheat:	$/bu	3.30	3.30	2.80	2.95	3.10	3.25	3.30

Source: (7), p.24

The regionalized linear programming (LP) model used to estimate the regional effects of eliminating price supports was developed at Iowa State University for the Resource Conservation Act. The model was designed for analyzing natural resource use issues, but it can also be used to identify regional and commodity impacts of a change in U.S. price supports. Net returns defined in the model, are the difference between unit prices and unit production costs where costs include payments to labor and capital but exclude returns to land and management. Hence, net returns as used in the context of this discussion are net returns to land and management - not gross net returns. For production of a crop in a particular region to be viable in the long-run, the net returns - as defined in this model - will have to cover the opportunity costs of land and management. Yet because returns to land and management vary widely over time and across farm enterprises, it is extremely difficult to incorporate a meaningful valuation of these inputs in order to determine what these opportunity costs might be. This is not a serious problem as long as the objective is to determine the crops and regions of the country which are most likely to come under stress rather than trying to estimate the level of the financial stress itself.

The regionalized multiple-commodity model includes regional characteristics that influence the type and the mix of crops to be grown, method of production and resource uses. The model includes 105 producing areas (PAs) and incorporates 6 land groups (table 2) and ten crops including wheat, corn grain, soybeans, cotton, oats, barley, sorghum, hay, nonlegume hay, and corn silage. A large regionalized and differentiated land group model such as this allows analysis of locational variations in the optimum production mix, resource uses and productivity for different land types. It is, then, possible to analyze the impact of a Government program on producers of different crops at the PA level and for different types of land.

Table 2: Model Land Groups and Their Yields

Model Land Groups	Erosion Potential	Yields	Average Corn Yield	Average Sheet and Rill Erosion Rate
			bu/acre	tons/acre
1	low	highest	109	1.68
2	low	low	67	1.22
3	medium	high	97	2.59
4	high	medium	85	18.30
5	high	medium	79	29.08
6	high or low*	lowest	37	12.34
			102	3.75

* Land group 6 refers to fragile land which includes land designated by Soil Conservation Service as unsuitable for crop production.
Source: (8)

We use the economic information contained in the base run solution which represents the crop production pattern in existance in 1982. Crop prices for wheat, corn and cotton reflect 1985 target prices; the soybean price was adjusted by the ratio of 1985 target price for corn to the 1982 corn price. The higher price level is used because as a profit maximization model, the LP underestimates 1982 production (i.e., it does not include land producing at a loss). By raising prices to 1985 target prices, the production estimates will be close to normal actual production. This means that the estimation of the effects of eliminating price supports will tend to be overstated since a substantial part of the land in the 1982 base was already producing at a loss. The regional and commodity distribution of the the effects, however, should not be effected.

Data sources used to derive base run are contained in the documentation (1 and 2). The base run solutions of the model provides information on crop production, land use, net returns to land and management, total cost of production, yields per acre, sheet and rill erosion rates for each crop and each land group at the PA level. Results are presented, however, only for the aggregated regions shown in Figure 1.

Figure 1: Ten Producing Regions

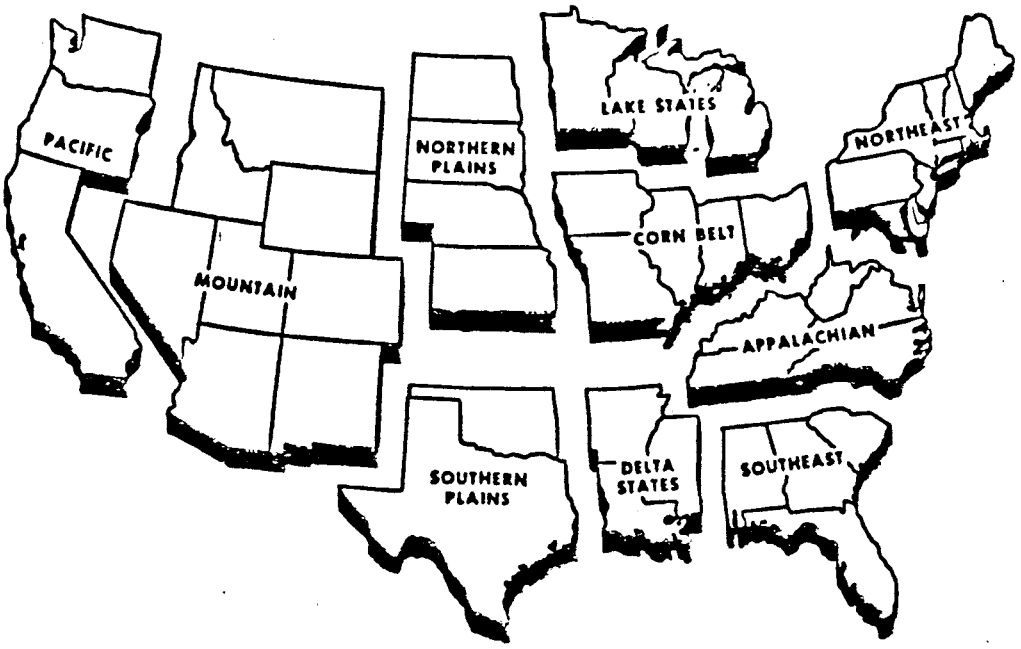

Table 3. Average Total Production Cost by Region by Crop

Region	Crop: Wheat	Corn	Soybean	Cotton
	$/bu			¢/lb
Northeast	2.82	1.67	3.00	--
Appalachian	2.83	1.88	3.77	32.
Southeast	3.18	3.25	4.52	72.
Delta States	2.57	--	4.19	39.
Corn Belt	2.72	1.62	3.44	37.
Lake States	3.15	1.57	4.38	--
Northern Plains	2.83	2.13	4.28	--
Southern Plains	3.51	3.05	3.26	52.
Mountain	2.69	2.35	--	121.
Pacific	3.11	2.60	--	76.
U.S.	2.93	1.78	3.78	60.

The production costs obtained from the model's base solution (Table 3) is the foundation of this analysis. Land costs or the opportunity cost of managerial skill and time, as mentioned, are not included. Costs do reflect each PA's natural resource endownment and, therefore, their productivity differences. Hence costs indicate the competitive advantage of producing different crops in different regions subject to the available land for each crop in each region. For example, excluding land costs, the Corn Belt and the Northeast appear to be the cheapest producing regions.

RESULTS

The price projections in Table 1 show a sharp drop for all four commodities for 1986 - the year when price and income supports are assumed to be eliminated. Thereafter prices gradually increase until the end of the forecast period in 1990. Assuming that technology and costs remain the same as they were in 1982 for the 1986-1990 period, the returns to land and management can be examined and compared with the base run for the 4 major crops in each of 10 regions for prices at the two extremes (i.e. the 1986 low price scenario and the 1990 high price scenario).

Major crop prices in 1986 are forecast to drop to $2.80 per bushel for wheat, $2.40 per bushel for corn, $6.25 per bushel for soybean, and 58 cents per pound for cotton with the elimination of price and income supports. At these levels, 52 million acres or about 23 percent of the total acreage of these crops will have negative returns to land and management (Table 4). Wheat farmers will be hurt the most. Almost 52 percent of the acreage in wheat (38.8 mllion acres) will experience negative returns. Cotton producers will also be hurt substantially with negative returns to about 36 pecent of cotton acreage. Corn and soybeans are affected less with negative net returns to about 9 and 1 percent of acreage in these crops respectively.

The regional distribution of the adjustments implied by an elimination of Government price supports are shown in Table 4. The Northeast, Appalachian,

Table 4: Regional Distribution of Negative Net Return Acreage by Crop Under No Price Support Scenario

Region / Crop	N.E.	Appal.	S.E.	D.S.	C.B.	L.S.	N.P.	S.P.	Mount.	Pac.	U.S.
				LAND BASE IN THE MODEL (1,000 Acres)							
Wheat	671	1751	1179	1424	4391	4412	32791	11517	11039	5767	74742
Corn	2187	3654	2850	17	41919	13744	13091	1145	1125	267	80002
Soybean	834	5050	4299	9829	33008	2553	3401	551	3	0	59524
Cotton	0	212	617	2356	174	0	0	7460	843	2612	14272
Total 4 Crops	3492	10667	8945	13626	79492	20709	49283	20673	13010	8646	228543
				PERCENT OF REGION's TOTAL ACREAGE (1990 Estimated Prices)							
Wheat	8.8	15.3	38.8	0	8.2	25.1	21.3	24.0	17.7	25.4	20.6
Corn	3.3	3.4	67.9	0	0.3	1.4	23.0	74.4	0	46.8	8.1
Soybeans	0	0	0.7	0	1.2	0	13.4	0	0	0	1.0
Cotton	--	40.1	36.1	12.0	0	--	--	25.0	89.4	56.9	35.6
Total 4 Crops	3.4	4.5	29.5	2.2	0.8	6.3	20.3	26.6	20.8	35.6	11.6
				PERCENT OF REGION's TOTAL ACREAGE (1986 Estimated Prices)							
Wheat	55.4	55.2	82.8	0	19.8	87.4	44.0	56.2	63.4	67.0	51.9
Corn	3.8	3.4	72.3	0	0.3	3.0	23.1	74.4	51.1	46.8	9.2
Soybeans	0	0	0.7	0	1.2	0	13.4	0	0	0	1.5
Cotton	--	40.1	52.8	12.6	21.3	--	--	28.0	89.4	56.9	35.5
Total 4 Crops	13.1	11.0	37.9	2.2	1.8	20.6	36.3	45.2	64.0	63.3	22.8

Delta States, Corn Belt, and Lake States regions are affected the least - primarily because they are not large producers of the two most affected commodities, wheat and cotton. The Delta States, with 16.5 percent of the nation's cotton acreage, is the only region among the five with more than 10 percent of the base acreage in either of these 2 crops but, as a low cost cotton producing region, it accounts for only 12 percent (.3 million acres) of the 5.1 million acres in cotton earning negative returns.

The remaining regions all have negative returns for 20 percent or more of their total acreage in these 4 crops. The greatest adjustment in corn production is likely to occur in the Southeast, Northern and Southern Plains regions while negative profits in wheat production are spread over the two Plains, Mountain and Pacific regions. The Southern Plains and the Pacific regions have the highest proportions of the high cost cotton production acreage.

The regional distribution of negative returns at 1990 prices is roughly the same as for the 1986 prices (table 4). The Delta States and Corn Belt regions, with negative returns to a relatively small percentage of their acreage showed very little response to the increase in prices. For the Lake States and the Southern Plains, 15 to 20 percent of the total land in each region planted to these four crops shifts from negative to positive returns to land and management between 1986 and 1990. The shift in the Mountain and Pacific regions is even more dramatic with 43.2 and 27.7 percent, respectively, of the total base acreage showing positive returns in 1990 after initial negative returns in 1986.

A comparison of land and management returns for 1986 - the first year of the policy change - with the returns for 1990 - after prices have begun to recover - will show how much of the acreage initially experiencing negative returns will eventually have positive returns. At the higher set of prices, unit production costs will still exceed farmgate prices for about 12 percent of the acreage in these crops. Approximately 21 percent of wheat and 33 percent of cotton acreage would have negative net returns while only 8 and 1 percent of corn and

soybean acreage would fail to have positive returns. Hence, between 12 and 23 percent of the land in these four crops would experience negative returns to land sometime over the next 5 years if price supports were eliminated.

The distribution of negative net returns across land groups is shown in Table 5. As expected, all of the fragile land (land group 6), and 43 percent of the least profitable wet and stony land (land group 2) for these 4 crops have negative profits under free market scenario (Table 5). Of the highly erosive land in land groups 4 and 5, 11 and 24 percent, respectively, will have negative net returns. Only a small portion (1.3 percent) of the acreage with negative net returns occurred in the prime agricultural land of group 1.

IMPLICATIONS

Income Distribution

The elimination of Government income and price supports implies major adjustments in the U.S. agricultural sector. The results of the Iowa State LP model show that of the 4 major crops, the burden of adjustment will fall most heavily on wheat and cotton producers. The regions most affected were shown to be the Southeast, the Northern and Southern Plains, the Mountain and Pacific States.

An important dimension of the removal of price and income supports is the year-to-year adjustments which will be required to world price movements. When productivity differences across regions and land groups are taken into account, it becomes clear that price movements will be far more disruptive for some areas than for others. Almost half of the wheat and corn land with negative net returns under the highest price case is in the Northern Plains region. Changes in these crop prices will have a much greater relative impacts on the agricultural sector of this region than they will, for example, on the Corn Belt or Delta States. A large proportion of the land shifting in and out of production with changes in world prices is in the Northern Plains region. This region will, therefore, bear the brunt of adjustment to changes in the market.

Conservation Policy

A hoped-for byproduct of the elimination of price suppots is removal of highly

Table 5. Acres With Negative Net Returns Under No Support Scenario by Land Group

Land Group	Crop	Wheat	Corn	Soybeans	Cotton	Total 4 Crops
		LAND BASE IN THE MODEL (1,000 Acres)				
1		9095	46955	27548	1738	85336
2		14453	6175	3011	4689	28329
3		46762	18963	22138	5464	93327
4		3416	5971	5469	549	15405
5		530	1473	1025	534	3561
6		486	465	335	1297	2583
Total		74742	80002	59525	14253	228541
		PERCENT OF EACH LAND GROUP'S TOTAL ACREAGE (1990 estimated prices)				
1		.7	1.5	0	19.9	1.2
2		48.2	50.0	0	48.4	42.6
3		13.5	10.9	0	9.1	9.5
4		36.9	4.4	0	34.1	11.1
5		66.4	7.6	26.0	25.3	24.4
6		100.0	100.0	100.0	100.0	100.0
Total		20.6	8.1	1.0	33.0	11.9
		PERCENT OF EACH LAND GROUP's TOTAL ACREAGE (1986 estimated price)				
1		5.6	1.8	0	19.9	2.0
2		80.8	51.0	8.8	53.8	62.2
3		50.3	13.5	0	9.1	28.5
4		60.6	4.5	0	34.1	16.4
5		100.0	9.0	26.0	41.9	32.4
6		100.0	100.0	100.0	100.0	100.0
Total		51.9	9.2	1.5	35.6	22.8

erosive and fragile land from production. If this were the case, the land in groups 4, 5, and 6 in Table 3 would be included in the highest cost (or most negative returns) acreage. High rates of erosion, however, do not necessarily imply high costs of production. All of land group 6 has negative returns in the high price scenario, but, 75 percent of land group 5 and 90 percent of land group 4 remains profitable. Clearly, the elimination of price supports alone will not fully address the problem of soil erosion in U.S. agriculture.

CONCLUSION

The removal of price supports should greatly boost the competitiveness of U.S. agricultural exports in 2 ways. First, as Paarlberg et.al.(5) have argued, price supports act as an export tax. The removal of this "tax" should stimulate exports and expose U.S. agriculture more directly to the rigors of the world market. If U.S. agriculture is to grow and prosper in the future, it will have to adapt its cost structure to compete in the world market. Second, the United States is such a large exporter of all 4 of the commodities considered in this study the price support and stabilization policies of the U.S. government - designed to benefit U.S. farmer - have also meant price support and stabilization for the world. A change in these policies. will allow world prices to fall and become more variable. The adjustments to this change in policies will also be forced, to varying degrees, upon the taxpayers, consumers and producers of all other countries which buy or sell on the world market.

The effects of the removal of Government price supports however, were shown to fall most heavily on wheat and cotton producers and will primarily affect producers in the Southeastern, Nothern and Southern Plains, Mountain and Pacific States. Producers in these regions will also be more exposed to changes in the world market as acreage shifts in and out of production with changes in market prices. The welfare and resource costs of making these adjustments may be substantial. Alternative policies may need to be considered which will reduce these adjustment costs or spread them over a broader segment of the agricultural sector or the general population. The key policy dilemna is how to ease the adjustment without preventing it.

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