12-1986

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William H. Meyers
Iowa State University

S. Devadoss
Iowa State University

Michael D. Helmar
Iowa State University

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Abstract
Over the past decade the operation of the commodity loan programs and since 1977 the farmer-owned reserve (FOR) programs, has resulted in the accumulation of large quantities of grain stocks both in the hands of the government and in the hands of farmers, sealed under the reserve program. Government and farmer-owned reserve (FOR) stocks for wheat exceeded a billion bushels several times in recent years and for corn reached two and a half billion bushels in 1982/83. The build-up of these stocks in 1982/83 led to the implementation of the massive acreage reduction under the Payment-in-Kind (PIK) program. Government-owned (CCC) and FOR stocks were used in this program as payment to farmers for idling cropland.

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Working Paper 86-WP 18
November 1986

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Introduction

Over the past decade the operation of the commodity loan programs, and since 1977 the farmer-owned reserve (FOR) programs, has resulted in the accumulation of large quantities of grain stocks both in the hands of the government and in the hands of farmers, sealed under the reserve program. Government and farmer-owned reserve (FOR) stocks for wheat exceeded a billion bushels several times in recent years and for corn reached two and a half billion bushels in 1982/83. The build-up of these stocks in 1982/83 led to the implementation of the massive acreage reduction under the Payment-in-Kind (PIK) program. Government-owned (CCC) and FOR stocks were used in this program as payment to farmers for idling cropland.

The U.S. government operates under strict rules regarding the release of CCC and FOR stock quantities on the domestic market; however, there is much more flexibility in disposing of these commodities abroad. The use of export disposal schemes has been suggested as a means to prevent accumulation of surplus stocks. Although numerous export incentive programs have operated during the past decade, no general export subsidy program has been attempted since the early 1970s.

The hypothetical policy evaluated in this study is a generalized export subsidy designed to prevent the accumulation of government stocks. This is the most direct procedure for surplus disposal, and it avoids the difficult problem of potential displacement of commercial exports by government sponsored exports. In this scheme all exports are subsidized to the degree necessary to dispose of the additional quantities available from CCC and FOR stocks.

Analytical Method: The Counterfactual Approach

What would have happened over the 1977/78 to 1984/85 crop years had an export disposal policy using export subsidies been adopted by the United States? The starting year 1977/78 was chosen because that was the first year, after the export boom of the early 1970s, that prices and loan rates converged and government stocks began to accumulate. The consequences of using the hypothetical export subsidy scenario are compared with actual conditions that existed during this period.

Figure 1 illustrates the analysis. The actual price and quantity levels are represented by P_o (price), D_o (domestic use), I_o (private stocks), X_o (exports), and G_o (government stocks). The sale of government stocks shifts G_o to zero, as indicated in (1). Both theoretical and empirical research shows that public stocks displace private stocks to some degree. In the empirical models used for this analysis, private corn stocks decrease (increase) by 0.47 bushels for every bushel added to (removed from) public stocks. The corresponding substitution rate for wheat is 0.21 for each 1.0

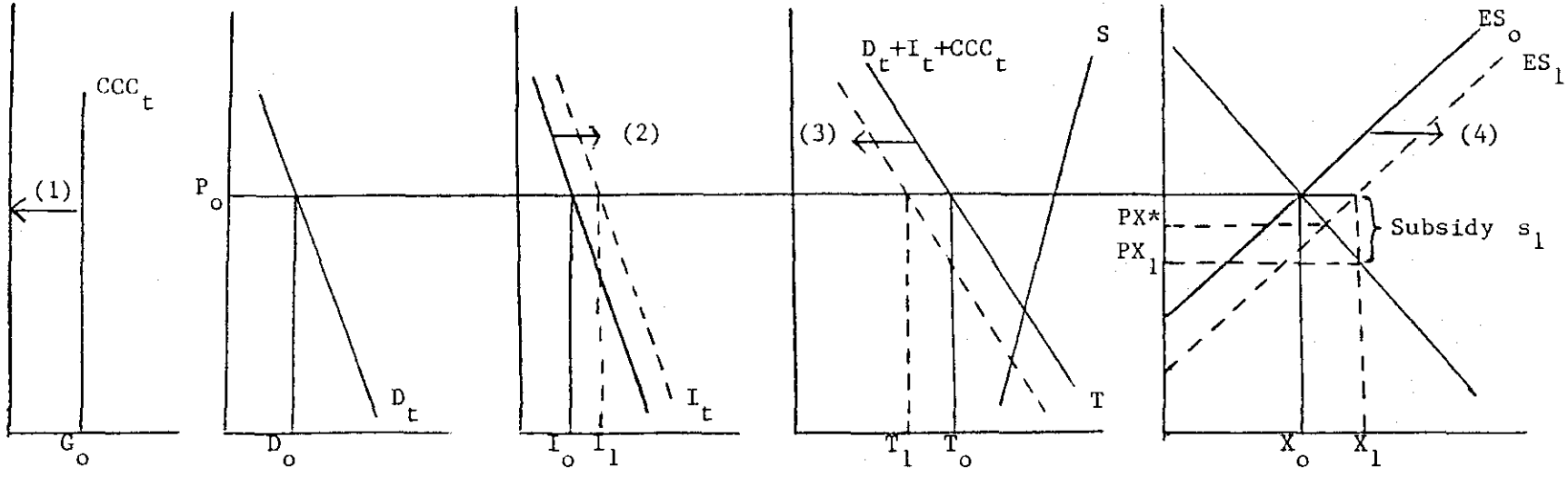


Figure 1. The impact of selling CCC stocks and subsidizing exports to maintain constant domestic prices.

bushel change in public stocks. Thus private stock demand shifts to the right by less than the change in government stocks, as seen in (2). The decline in total domestic demand (3) and increase in net export supply (4) are the net effects of the stock shifts.

If no export subsidy were employed, the increase in market surplus would depress both domestic and export prices to PX* (if the loan rate were not above PX*). However, an export subsidy exactly equal to s_1 would keep domestic prices constant at P_0 and drive the export price down to PX_1. For this analysis, a subsidy was determined for each year that would allow the complete disposal of government stocks while keeping domestic prices at their actual historical levels. The only constraint imposed on the subsidy was that it could not be so large as to drive export prices below the U.S. variable cost of production. If that occurred, it would be equivalent to subsidizing variable inputs used in the production of the exported commodity.

Models Used in the Analysis

The analysis was conducted by the Food and Agricultural Policy Research Institute (FAPRI) at Iowa State University. The econometric regional trade model used includes wheat, coarse grains, soybeans, and soymeal and explicitly incorporates exchange rates and price transmission relationships between countries and regions. A the basic elements of this dynamic nonspatial equilibrium supply and demand model are illustrated in Figure 2. The model determines net imports and exports but does not show trade flows between specific regions. The net demands of importers (EDT) less the net supplies of other exporters (ESO) is the net excess demand facing the U.S. market (EDN).

The major importers and exporters for each commodity are endogenized, and these differ somewhat from commodity to commodity. The regional coverage and the endogenous components of internal markets are evident in the Appendix A summary tables of structural elasticities. Those countries for which parameters have not been directly estimated with econometric techniques have been assigned price and income response elasticities based on the best judgment of the USDA project task force. These elasticities are converted to net import elasticities and reported in Table A.8. By using these models, it is possible to not only determine the level and cost of the subsidy necessary to dispose of the government stocks but also to determine the effects of this program on foreign importers and exporters.

The countries or regions included in the wheat model are the United States, Canada, Australia, Argentina, India, Japan, China, USSR, Eastern Europe, European Community, Africa and Middle East, Other Asia, Other South America, and Other West Europe. The rest of the world is an exogenous block. The U.S. part of the wheat model is more complete than the other regions. However, at least two

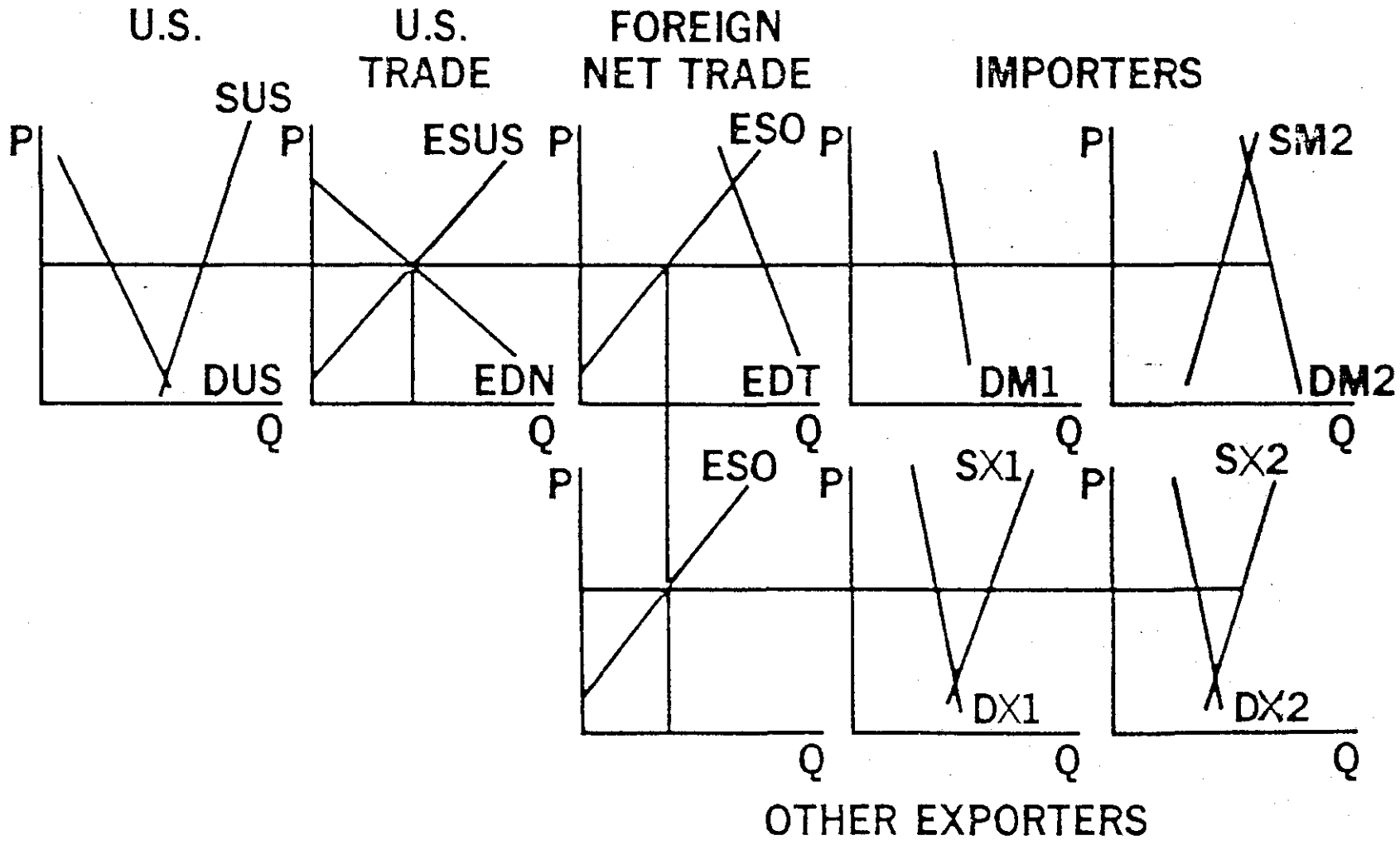


Figure 2. Illustration of nonspatial equilibrium supply and demand model

structural equations for production and demand are specified for most other regions.

The feed grains model includes 12 regions in differing levels of detail. The most complete submodels are for the United States, Canada, European Community, Argentina, and Thailand, where both supply and demand components are endogenous. The South African submodel consists of a net export function, with production exogenous. The demand side is modeled for the USSR, Spain, and Japan; but production in these countries is exogenous. Net imports are modeled for Eastern Europe, High Income East Asia, and an aggregation of the rest of the world.

It is well known, and the subject of much debate among economists, that the magnitude of the elasticities of export demand facing the United States is crucial to any analysis of export performance. In this study, the cost of the export subsidy program evaluated in this study decreases if the export demand is more responsive to price changes (more elastic) simply because a given increase in export supplies can be disposed of with a smaller subsidy. Thus, a sensitivity analysis was conducted using the more elastic (short- run) export demand elasticity assumptions of the Purdue model as shown below:

	FAPRI Model	Purdue Model
Wheat	-0.56	-1.15
Corn	-1.04	-1.65

The results of the high elasticity analysis provide a lower bound on the export subsidy cost. Some would argue that the export elasticities should be even smaller than those in the FAPRI model. If so, the subsidy costs could be even higher than those estimated with FAPRI elasticities.

Assumptions for the Export Subsidy Scenarios

To quantitatively evaluate the impact of an export subsidy/ stocks disposal program, operational rules and key assumptions need to be made regarding the government's stock and price objectives, the policy instruments to be used, the effect on other U.S. commodity programs, and the response of other exporters. The rules adopted for this analysis may not be politically feasible or economically optimal, but they represent a general form of export subsidy that could be used in place of government stock programs.

The assumptions established to conduct this analysis:

1. The stock objective of the government is to carry no public stocks, i.e., CCC and FOR stocks. Two scenarios were evaluated: in one, only CCC stocks were disposed of, and in the second, both CCC and FOR stocks were sold. The

latter case is not currently feasible, since under current law farmers retain the marketing rights for their FOR stocks.

2. The price objective is to hold domestic U.S. farm prices at their actual historical levels.

3. The stocks to be disposed of are sold through commercial channels.

4. The export subsidy applies to all exports. It is set at a level that allows all surplus to be exported while keeping the domestic price at the same level it would have been without stock disposal.

5. The export sales price, which is the farm price minus the export subsidy, is not permitted to be lower than the U.S. variable cost of production per bushel. In the event that this minimum price rule is violated, the quantity of the stock disposal is reduced until the condition is met. The stocks not disposed of as a result of this rule would be added to the stocks available for disposal the following year. (The variable costs used to implement this rule are given in Appendix B.)

6. U.S. commodity program provisions are to remain unchanged, except that the Payment-in-Kind (PIK) acreage reduction programs in 1983/84 and 1984/85 (wheat) are eliminated. Since the stock disposal program would eliminate one of the main motivations for the PIK program, it is unlikely that the PIK program would have been needed.

7. There are no significant changes in the U.S. livestock sector, since crop prices are held at actual historic levels.

8. Other exporters would not retaliate to maintain their market share. It is assumed that the EC would increase its export subsidies to match the decline in world prices in order to maintain export volume. Other exporters would follow their normal pattern of response to changing world prices and would not make policy changes.

Analytical Procedures

The consequences of the surplus disposal policy are estimated by first simulating a baseline with the model from 1977/78 to 1984/85 and then simulating the alternative policy scenarios over the same period. The changes from the baseline are a measure of the dynamic impacts of the alternative policies over the eight year period.

The steps involved in the analysis are as follows:

1. Set ending public stocks to zero in 1977/78 and pay a subsidy on all export sales sufficient to hold farm prices at their original level. If the minimum price rule is violated, public stocks would be held at the level necessary to hold the export sales price at the U.S. variable cost of production.

2. The models estimate the effect on U.S. stocks and exports, on export prices, and on the imports and exports of other countries. If the U.S. prices remain at their initial level, there are no effects on domestic use or production.

3. Beginning stocks for 1978/79 (the next crop year) are adjusted for reductions in ending stocks in the previous year; the whole process is then repeated. (In fact, there was no year when the export prices declined to the variable cost minimum.)

4. If there are no public stocks at the end of any year, then there were no export subsidies, and the U.S. farm price could be above or below their historical level in response to price or stock changes the previous year.

5. Program cost and farm income effects of these scenarios are estimated from the changes in prices, quantities, and subsidies that were derived in the analysis.

6. The analysis was repeated for sensitivity testing, assuming the higher U.S. export demand elasticities from the Purdue spatial model.

Results of the Evaluation

The results of the surplus public stocks disposal analysis are discussed first with respect to the wheat and corn commodity impacts in the United States and major importing and exporting countries and regions. Then the impacts on aggregate volume and value of exports, government cost, and net farm income are discussed. Finally, the sensitivity of the results to higher export demand elasticities are evaluated.

Wheat

The impact of surplus wheat stock disposal on U.S. supply, use, stocks, and price are presented in Table 1. On average over the eight year period, the release of only CCC stocks reduces total ending stocks by more than 10 percent and increases exports more than 9 percent annually. Since the export subsidy is set to hold the domestic price, CCC stocks disposal in the foreign market did

Table 1. Impact of Surplus Wheat Stock Disposal on U.S. Supply, Use, Stocks, and Prices.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	(MMT)								
ACTUAL									
PRODUCTION	55.70	48.30	58.10	64.80	75.80	75.30	65.90	70.60	64.31
BEG. STOCKS	30.30	32.10	25.10	24.50	26.84	31.46	41.01	37.96	31.16
DOMESTIC USE	23.40	22.80	21.31	21.31	23.05	24.71	30.24	31.38	24.78
EXPORTS	30.60	32.50	37.42	41.20	48.20	41.07	38.89	38.75	38.58
END STOCKS	32.10	25.10	24.50	26.84	31.46	41.01	37.96	38.57	32.19
CCC	1.31	1.39	5.11	5.43	5.18	5.23	5.17	10.29	4.89
FOR	9.24	10.67	5.55	9.80	15.29	28.87	26.89	22.53	16.11
PRICE ($/MT)	85.61	109.50	138.89	143.67	134.11	130.44	129.71	124.19	124.52
CCC DISPOSAL (CHANGE FROM ACTUAL)									
PRODUCTION	0.00	0.00	0.00	0.00	0.00	0.21	18.59	5.97	3.09
BEG. STOCKS	0.00	-0.77	-1.06	-3.58	-4.19	-4.21	-12.64	3.61	-2.85
DOMESTIC USE	0.02	0.00	0.03	0.00	-0.12	0.09	0.41	0.03	0.06
EXPORTS	0.75	0.29	2.49	0.61	0.14	8.47	1.92	13.86	3.56
END STOCKS	-0.77	-1.06	-3.58	-4.19	-4.21	-12.64	3.61	-4.30	-3.39
CCC	-1.31	-1.39	-5.11	-5.43	-5.18	-5.23	-5.17	-10.29	-4.89
FOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRICE ($/MT)	0.00	-0.01	-0.02	0.03	1.00	-0.02	-3.57	0.62	-0.25
SUBSIDY ($/MT)	3.67	0.73	8.08	1.84	0.00	28.29	0.00	37.48	9.92
FOR + CCC DISPOSAL (CHANGE FROM ACTUAL)									
PRODUCTION	0.00	0.00	0.00	0.37	0.13	0.05	18.56	6.44	3.19
BEG. STOCKS	0.00	-6.55	-9.17	-8.80	-11.33	-15.47	-34.42	-18.05	-12.97
DOMESTIC USE	0.12	0.03	-0.37	0.03	0.04	0.16	-0.00	-0.00	-0.00
EXPORTS	6.43	2.59	0.01	2.87	4.23	18.84	2.20	10.72	5.99
END STOCKS	-6.55	-9.17	-8.80	-11.33	-15.47	-34.42	-18.05	-22.34	-15.77
CCC	-1.31	-1.39	-5.11	-5.43	-5.18	-5.23	-5.17	-10.29	-4.89
FOR	-9.24	-10.67	-5.55	-9.80	-15.29	-28.87	-26.89	-22.53	-16.11
PRICE ($/MT)	-0.01	-0.02	3.19	0.03	-0.00	-0.01	0.01	0.63	0.48
SUBSIDY ($/MT)	25.72	5.51	0.00	9.92	12.86	50.71	0.00	27.19	16.53

not significantly affect the domestic price. The largest domestic price change was a 2.8 percent drop in 1983/84. In that year, the increased production realized by removing PIK was larger than the change in stocks and there was no export subsidy. Since there was very little change in the domestic price, domestic use and production did not exhibit much change, except in 1983/84 and 1984/85. In these two years production increased because the PIK program was eliminated in the analysis. The required export subsidy ranged from zero to $37.5/MT and averaged nearly $10/MT per year. When both CCC and FOR are released, total stocks decrease by nearly 50 percent on average and exports increase by more than 15 percent. The wedge between the domestic price and the world price increases, leading to a higher average subsidy of $16.5/MT and a maximum subsidy of $50.7/MT in 1982/83.

The effects of the U.S. stocks disposal program on net exports by the exporters are shown in Table 2. Average net exports of Canada, Australia, and Argentina decline over the period. The declines in the exports from these countries have been replaced by the higher exports from the United States. European Community exports remain unaffected, as assumed, since their policy is to increase subsidies as prices fall. The estimated cost to the EC of the additional subsidies is $1.0 billion and $1.3 billion in the two cases, respectively. The United States gains more from increases in total trade than from reductions in competitors' exports. The average annual increase in U.S. exports when both CCC and FOR stocks are sold is about six million tons, three-fourths of which comes from an increase in total trade. The average U.S. trade share gain is 2.38 percent in the CCC case and 4.23 percent in the FOR + CCC case. In the years with large export subsidies, 1982/83 and 1984/85, the U.S. trade share increased from 7 to nearly 11 percent over the actual levels.

The U.S. subsidy on exports leads to an increase in imports by most of the importers (Table 3). India, USSR, China, and Eastern Europe are assumed to insulate domestic markets from world price changes, so their imports are not affected. The total imports by importers are estimated to increase by an average of 3.5 percent in the CCC case and 5.5 percent in the FOR + CCC case. The largest import responses occurred in the years with the largest subsidies, 8 to 18 percent in 1982/83 and 8 to 12 percent in 1984/85 for the CCC and FOR + CCC cases, respectively.

Under the program being evaluated, the export subsidy replaces stocks as the means of supporting and stabilizing domestic prices. Subsidies rather than CCC and FOR stocks change from year to year in response to changing supply and demand conditions. Thus, export prices and world prices become more variable. The U.S. farm price less the export subsidy fluctuates more than the actual price, and is substantially lower, especially in the 1980s (Table 4 and Figure 3). The larger disposal program (FOR + CCC) also generates larger impacts on world prices.

Table 2. Impact of Surplus Wheat Disposal on Net Export by Exporters and the U.S. Market Share.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	(MMT)								
ACTUAL									
CANADA	15.90	13.50	15.00	17.00	17.60	21.40	21.80	19.40	17.70
AUSTRALIA	11.10	6.70	15.00	10.60	11.00	8.10	10.60	15.30	11.05
EC	-0.50	4.20	5.10	10.20	10.80	11.70	11.80	15.30	8.58
ARGENTINA	1.80	4.10	4.80	3.90	4.30	7.50	9.70	8.00	5.51
TOTAL NON-U.S.	28.30	28.50	39.90	41.70	43.70	48.70	53.90	58.00	42.84
UNITED STATES	30.60	32.50	37.42	41.20	48.20	41.07	38.89	38.75	38.58
EXPORT SHARE (%)	51.95	53.28	48.40	49.70	52.45	45.75	41.91	40.05	47.94
TOTAL	58.90	61.00	77.32	82.90	91.90	89.77	92.79	96.75	81.42
CCC DISPOSAL (CHANGE FROM ACTUAL)									
CANADA	-0.10	-0.09	-0.32	-0.29	-0.38	-0.81	-0.89	-1.76	-0.58
AUSTRALIA	-0.04	0.03	-0.07	0.05	0.02	-0.25	0.19	-0.26	-0.04
EC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARGENTINA	-0.01	-0.04	-0.01	-0.04	-0.01	-0.03	-0.26	-0.08	-0.06
TOTAL NON-U.S.	-0.15	-0.10	-0.40	-0.28	-0.37	-1.08	-0.97	-2.10	-0.68
UNITED STATES	0.75	0.29	2.49	0.61	0.14	8.47	1.92	13.86	3.56
EXPORT SHARE (%)	0.74	0.31	1.86	0.53	0.28	5.24	1.62	8.43	2.38
TOTAL	0.60	0.19	2.09	0.33	-0.23	7.38	0.95	11.76	2.88
FOR + CCC DISPOSAL (CHANGE FROM ACTUAL)									
CANADA	-0.67	-0.66	-0.80	-0.84	-0.81	-1.89	-2.11	-2.72	-1.31
AUSTRALIA	-0.29	0.20	0.06	-0.13	-0.04	-0.34	0.37	-0.23	-0.05
EC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARGENTINA	-0.04	-0.25	-0.03	0.01	-0.07	-0.21	-0.45	-0.03	-0.13
TOTAL NON-U.S.	-0.99	-0.71	-0.77	-0.97	-0.91	-2.43	-2.20	-2.99	-1.50
UNITED STATES	6.43	2.59	0.01	2.87	4.23	18.84	2.20	10.72	5.99
EXPORT SHARE (%)	5.60	2.53	0.50	2.27	2.61	10.67	2.37	7.30	4.23
TOTAL	5.44	1.88	-0.76	1.90	3.31	16.41	-0.00	7.74	4.49

TABLE 3. IMPACT OF SURPLUS WHEAT STOCK DISPOSAL ON NET IMPORTS BY IMPORTERS.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	(MMT)								
ACTUAL									
JAPAN	5.71	5.66	5.49	5.70	5.60	5.80	5.90	5.60	5.68
INDIA	-0.24	-0.56	-0.48	0.00	2.26	2.39	2.50	0.15	0.75
USSR	5.55	3.60	11.60	15.50	19.00	19.70	20.00	27.10	15.26
CHINA	8.60	8.05	8.90	13.80	13.20	13.00	9.60	7.40	10.32
E. EUROPE	2.66	2.20	5.00	3.40	4.30	2.20	1.50	-1.50	2.47
AFRICA & M.E.	13.69	12.76	17.08	17.04	18.27	16.99	22.85	24.99	17.96
OTH. ASIA	13.03	12.05	12.56	11.19	11.17	12.09	12.98	14.21	12.41
OTH. LAT. AMERICA	7.02	7.64	8.54	7.57	8.30	8.19	8.52	8.97	8.09
OTH. W. EUROPE	0.53	1.39	1.28	0.45	1.29	-0.52	0.34	-0.46	0.54
ROW	2.35	8.22	7.36	8.25	8.52	9.93	8.60	10.29	7.94
TOTAL	58.90	61.00	77.32	82.90	91.90	89.77	92.79	96.75	81.42
CCC DISPOSAL (CHANGE FROM ACTUAL)									
JAPAN	0.00	0.00	0.01	0.00	-0.00	0.02	0.00	0.03	0.01
INDIA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
USSR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHINA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. EUROPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AFRICA & M.E.	0.18	0.02	0.32	0.07	-0.04	1.42	0.21	2.86	0.63
OTH. ASIA	0.20	0.03	0.28	0.05	-0.03	1.21	0.15	1.94	0.48
OTH. LAT. AMERICA	0.11	0.02	0.20	0.04	-0.02	0.86	0.10	1.28	0.32
OTH. W. EUROPE	0.08	0.04	0.42	0.03	-0.04	0.28	0.06	0.46	0.17
ROW	0.02	0.09	0.86	0.14	-0.09	3.59	0.43	5.18	1.28
TOTAL	0.60	0.19	2.09	0.33	-0.23	7.38	0.95	11.76	2.88
FOR + CCC DISPOSAL (CHANGE FROM ACTUAL)									
JAPAN	0.03	0.00	-0.00	0.01	0.01	0.04	-0.00	0.02	0.01
INDIA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
USSR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHINA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. EUROPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AFRICA & M.E.	1.45	0.21	-0.12	0.39	0.57	3.00	-0.00	1.91	0.93
OTH. ASIA	1.64	0.24	-0.11	0.30	0.41	2.57	-0.00	1.29	0.79
OTH. LAT. AMERICA	0.92	0.16	-0.08	0.21	0.32	1.83	-0.00	0.85	0.53
OTH. W. EUROPE	1.27	0.40	-0.14	0.17	0.68	0.37	-0.00	0.38	0.39
ROW	0.14	0.86	-0.32	0.81	1.32	8.58	-0.00	3.28	1.84
TOTAL	5.44	1.88	-0.76	1.90	3.31	16.41	-0.00	7.74	4.49

TABLE 4. IMPACT OF SURPLUS WHEAT STOCK DISPOSAL ON PRICES, SUBSIDY, AND PROGRAM COSTS.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	($/BU)								
ACTUAL									
U.S. GULF PRICE	3.16	3.83	4.74	4.95	4.65	4.32	4.19	4.03	4.23
U.S. FARM PRICE	2.33	2.98	3.78	3.91	3.65	3.55	3.53	3.38	3.39
9-MONTH LOAN RATE	2.25	2.35	2.50	3.00	3.20	3.55	3.65	3.30	2.98
RESERVE LOAN	2.25	2.35	2.50	3.30	3.50	4.00	3.65	3.30	3.11
CCC DISPOSAL									
U.S. FARM PRICE	2.33	2.98	3.78	3.91	3.68	3.55	3.43	3.40	3.38
SUBSIDY	0.10	0.02	0.22	0.05	0.00	0.77	0.00	1.02	0.27
U.S. PRICE-SUBSIDY	2.23	2.96	3.56	3.86	3.68	2.78	3.43	2.38	3.11
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	120.39	19.67	315.66	77.76	0.00	1402.89	0.00	1971.66	488.50
STORAGE COST[a]	-12.76	-13.53	-49.76	-52.87	-50.44	-50.92	-50.34	-100.19	-47.60
NET SALES LOSS[b]	-3.85	-1.85	-174.88	-10.71	0.00	0.00	0.00	-18.21	-26.19
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1247.00	155.96
NET COST	103.78	4.29	91.02	14.18	-50.44	1351.97	-50.34	3100.25	570.67
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	389.10	1836.40	248.60	309.26
	($/BU)								
FOR + CCC DISPOSAL									
U.S. FARM PRICE	2.33	2.98	3.87	3.91	3.65	3.55	3.53	3.40	3.40
SUBSIDY	0.70	0.15	0.00	0.27	0.35	1.38	0.00	0.74	0.45
U.S. PRICE-SUBSIDY	1.63	2.83	3.87	3.64	3.30	2.17	3.53	2.66	2.95
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	951.69	195.83	0.00	444.19	665.82	3033.59	0.00	1340.76	828.98
STORAGE COST[a]	-102.73	-117.43	-103.80	-148.30	-199.32	-332.03	-312.17	-319.57	-204.42
NET SALES LOSS[b]	-30.88	-34.93	-528.53	-106.11	-30.22	224.67	0.00	-18.27	-65.54
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1247.00	155.96
NET COST	818.08	43.47	-632.33	189.78	436.29	2926.22	-312.17	2249.91	714.99
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	389.10	1836.40	248.60	309.26

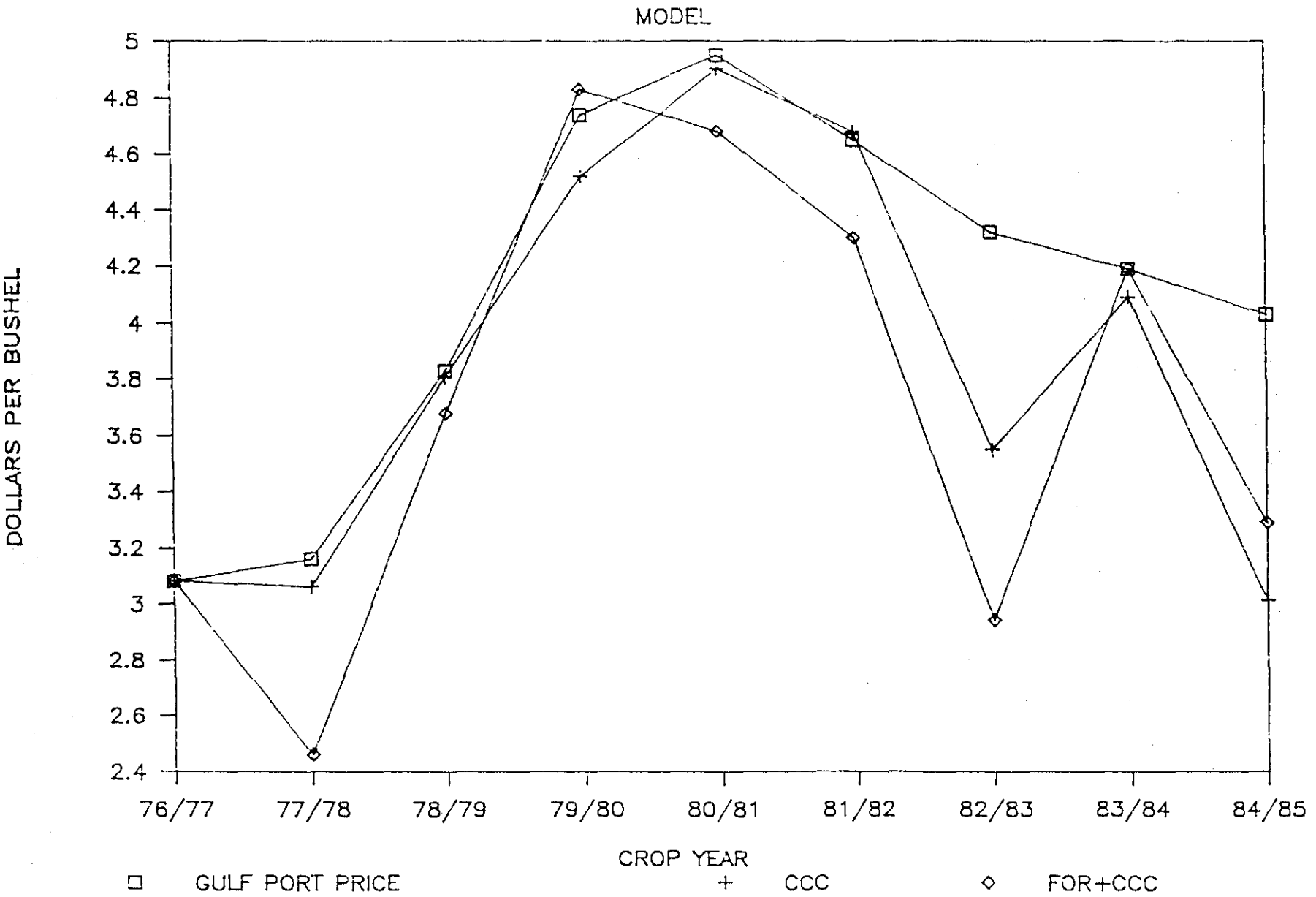
[a]Cost of CCC storage and FOR storage payments (FOR + CCC case only).

[b]Acquisition cost of stocks minus the value of stock sales.

[c]Value of CCC stocks held at the end of 1984/85 if there is no disposal program.

[d]Value of PIK entitlements to producers.

FIGURE 3. U.S. WHEAT EXPORT PRICES



There is, of course, a cost to this subsidy. Under the CCC case, the subsidy cost alone varies from zero to nearly $2 billion (1984/85) and averages about $490 million per year (Table 4). In the FOR + CCC case the highest annual cost is $3.0 billion in 1981/82 and the average is about $830 million annually. There are some compensating savings in CCC storage costs and FOR storage payments, and in some years the CCC sales price is greater than the loan rate (assumed acquisition cost). These adjustments reduce the net costs by about $75 million in the CCC case and $270 million in the FOR + CCC case. There is also the consideration that under current programs the government has an asset at the end of the 1984/85 crop year equal to the value of CCC stocks. If these are valued at the loan rate, the estimated net cost for the eight year period is $4.5 billion for the CCC case and about $5.7 billion for the FOR + CCC case, which is about $571 million and $715 million per year, respectively.

There is debate over how to count the costs of the PIK program and the savings associated with eliminating the program. The value of the PIK entitlements to wheat producers is given in Table 4 for comparison with the subsidy costs. If these figures represent the savings associated with eliminating PIK, the net cost of the subsidy program is reduced by $2.5 billion. The resulting average annual cost would then be $262 million for the CCC option and $406 million for the FOR + CCC options.

Corn

The impacts of surplus disposal of corn on U.S. supply, use, stocks, and prices are presented in Table 5. On average over the eight year period, the release of only CCC stocks reduces total ending stocks by nearly 15 percent and increases exports by about the same percentage. Subsidies and CCC stocks disposal have no significant effect on domestic prices except in 1983/84. The domestic price under the CCC stocks disposal program is 15 percent lower than the actual domestic price in 1983/84 because there was no export subsidy; and increased production from removing PIK exceeded the change in stocks. Because of the small variation in the domestic price, production and domestic use did not change much, except for 1983/84 and 1984/85. In these two years production increased due to elimination of the PIK program in the analysis. The required subsidies in the CCC case ranged from zero to over $22/MT in 1984/85. The impacts of disposal of both CCC and FOR stocks are naturally larger. Release of more stocks in the foreign market reduces the total ending stocks by an average of 52 percent and increases exports an average of 20 percent. The larger volume of stocks sold requires subsidies of more than $20/MT in three of the last four years and an average annual subsidy of more than 10 percent of the farm price over the period.

The impacts of disposal of surplus U.S. corn stocks on net feed grains exports by major exporters is presented in Table 6. The average net exports by Argentina, Australia, Canada, and Thailand

TABLE 5. IMPACT OF SURPLUS CORN STOCK DISPOSAL ON U.S. SUPPLY, USE, STOCKS, AND PRICES.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	(MMT)								
ACTUAL									
PRODUCTION	165.24	184.62	201.38	168.64	206.23	209.18	106.05	194.93	179.53
BEG. STOCKS	22.51	28.22	33.12	41.07	26.26	55.22	79.25	18.37	38.00
DOMESTIC USE	110.09	125.56	131.64	123.63	127.32	137.65	119.56	131.53	125.87
EXPORTS	49.48	54.18	61.80	59.82	49.96	47.50	47.37	46.69	52.10
END STOCKS	28.22	33.12	41.07	26.26	55.22	79.25	18.37	35.08	39.57
CCC	0.30	2.47	6.33	5.88	7.46	28.81	5.11	6.10	7.81
FOR	7.80	13.35	15.72	4.57	32.37	38.30	10.80	11.10	16.75
PRICE ($/MT)	79.52	88.58	99.21	122.43	98.42	106.29	127.95	103.14	103.19
CCC DISPOSAL (CHANGE FROM ACTUAL)									
PRODUCTION	0.00	0.00	0.00	0.00	0.08	0.03	50.55	8.97	7.45
BEG. STOCKS	0.00	-0.25	-2.08	-5.32	-5.05	-6.27	-26.90	4.32	-5.19
DOMESTIC USE	-0.00	0.00	-0.00	-0.11	0.00	-0.00	3.97	-0.00	0.48
EXPORTS	0.25	1.82	3.24	-0.15	1.30	20.66	15.35	18.42	7.61
END STOCKS	-0.25	-2.08	-5.32	-5.05	-6.27	-26.90	4.32	-5.13	-5.83
CCC	-0.30	-2.47	-6.33	-5.88	-7.46	-28.81	-5.11	-6.10	-7.81
FOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PRICE ($/MT)	0.01	-0.03	0.01	0.66	-0.01	0.01	-20.22	0.02	0.00
SUBSIDY ($/MT)	0.39	1.57	3.15	0.00	2.36	20.08	0.00	22.05	6.30
FOR + CCC DISPOSAL (CHANGE FROM ACTUAL)									
PRODUCTION	0.00	0.00	0.00	0.00	1.18	0.44	50.65	11.34	7.95
BEG. STOCKS	0.00	-6.80	-13.30	-18.53	-10.48	-33.49	-59.10	-8.15	-18.73
DOMESTIC USE	-0.00	0.00	-0.00	-1.81	0.00	-0.00	-0.57	-0.00	-0.30
EXPORTS	6.80	6.50	5.23	-6.24	24.19	26.05	0.27	17.65	10.06
END STOCKS	-6.80	-13.30	-18.53	-10.48	-33.49	-59.10	-8.15	-14.46	-20.54
CCC	-0.30	-2.47	-6.33	-5.88	-7.46	-28.81	-5.11	-6.10	-7.81
FOR	-7.80	-13.35	-15.72	-4.57	-32.37	-38.30	-10.80	-11.10	-16.75
PRICE ($/MT)	0.00	-0.01	0.02	10.49	-0.02	0.00	2.92	0.01	1.68
SUBSIDY ($/MT)	7.48	4.72	4.33	0.00	23.23	22.05	0.00	24.01	10.63

TABLE 6. IMPACT OF SURPLUS CORN STOCK DISPOSAL ON NET EXPORTS BY EXPORTER AND U.S. MARKET SHARE.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	(MMT)								
ACTUAL									
ARGENTINA	11.15	10.02	5.13	13.88	10.14	11.41	10.67	10.42	10.35
CANADA	3.65	3.21	3.64	3.35	6.62	5.80	6.61	3.22	4.51
AUSTRALIA	1.56	3.24	3.89	2.84	3.38	1.24	5.75	6.66	3.57
THAILAND	1.32	2.25	2.34	2.40	3.51	2.33	3.11	3.35	2.58
SOUTH AFRICA	3.34	2.51	3.72	4.93	4.57	-2.33	0.80	0.97	2.31
TOTAL NON-U.S.	21.02	21.23	18.72	27.40	28.22	18.45	26.94	24.62	23.33
UNITED STATES	55.99	59.94	71.07	69.21	58.40	54.00	55.80	55.50	59.99
EXPORT SHARE (%)	72.70	73.85	79.15	71.64	67.42	74.53	67.44	69.27	72.00
TOTAL	77.01	81.17	89.79	96.61	86.62	72.45	82.74	80.12	83.31
CCC DISPOSAL (CHANGE FROM ACTUAL)									
ARGENTINA	-0.00	-0.02	-0.03	-0.02	-0.03	-0.28	-0.37	-0.48	-0.15
CANADA	-0.00	-0.05	-0.17	-0.24	0.04	-0.31	-1.08	-1.99	-0.48
AUSTRALIA	-0.01	-0.04	-0.08	-0.03	-0.05	-0.30	-0.49	-0.64	-0.20
THAILAND	-0.00	-0.01	-0.02	-0.03	0.00	-0.04	-0.15	-0.15	-0.05
SOUTH AFRICA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NON-U.S.	-0.01	-0.11	-0.30	-0.32	-0.04	-0.92	-2.10	-3.26	-0.88
UNITED STATES	0.25	1.82	3.24	-0.15	1.30	20.66	15.35	18.42	7.61
EXPORT SHARE (%)	0.13	0.91	1.10	0.20	0.59	6.21	6.59	8.29	3.00
TOTAL	0.24	1.71	2.94	-0.47	1.25	19.74	13.26	15.16	6.73
FOR + CCC DISPOSAL (CHANGE FROM ACTUAL)									
ARGENTINA	-0.10	-0.11	-0.08	0.04	-0.29	-0.48	-0.21	-0.34	-0.20
CANADA	-0.07	-0.78	-0.46	-0.29	0.68	-2.03	-1.08	-0.03	-0.51
AUSTRALIA	-0.15	-0.21	-0.22	0.05	-0.27	-0.42	-0.27	-0.50	-0.25
THAILAND	-0.01	-0.08	-0.05	-0.03	0.06	-0.17	-0.14	-0.01	-0.05
SOUTH AFRICA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NON-U.S.	-0.33	-1.19	-0.81	-0.23	0.18	-3.10	-1.70	-0.89	-1.01
UNITED STATES	6.80	6.50	5.23	-6.24	24.19	26.05	0.27	17.65	10.06
EXPORT SHARE (%)	2.51	2.98	1.84	-1.78	6.99	9.38	1.52	6.23	3.71
TOTAL	6.48	5.31	4.43	-6.48	24.37	22.95	-1.44	16.76	9.05

decline. The loss of feed grains exports by these countries has been captured by the United States. As in the case of wheat, the United States gains more from increased imports than from reductions in competitors' exports. On average, increased trade accounts for nearly 90 percent of the U.S. export increases. The average U.S. trade share gain is 3 percent in the CCC case and 3.7 percent in the FOR + CCC case.

The stock disposal program generally increases net imports by major importers (Table 7). The two years when imports declined, 1980/81 and 1983/84, were drought years in the U.S. corn belt. In these years under the FOR + CCC case, prices in the United States and abroad were higher under the subsidy program because there were fewer stocks to buffer the production shortfalls. The net imports by importers increased by an average of 8 percent in the CCC stock disposal case and 10.9 percent in the FOR + CCC case. In the years with larger subsidies, 1982/83 and 1984/85, the total net imports increased by 27 and 19 percent for the CCC case and 32 and 21 percent for the FOR + CCC case. The imports of the EC and the USSR are invariant to price because of their price insulation from world markets. The EC automatically increases its import levies when world market prices decline. Since the EC was a net importer of feed grains in all but the last year of this period, there is an increase in their import levy revenues for seven years and an increase in export subsidy costs for 1984/85. The net revenue gain to the EC is $16 million and $260 million in the two cases.

As is the case with wheat, the stock disposal-export subsidy program causes world market prices to be more unstable and generally lower than U.S. prices (Figure 4). Moreover, the larger disposal program (FOR + CCC) creates a greater degree of instability in world markets. The annual subsidy costs range from zero to over $1.7 billion and average about $400 million for the CCC case and $740 million for the FOR + CCC case (Table 8). When adjustments are made for storage savings and net sales revenue, the average annual costs are reduced by about $110 million and $260 million, respectively, for the two cases. Taking into consideration the CCC inventory value loss in 1984/85, the estimated net cost for the eight year period is nearly $3.0 billion for the CCC case and $4.4 billion for the FOR + CCC case.

By contrast, the value of PIK entitlements to feed grains producers over the 1982/83-1984/85 period is $5.6 billion. This is about equivalent to $700 million per year over the eight year period. Thus, for feed grains, the export subsidy-surplus disposal scheme appears to be less costly than the PIK program by $146 to $330 million per year.

Export Volume and Value

The combined effect of the stocks disposal program is to increase export volume and value in most years. Export volume for

TABLE 7. IMPACT OF SURPLUS CORN STOCK DISPOSAL ON NET IMPORTS BY IMPORTERS.

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	(MMT)								
ACTUAL									
EC	11.67	11.16	9.30	6.56	5.45	1.79	1.24	-4.04	5.39
JAPAN	16.95	17.87	18.89	18.86	18.32	18.70	20.51	20.41	18.81
SPAIN	5.70	4.76	5.90	3.72	7.79	6.72	4.80	3.42	5.35
USSR	10.71	8.90	18.40	18.00	25.50	11.30	11.50	27.00	16.41
E. EUROPE	5.36	7.11	6.83	9.76	4.85	0.78	0.97	0.58	4.53
HI INCOME E ASIA	3.53	4.30	5.41	6.79	7.88	9.23	8.69	8.72	6.82
ROW	23.09	27.07	25.06	32.92	16.83	23.93	35.03	24.03	26.00
TOTAL	77.01	81.17	89.79	96.61	86.62	72.45	82.74	80.12	83.31
CCC DISPOSAL (CHANGE FROM ACTUAL)									
EC	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00
JAPAN	0.01	0.04	0.07	-0.01	0.02	0.37	0.41	0.39	0.16
SPAIN	0.00	0.01	0.02	-0.00	0.02	0.17	0.17	0.18	0.07
USSR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. EUROPE	0.10	0.94	1.73	-0.22	0.62	3.22	1.32	1.37	1.14
HI INCOME E ASIA	0.01	0.07	0.10	-0.02	0.09	1.23	0.79	1.13	0.43
ROW	0.12	0.65	1.02	-0.23	0.50	14.74	10.57	12.08	4.93
TOTAL	0.24	1.71	2.94	-0.47	1.25	19.74	13.26	15.16	6.73
FOR + CCC DISPOSAL (CHANGE FROM ACTUAL)									
EC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JAPAN	0.19	0.14	0.07	-0.19	0.34	0.52	-0.04	0.32	0.17
SPAIN	0.07	0.04	0.03	-0.06	0.17	0.19	-0.02	0.20	0.08
USSR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E. EUROPE	3.01	2.98	2.66	-2.75	15.25	3.93	-0.10	1.60	3.32
HI INCOME E ASIA	0.25	0.20	0.15	-0.26	1.15	1.39	-0.10	1.24	0.50
ROW	2.95	1.94	1.52	-3.21	7.45	16.91	-1.18	13.40	4.97
TOTAL	6.48	5.31	4.43	-6.48	24.37	22.95	-1.44	16.76	9.05

FIGURE 4. U.S. CORN EXPORT PRICES

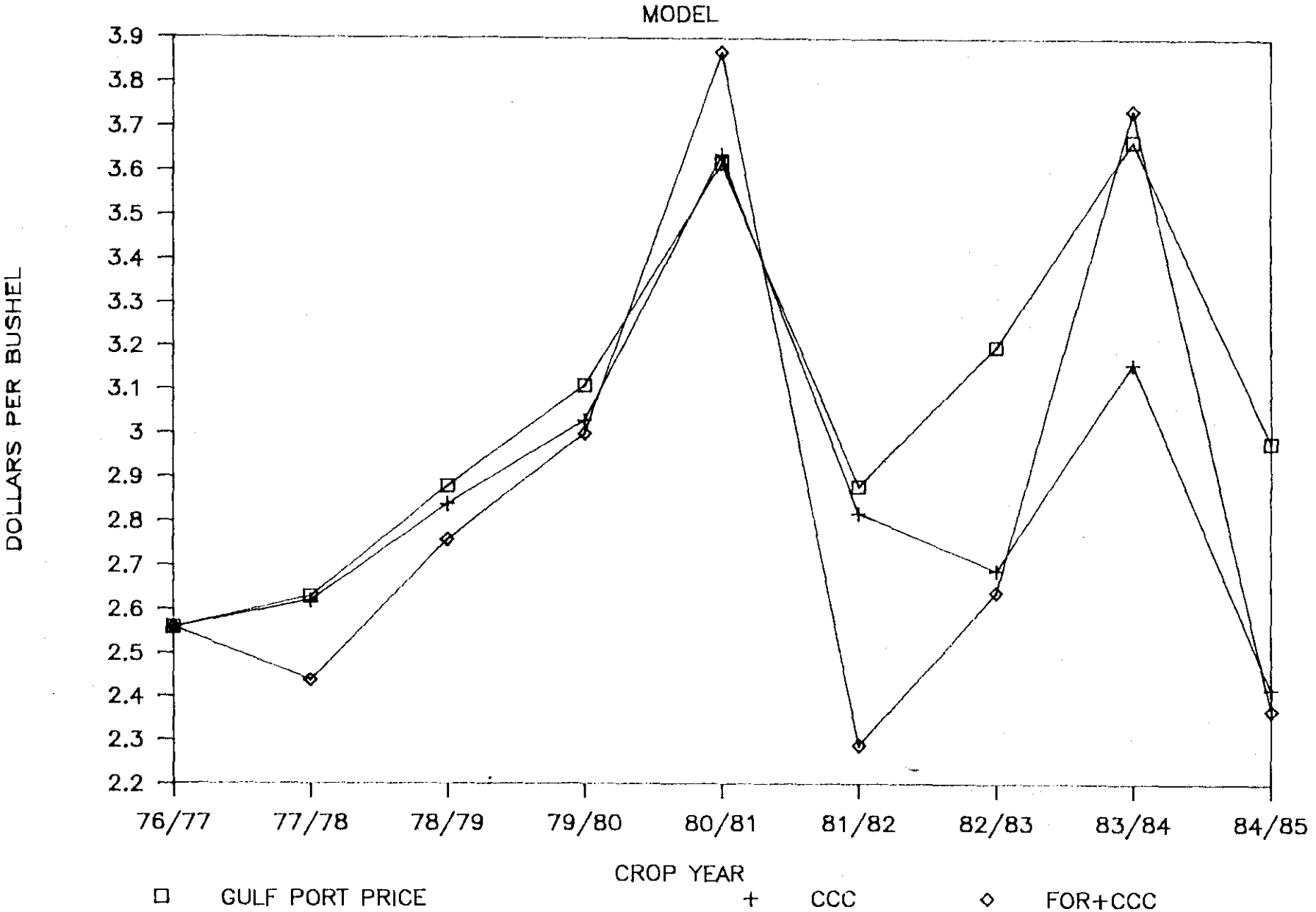


TABLE 8. IMPACTS OF SURPLUS CORN STOCKS DISPOSAL ON PRICES, SUBSIDY, AND PROGRAM COSTS

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVE
	($/BU)								
ACTUAL									
U.S. GULF PRICE	2.63	2.88	3.11	3.62	2.88	3.20	3.67	2.98	3.12
U.S. FARM PRICE	2.02	2.25	2.52	3.11	2.50	2.70	3.25	2.62	2.62
9-MONTH LOAN RATE	2.00	2.00	2.10	2.25	2.40	2.55	2.65	2.55	2.31
RESERVE LOAN	2.25	2.35	2.50	2.25	2.55	2.90	2.65	2.55	2.50
CCC DISPOSAL									
U.S. FARM PRICE	2.02	2.25	2.52	3.13	2.50	2.70	2.74	2.62	2.56
SUBSIDY	0.01	0.04	0.08	0.00	0.06	0.51	0.00	0.56	0.16
U.S. PRICE-SUBSIDY	2.01	2.21	2.44	3.13	2.44	2.19	2.74	2.06	2.40
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	16.41	96.61	194.80	0.00	111.99	1366.24	0.00	1442.11	403.52
STORAGE COST[a]	-3.10	-25.78	-66.01	-61.35	-77.86	-300.59	-53.27	-63.60	-81.44
NET SALES LOSS[b]	-0.24	-21.34	-63.80	0.00	-6.21	-126.30	0.00	-2.74	-27.58
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	612.00	76.55
NET COST	13.07	49.48	65.00	-61.35	27.92	939.34	-53.27	1987.77	371.05
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	14.20	5218.60	362.70	699.44
	($/BU)								
FOR + CCC FOR DISPOSAL									
U.S. FARM PRICE	2.02	2.25	2.52	3.38	2.50	2.70	3.32	2.62	2.66
SUBSIDY	0.19	0.12	0.11	0.00	0.59	0.56	0.00	0.61	0.27
U.S. PRICE-SUBSIDY	1.83	2.13	2.41	3.38	1.91	2.14	3.32	2.01	2.39
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	421.85	296.41	293.61	0.00	1719.90	1627.67	0.00	1535.15	736.82
STORAGE COST[a]	-84.43	-165.07	-229.97	-109.05	-415.57	-700.18	-165.89	-179.41	-256.20
NET SALES LOSS[b]	70.36	0.55	-65.76	0.00	49.12	-79.28	0.00	-3.58	-3.57
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	612.00	76.55
NET COST	407.78	131.88	-2.13	-109.05	1353.45	848.00	-165.89	1964.16	553.60
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	14.20	5218.60	362.70	699.44

[a]Cost of CCC storage and FOR storage payments.

[b]Acquisition cost of stocks minus the value of stock sales.

[c]Value of CCC stocks held at the end of 1984/85 if there is no disposal program.

[d]Value of PIK entitlements to producers.

wheat and corn is higher than actual levels, in both scenarios, nearly every year (Figure 5). The largest impacts are from 1981/82 onward, when stocks have been accumulating so rapidly. For the eight year period, export volume for wheat and corn is 12 percent higher in the CCC case and 18 percent higher in the FOR + CCC case. Export values do not increase as much as volume, since world prices are lower in most years (Figure 6). Since wheat export demand is inelastic and corn export demand is elastic in the model, wheat export values are actually declining while corn and total export values are increasing. Total export value over the eight year period increases by 2.5 to 3.0 percent in the two cases.

Net Program Cost

When the wheat and corn net program costs are aggregated, they range from -$100 million to $5.1 billion with an average cost of $940 million in the CCC case, and from -$600 million to $4.2 billion with an average cost of $1.3 billion in the FOR + CCC case (Figure 7). If the net costs of wheat and corn including PIK are combined, the PIK savings almost exactly offset the export subsidy costs for the CCC case. In the FOR + CCC case, the aggregated net costs adjusted for PIK savings are still positive by about $260 million per year or $2.1 billion over the eight year period.

Net Farm Income

During most years prior to 1983/84 there was not enough change in prices or production in the surplus disposal alternatives to have a significant effect on net farm income. The exception was the 1980/81 FOR + CCC scenario for corn. Because all reserve stocks were depleted in the previous years under this scenario, the drought in 1980/81 caused prices to go $.27/bushel higher than the actual level that year. Thus, the value of corn production in 1980/81 would have been about $1.8 billion higher under the FOR + CCC case (Table 9). Since there would have been no effect on payments or expenses, the increase in net farm income would have been the same.

The removal of the PIK acreage diversion program in 1983/84 and 1984/85 has significant effects on production, prices, payments, and production expenses of both wheat and corn. In the 1983/84 CCC case the increase in production was partly offset by the decline in corn prices, and the increased value of production was over $5.6 billion (Table 9). There are no CCC stocks left to dispose of and the production increase is nearly twice as large as the decline in beginning stocks, so the corn price falls about $.50/bushel (see Table 5). The price falls below the target price, so nearly $1 billion in deficiency payments is required. The PIK payment loss of over $7.0 billion more than offsets the increased receipts, leaving total receipts slightly lower than the actual 1983/84 values. However, the additional acreage planted and harvested increases variable production expenses by over $3 billion and leaves net farm income nearly $3.6 billion lower.

FIGURE 5.

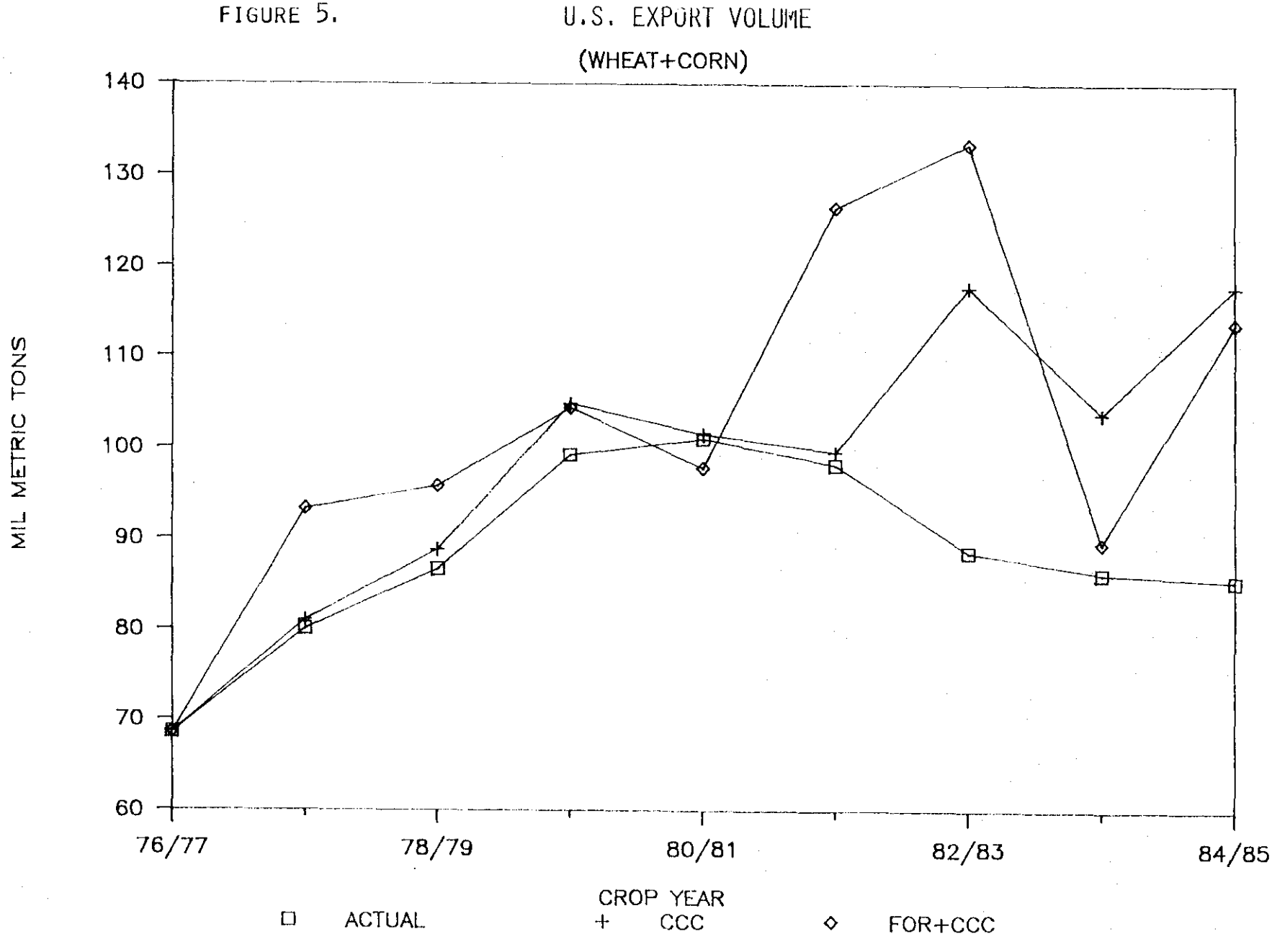

U.S. EXPORT VOLUME
(WHEAT+CORN)
MIL METRIC TONS
140
130
120
110
100
90
80
70
60
76/77
78/79
80/81
82/83
84/85
CROP YEAR
ACTUAL
CCC
FOR+CCC

FIGURE 6. MARKET VALUE OF U.S. EXPORTS

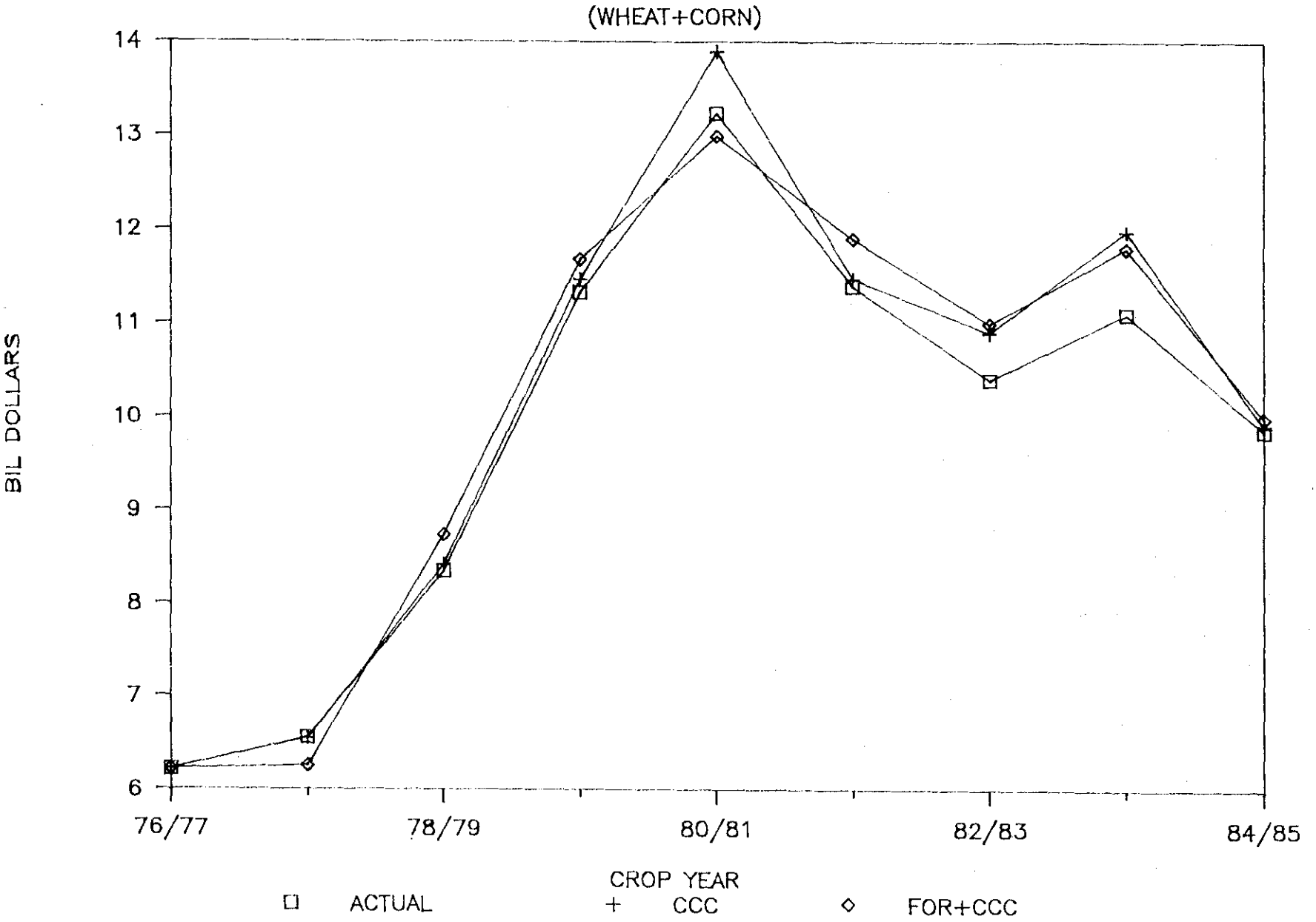


FIGURE 7. U.S. SUBSIDY NET COST

(LOW ELAS WITHOUT PIK)

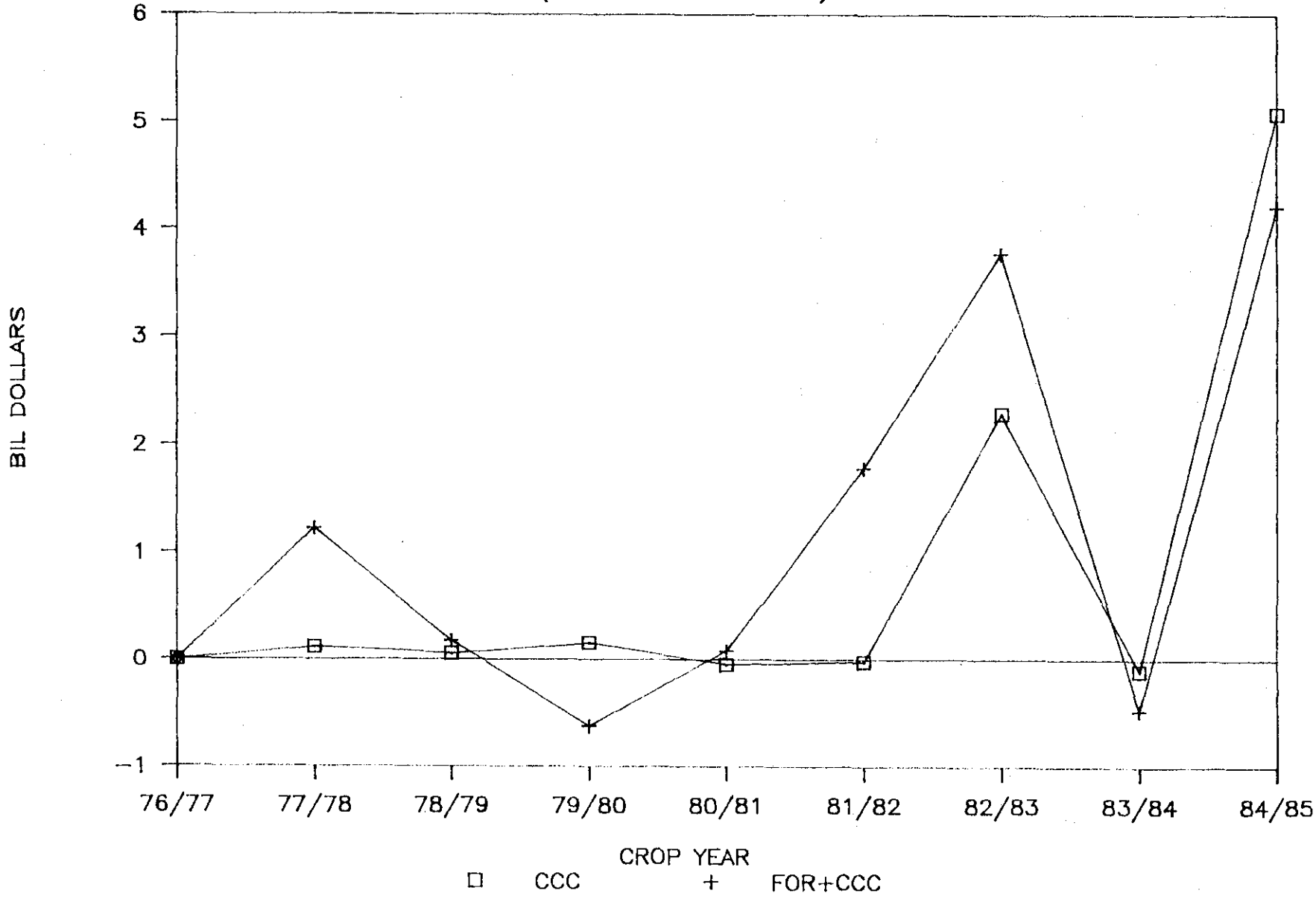


Table 9. Impacts of surplus corn and wheat disposal on net farm income.

Crop Year	1980/81	1983/84	1984/85	Total
	----------million $----------			
CCC Disposal				
Value of Production*	0	5,655	1,750	7,100
Deficiency Payments	0	960	0	960
PIK Payments	0	-7,055	-610	-7,665
Total Receipts	0	-440	1,140	700
Production Expenses	0	3,153	629	3,782
Farm Net Income	0	-3,593	511	-3,082
FOR + CCC Disposal (change from actual)				
Value of Production*	1,770	7,350	2,070	11,190
Deficiency Payments	0	0	0	0
PIK Payments	0	-7,055	-610	-7,665
Total Receipts	1,770	295	1,460	3,525
Production Expenses	0	3,160	777	3,937
Farm Net Income	1,770	-2,865	683	-412

*Estimates the cash receipts from marketings plus the value of inventory changes.

The FOR + CCC case is quite similar for 1983/84, except that prices do not decline. Thus, the value of production increases more than $7 billion, there are no deficiency payments, and total receipts do not increase enough to cover the increase in variable production expenses. As a result, net farm income falls by about $2.9 billion. It is clear that, given the opportunity to plant, producers cannot generate profits equal to what was offered by the PIK program. This result is consistent with the generally accepted view that the 1983/84 PIK program offered very generous payments per idled acre.

In 1984/85 the program was less generous and was offered only on wheat. In both cases evaluated here, the profits from increased plantings in 1984/85 are not overpowered by losses in PIK payments, so net farm income increases. For the eight year period of analysis there is an estimated loss of net farm income of $3 billion in the CCC disposal case and less than half a billion dollars in the FOR + CCC case.

Sensitivity of Results to Export Elasticities

As indicated in the procedures, the analysis was repeated with a set of export demand elasticities that imply a greater response of exports to changes in prices. A major impact of a change in elasticities is on the foreign market price and subsidy costs. Since there is a given amount of surplus grain to move in export markets, a more elastic export demand means that a smaller subsidy is required to export the same quantity. This would lead to lower costs of achieving the same objectives.

The change in the subsidy rates for wheat and corn can be seen in Figures 8 and 9. The subsidy rate is equal to the difference between actual prices and the simulated prices over the historical period. It is clear that the price movements under the high elasticity assumption are also more variable than actual prices, but they are not as variable or as low as those estimated with the original model. There is a bigger reduction in export subsidies in the case of wheat, because the change in the export elasticity was proportionately larger. On average, export subsidies were $.11 to $.16 bushel ($4 to $6 ton) lower for wheat and $.04 to $.05 per bushel ($1.6 to $2.0 ton) lower for corn (Appendix Tables B.2 and B.3).

The market value of exports is also expected to be higher when the export elasticity is higher because the same increase in exports can be achieved with a smaller reduction in the export price. Figure 10 compares the value of exports under the two alternative elasticities. Most of the gain in export value occurred in 1982 and 1984, when the export subsidies were relatively large. For the eight year period of the program the value of corn and wheat exports was $2.7 billion, or 3.2 percent higher under the high elasticity assumption.

FIGURE 8. U.S. WHEAT EXPORT PRICES

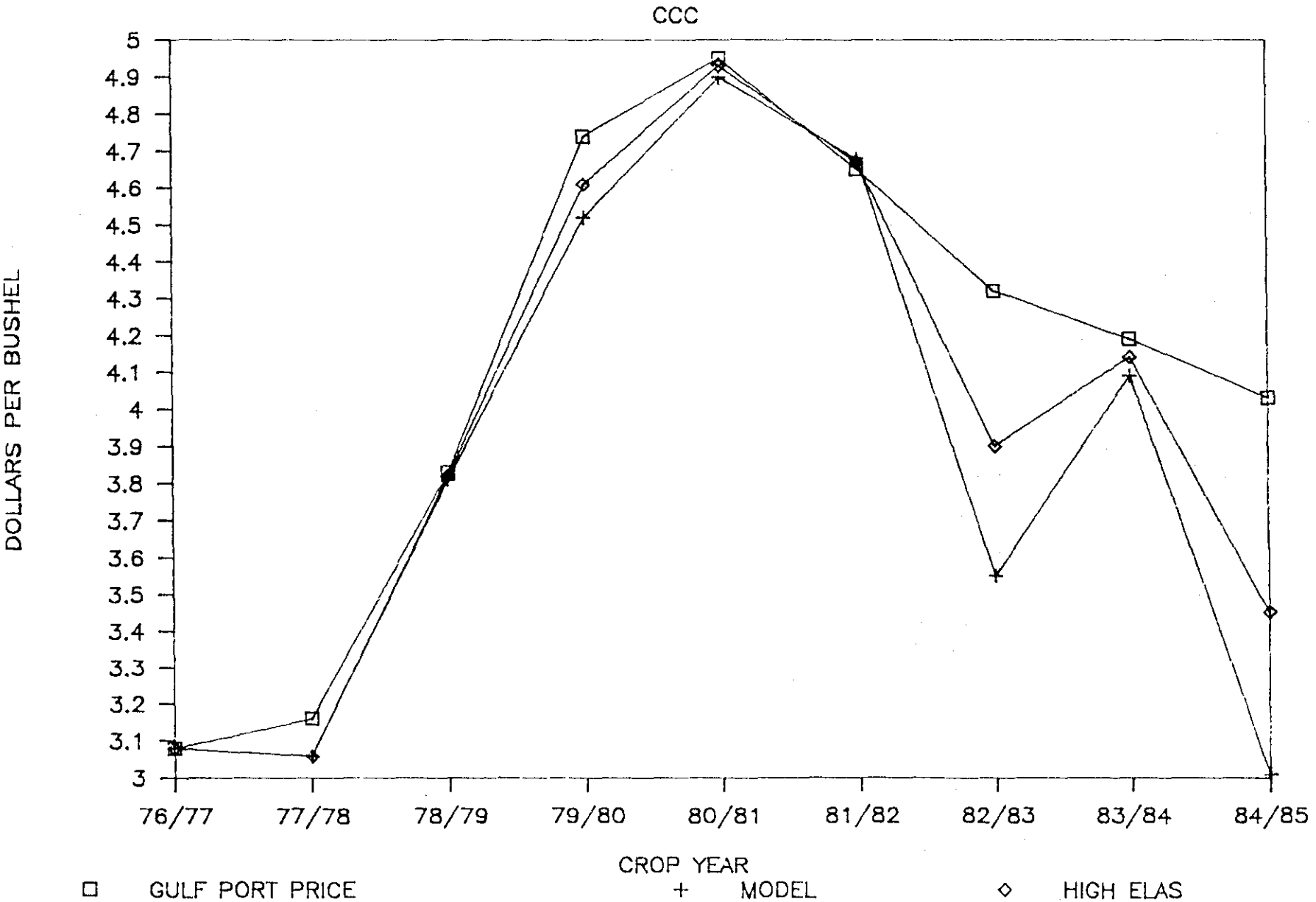


FIGURE 9. U.S. CORN EXPORT PRICES

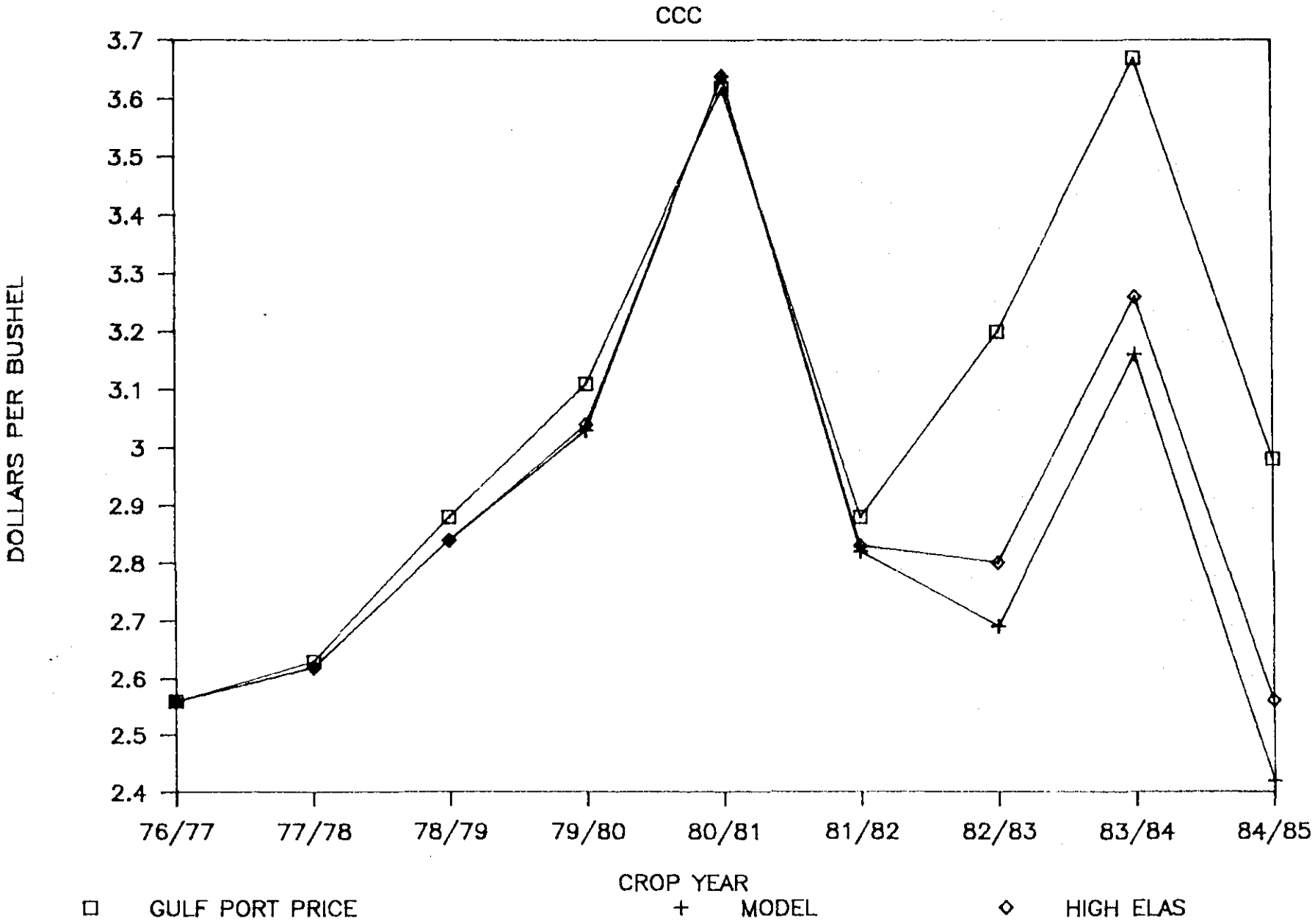
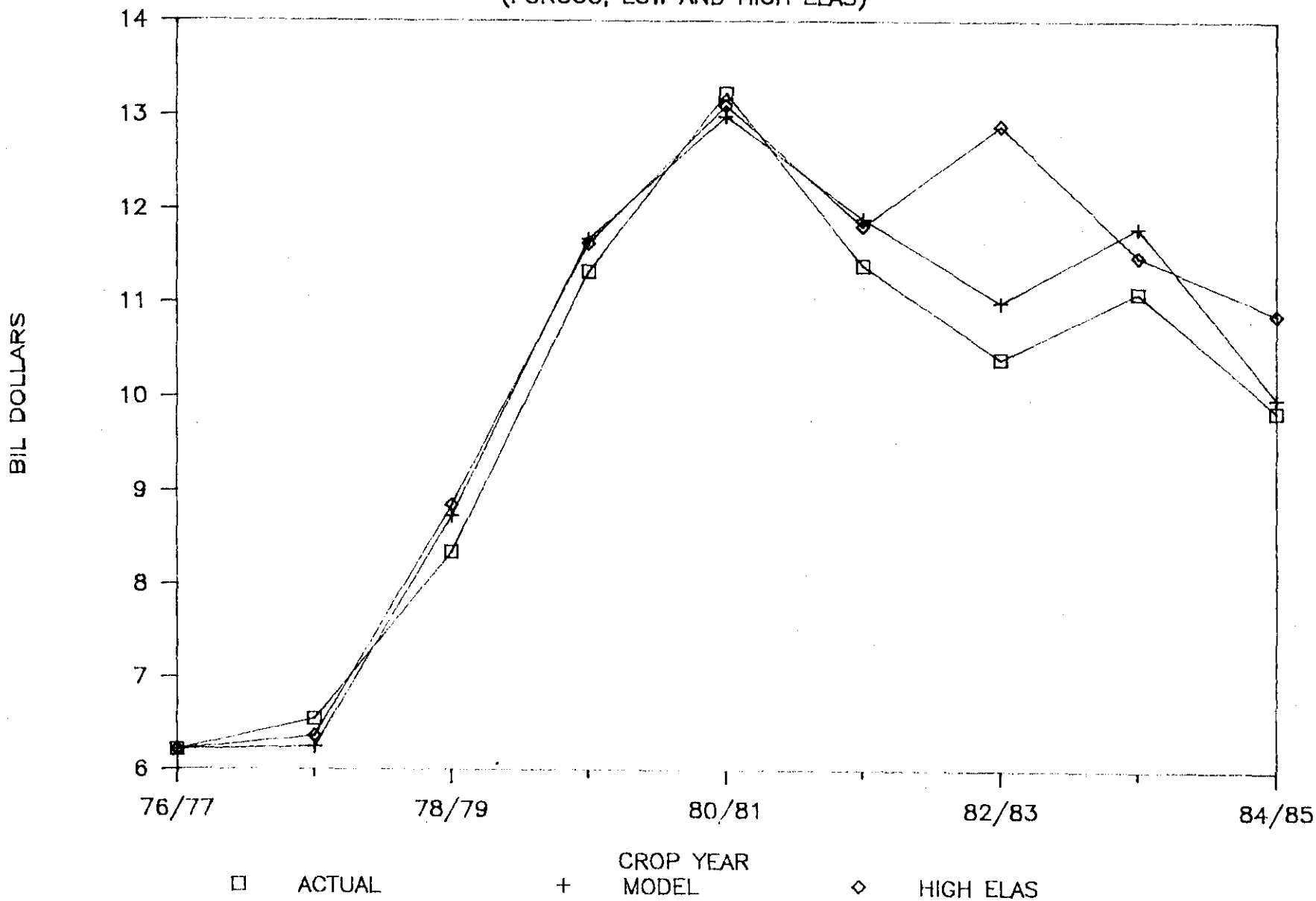


FIGURE 10. MARKET VALUE OF U.S. EXPORTS
(FORCCC, LOW AND HIGH ELAS)



Achieving the same expansion in exports with a smaller subsidy naturally reduces the estimated program costs (Figure 11). In the case where both FOR and CCC stocks are sold, the net cost without PIK rises to a peak of over $4 billion in 1984/85 and averages $1.3 billion per year, compared with a peak of over $3 billion and an average of $0.8 billion per year under the high elasticity assumption. Again in 1984/85, the estimated cost is $2.3 billion using the model elasticities and $1.4 billion using the high elasticity assumptions. Over the eight year period, the estimated costs are $4.7 billion lower with the higher elasticities. Thus, if exports respond as readily to price changes as is assumed in the high elasticity scenarios, the export subsidy programs turn out to be less costly than PIK for both wheat and corn.

As indicated earlier, some analysts would argue that the export demand elasticities are smaller than those in the FAPRI model. It is clear that the cost estimates are quite sensitive to the level of the export demand elasticities. Thus, if the export demand elasticities were smaller than those in the model, the cost of the subsidy program would be higher than what was estimated with the FAPRI model. It is clear that one of the great uncertainties of initiating a program of this type is the uncertainty about the export response to lower prices.

Summary and Conclusions

This study evaluates a program that would allow the U.S. government to dispose of commodities held in public stocks. No consideration has been given to the question of whether the government should or should not hold or encourage farmers to hold reserve stocks or what the optimum level of such reserve stocks should be. This study was conducted under two cases, one in which there are no government-owned stocks carried from year to year and the other in which there are no reserve stocks of any kind carried from one year to the other. In the latter case, all carryover stocks would be in privately owned inventories.

The results of the study indicate that the surplus disposal-export subsidy approach over the past eight years would have created much greater variability in world market prices and would have driven those prices substantially lower than they were during the 1980s. The increase in U.S. exports and U.S. market share that results from this policy comes primarily from increases in foreign demand at the lower prices and to a lesser extent from declines in the exports of competitors.

The costs of operating this type of program for wheat and corn alone reach several billion dollars in some years. Taking into account the savings on storage costs and the gains from sales revenue in some years, the estimated costs for the CCC stock disposal over the eight years was $7.5 billion, and the estimated cost for disposal of both CCC and FOR stocks was over $10 billion (Table 10). The actual costs of the PIK program can be considered

FIGURE 11. U.S. SUBSIDY NET COST

(FORCCC, WITHOUT PIK, LOW ELAS HIGH ELAS)

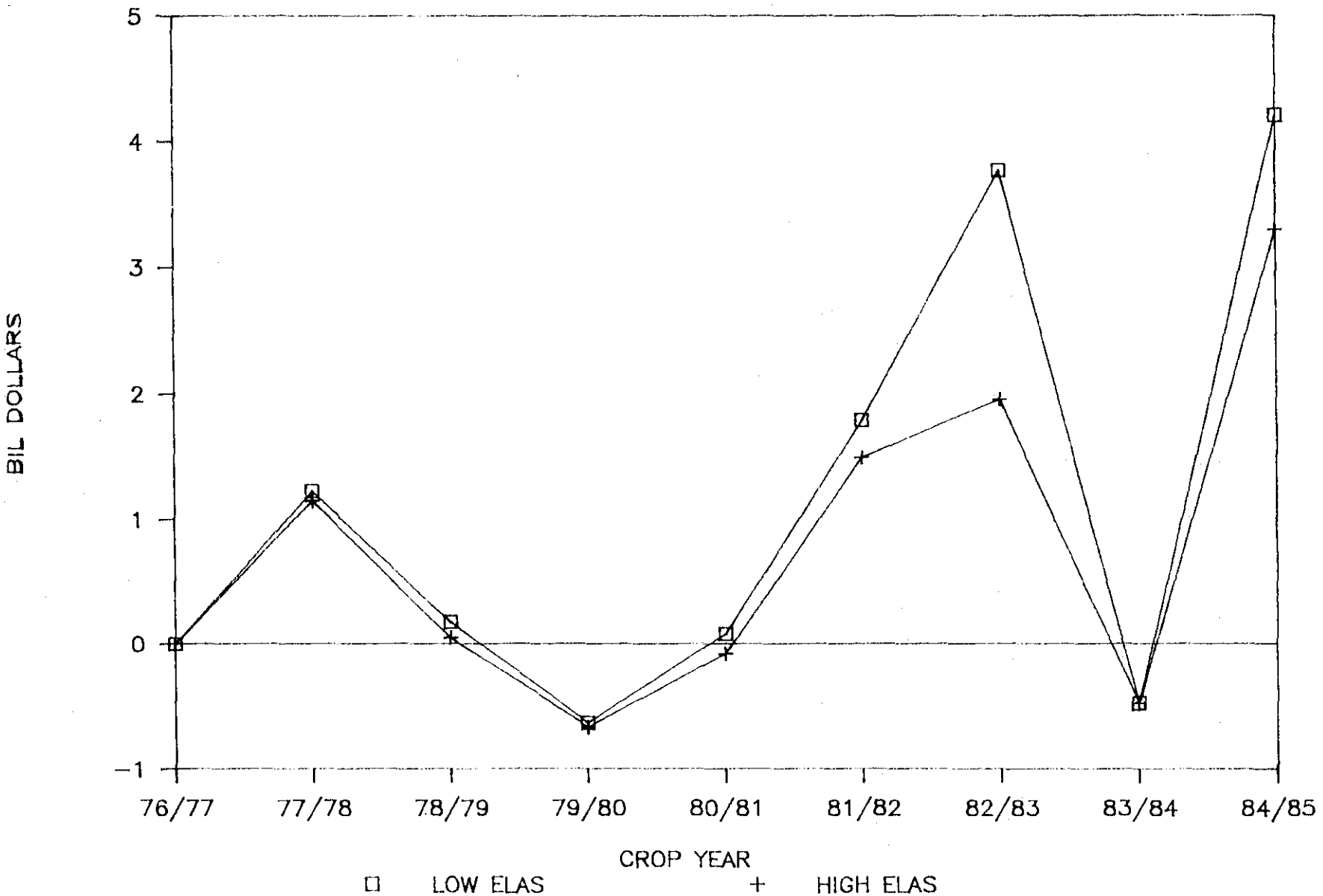


Table 10. Estimated increase in cost for the export disposal scenarios under alternative elasticities compared with the cost of PIK.

	Model Elasticities	High Elasticities
Change in Cost	billion dollars	
CCC case	7.5	5.1
FOR + CCC case	10.1	6.7
PIK cost	8.1	8.1

as a savings in this analysis, since the PIK program was not necessary. By comparison with the estimated costs of the subsidy programs, the value of PIK entitlements to wheat and corn producers was about $8 billion, which is slightly above the cost of the subsidy program for CCC stocks only and $2 billion below the cost of the FOR + CCC case. Other program costs, such as deficiency payments, were not affected by this program, since it was designed to hold U.S. prices at historic levels.

The estimated costs of the subsidy program are sensitive to the assumed export demand elasticities. When higher elasticities are assumed, the estimated costs decline by $2.5 to $3.5 billion. Both of the cost estimates under high elasticities are below the cost of PIK.

The design of this program requires that a domestic price objective be set. For this analysis, the actual prices were chosen as the policy price objective. If this analysis were done over some future period or such a program were actually implemented, it would require as a program parameter a price objective for the commodities affected. In many respects, this would be similar to the EC export restitution program, where the export subsidy varies based on the difference between a fixed domestic price and a variable international price. In this analysis, the larger costs occurred during years when there was an exceptionally good crop, and there were no subsidies in the drought years. As is the case with the EC export subsidy program, this program would add more instability to U.S. exports and world market prices while stabilizing domestic prices.

APPENDIX A

CARD/FAPRI Regional Trade Model

Specifications and Estimated Elasticities

The necessary components of this model are detailed in the following equations:

$$(1)\quad EDT = \Sigma DM_i - \Sigma SM_i = \Sigma f_i(P_i, X_i) - \Sigma h_i(P_i, Z_i) \qquad i = 1,..,n \text{ Importers}$$

$$(2)\quad ESO = \Sigma SX_j - \Sigma DX_j = \Sigma h_j(P_j, Z_j) - \Sigma f_i(P_j, X_j) \qquad j = 1,..,m \text{ Exporters}$$

$$(3)\quad ESUS = h_u(P_u, Z_u) - f_u(P_u, X_u) \qquad u = \text{U.S. Exports}$$

$$(4)\quad ESUS = EDT - ESO \qquad \text{World Market Equilibrium}$$

$$(5)\quad P_i = P_u e_i + M_i \qquad i = 1,..,n$$

$$(6)\quad P_j = P_u e_j + M_j \qquad j = 1,..,m$$

where

DM = importer demand

DX = exporter demand

e = exchange rate

M = trade margin (transport cost, tariff, subsidy, etc.)

P = domestic price

SM = importer supply

SX = exporter supply

X = vector of demand shifters

Z = vector of supply shifters.

In most instances, the supply and demand relationships f_i and h_i are the estimated equations in the model. In a few instances, net trade equations are estimated directly. The tables that follow outline the structural components of the model and report the estimated price and income elasticities. The functional form is generally linear.

Table A.1. Price elasticities of supply and demand for soybean trade model.

	Soybean Price	Soymeal Price	Soyoil Price	Value of Meal and Oil	Corn Price
U.S.					
Production	0.71				
Soybean crush	-2.08			1.96	
Soybean stocks	-0.69				
Soymeal demand		-0.41			0.19
Soyoil demand			-0.45		
Soyoil stocks			-0.13		
Brazil					
Production	0.08				
Soybean crush	-0.50			1.00	
Soymeal demand		-0.34			-0.21
Argentina					
Production	0.27				
Soybean crush	-2.26			2.50	
Soymeal demand		-0.18			
EC					
Soybean crush	-1.91			1.99	
Soymeal demand		-0.27			0.25
Spain					
Soybean crush	-4.87			5.05	
Soymeal demand		-0.32			0.44
Japan					
Soybean crush	-0.26			0.16	
Soymeal demand		-0.07			
Eastern Europe					
Soybean crush	-2.20			1.84	
Rest of World					
Soymeal demand		-0.30			

Table A.2. Price transmission elasticities of soybean and soymeal prices of other regions with respect to U.S. soybean and soymeal prices.

Regions	Soybean Price	Soymeal Price
Brazil	1.80	1, 0[a]
Argentina	0.97	0.96
European Community	0.90	0.88
Spain	0.86	0.84
Japan	0.91	0.53
Eastern Europe	0.88	0.88
Rest of world	--	1.00

[a]The domestic soymeal price is subject to government control and hence does not respond to U.S. soymeal price. The U.S. soymeal price is used for the Brazil soymeal export price and thus price transmission elasticity is 1.

Table A.3. Summary of estimated domestic supply and demand elasticities from the wheat trade model.

Country	Elasticity with respect to: Wheat Price	Barley Price	Sorghum Price	Rice Price	Soymeal Price	Income
U.S.						
Production	0.20					
Food demand	-0.14					0.55
Feed demand	-3.01		1.17			
Stock demand	-0.28					
Canada						
Production	0.38	-0.30				
Feed demand	-0.12					
Stock demand	-0.28					
Australia						
Production	0.01	-0.63				
Stock demand	-0.43					
Argentina						
Producton	0.50					
Food demand	-0.16					
EC						
Production	0.66					
Feed demand	-3.11	6.04			0.08	
India						
Production	0.44		-0.04			
Food demand	-0.45			0.48		0.73
Japan						
Total use	-0.12					0.22
USSR						
Food demand						0.23
China						
Total use						0.59
East Europe						
Total use						0.28

Table A.4. Price transmission elasticities of wheat prices of other regions with respect to world price[a].

Regions	RGULFUS U.S. Wheat Gulf Port Price
Canada	
Wheat export price	1.13
Australia	
Wheat export price	0.97
Argentina	
Wheat farm price	0.28
Japan	
Wheat resale price	0.28

[a]Price transmission elasticities for other regions--European Community, India, and Centrally Planned Economies are zero.

Table A.5. Summary of estimated production elasticities from the feed grains model.

Country	Elasticities of: Corn Price	Sorghum Price	Barley Price	Wheat Price	Soybean Price	Cassava Price	Rice Price
U.S.							
Corn	0.07				-0.13		
Canada							
Barley			0.74	-0.47			
Corn	0.26				-0.20		
Australia							
Barley			0.34	-0.29			
Argentina							
Sorghum		0.10					
Corn	1.10	-0.97					
Thailand							
Corn and Sorghum	0.30					-0.06	-0.28
EC(10)							
Corn	0.39						
Barley			0.70				

Table A.6. Summary of estimated domestic demand elasticities from the feed grains model.

Country	Elasticities of: Corn Price	Sorghum Price	Barley Price	Soymeal Price	Wheat Price	Cassava Price	Livestock Product Price	Income
U.S.								
Corn food	-0.19							
Corn feed	-0.18			0.18	0.20		0.13	
Corn stock	-0.67							
Canada								
Barley and corn total use		-0.08	0.14	0.05			0.25	
Australia								
Barley total use			-1.16		0.78			
Argentina								
Corn total use	-0.14	0.14						
Sorghum total use	0.98	-3.17						
Thailand								
Corn and sorghum total use	-0.14					0.14	0.25	
South Africa								
Feed grain net imports								2.00
EC(10)								
Corn feed	-0.05			0.05				0.88
Corn food	-0.70							
Barley feed			-0.26	0.02				0.06
Barley food			-0.39					0.58
Spain								
Corn	-0.21							
Soviet Union								
Feed grain total use								0.37
Japan								
Corn and sorghum total use	-0.20			0.16				
corn and sorghum stock	-0.46	-0.45					0.95	

Table A.7. Price transmission elasticities of feed grain prices with respect to U.S. feed grain prices.

Country	U.S. Corn Price	U.S. Barley Price	U.S. Sorghum Price
Canada			
Barley		0.84	
Corn	0.96		
Australia			
Barley		1.12	
Argentina			
Corn	1.10		
Sorghum			1.14
Thailand			
Corn	1.12		
South Africa			
Feed grain	0.0	0.0	0.0
EC(10)			
Corn	0.0		
Barley		0.0	
Spain			
Corn	0.75		
USSR			
Feed grain	0.0	0.0	0.0
Japan			
Corn	0.97		

Table A.8. Computation of Price and Income Elasticities for Net Import Demand in Selected Regions not Included in the Econometric model

Region	Net Imports (1)	Domestic Consumption (2)	(2)/(1)	$\frac{(2)-(1)}{(1)}$	n Income Elas.	$n \times \frac{(2)}{(1)}$ Adj. Income Elas.	e_d Demand Elas.	e_s Supply Elas.	e_I Price Trans.	Adj. Net* Imp. Elas.
	1000 MT									
WHEAT										
Africa and Middle East[a]	20026.0	48098.0	2.41	1.41	0.35	0.841	-0.2	0.2	0.4	-0.306
OWES Europe	220.0	9268.0	42.127	41.127	0.15	6.32	-0.2	0.2	0.25	-4.163
Oth. Asia[b]	12328.0	28505.0	2.31	1.31	0.40	0.925	-0.5	0.2	0.2	-0.362
Oth. Sou. America[c]	8312.0	12016.0	1.446	0.446	0.25	0.361	-0.2	0.2	0.5	-0.378
ROW**	10136.0	54939.0	5.42	4.42	0.40	2.17	-0.7	0.2	0.25	-1.170
FEED GRAINS										
High Income East Asia	8263.0	9513.0	1.151	0.151	0.45	0.518	-0.7	0.2	0.6	-0.502
East Europe	3390.0	70891.0	20.912	19.912	0.35	7.32	-0.3	0.2	0.5	-5.128
ROW**	24543.0	173197.0	7.057	6.057	0.40	2.82	-0.5	0.2	0.35	-1.659
SOYMEAL										
China	475.0	1019.0	2.145		0.40	0.86				
USSR	1211.0	2358.0	2.00		0.30	0.58				
ROW**	8200.0	14920.0	1.820	0.820	0.40	0.73	-0.3	0.2	0.5	-0.355
SOYBEAN										
China	568.6	8775.0	15.433		0.2	3.09				
USSR	1269.0	1785.0	1.41		0.3	0.42				

*computed as $e_d e_I \left(\frac{(2)}{(1)}\right) - e_s e_I \left(\frac{(2)-(1)}{(1)}\right)$

**rest of world includes all countries and regions not listed in Tables A.1 to A.8

[a]excludes Egypt

[b]excludes India

[c]excludes Central America

APPENDIX B

Supporting Tables

Table B.1. Variable costs of production used for the minimum export price rule.

	Wheat	Corn
1970	.64	.46
1971	.67	.48
1972	.72	.52
1973	.82	.59
1974	.94	.67
1975	1.03	.74
1976	1.10	.79
1977	1.16	.83
1978	1.25	.90
1979	1.42	1.02
1980	1.60	1.15
1981	1.73	1.25
1982	1.82	1.31
1982/84 and 83	1.85	1.33
1984	1.90	1.36

adj. pp Index 1977 = 100

SOURCE: ERS/USDA. The 1982/84 average is the average variable cost of production for the United States. Other years are computed by using the producer price index to adjust from year to year.

TABLE B.2. IMPACT OF SURPLUS WHEAT STOCK DISPOSAL ON PRICES, SUBSIDY, AND PROGRAM COSTS (HIGH ELASTICITY).

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	($/BU)								
ACTUAL									
U.S. GULF PRICE	3.16	3.83	4.74	4.95	4.65	4.32	4.19	4.03	4.23
U.S. FARM PRICE	2.33	2.98	3.78	3.91	3.65	3.55	3.53	3.38	3.39
9-MONTH LOAN RATE	2.25	2.35	2.50	3.00	3.20	3.55	3.65	3.30	2.98
RESERVE LOAN	2.25	2.35	2.50	3.30	3.50	4.00	3.65	3.30	3.11
CCC DISPOSAL									
U.S. FARM PRICE	2.33	2.98	3.78	3.91	3.67	3.55	3.48	3.38	3.38
SUBSIDY	0.10	0.01	0.13	0.02	0.00	0.42	0.00	0.58	0.16
U.S. PRICE-SUBSIDY	2.23	2.97	3.65	3.89	3.67	3.13	3.48	2.80	3.23
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	114.79	10.92	190.41	36.05	0.00	770.28	0.00	1133.52	282.00
STORAGE COST[a]	-12.76	-13.53	-49.76	-52.87	-50.44	-50.92	-50.34	-100.19	-47.60
NET SALES LOSS[b]	-3.86	-1.85	-174.93	-10.70	0.00	0.00	0.00	-15.06	-25.80
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1247.00	155.96
NET COST	98.18	-4.47	-34.28	-27.52	-50.44	719.35	-50.34	2265.27	364.89
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	389.10	1836.40	248.60	309.26
	($/BU)								
FOR + CCC DISPOSAL									
U.S. FARM PRICE	2.33	2.98	3.85	3.91	3.65	3.55	3.54	3.38	3.40
SUBSIDY	0.68	0.09	0.00	0.17	0.20	0.72	0.00	0.45	0.29
U.S. PRICE-SUBSIDY	1.65	2.89	3.85	3.74	3.45	2.83	3.54	2.93	3.11
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	932.71	110.97	0.00	282.88	388.98	1608.13	0.00	826.10	518.72
STORAGE COST[a]	-102.73	-117.43	-103.80	-148.30	-199.32	-332.03	-312.17	-319.57	-204.42
NET SALES LOSS[b]	-30.92	-34.98	-525.60	-105.94	-30.34	224.54	0.00	-15.04	-64.79
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1247.00	155.96
NET COST	799.06	-41.44	-629.39	28.65	159.32	1500.63	-312.17	1738.48	405.47
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	389.10	1836.40	248.60	309.26

[a]Cost of CCC storage and FOR storage payments (FOR + CCC case only).

[b]Acquisition cost of stocks minus the value of stock sales.

[c]Value of CCC stocks held at the end of 1984/85 if there is no disposal program.

[d]Value of PIK entitlements to producers.

TABLE B.3. IMPACT OF SURPLUS CORN STOCK DISPOSAL ON PRICES, SUBSIDY, AND PROGRAM COSTS (HIGH ELASTICITY).

YEAR	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	77-84 AVG
	($/BU)								
ACTUAL									
U.S. GULF PRICE	2.63	2.88	3.11	3.62	2.83	3.20	3.67	2.98	3.12
U.S. FARM PRICE	2.02	2.25	2.52	3.11	2.50	2.70	3.25	2.62	2.62
9-MONTH LOAN RATE	2.00	2.00	2.10	2.25	2.40	2.55	2.65	2.55	2.31
RESERVE LOAN	2.25	2.35	2.50	2.25	2.55	2.90	2.65	2.55	2.50
CCC DISPOSAL									
U.S. FARM PRICE	2.02	2.25	2.52	3.13	2.50	2.70	2.84	2.62	2.57
SUBSIDY	0.01	0.04	0.07	0.00	0.05	0.40	0.00	0.42	0.12
U.S. PRICE-SUBSIDY	2.01	2.21	2.45	3.13	2.45	2.30	2.84	2.20	2.45
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	13.67	84.29	174.63	0.00	93.81	1061.86	0.00	1065.36	311.70
STORAGE COST[a]	-3.10	-25.78	-66.01	-61.35	-77.86	-300.59	-53.27	-63.60	-81.44
NET SALES LOSS[b]	-0.23	-21.42	-63.74	0.00	-6.26	-126.14	0.00	-2.71	-27.56
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	612.00	76.55
NET COST	10.35	37.09	44.88	-61.35	9.70	635.12	-53.27	1711.05	278.25
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	14.20	5218.60	362.70	699.44
	($/BU)								
FOR + CCC DISPOSAL									
U.S. FARM PRICE	2.02	2.25	2.52	3.35	2.50	2.70	3.34	2.62	2.66
SUBSIDY	0.16	0.11	0.10	0.00	0.54	0.43	0.00	0.44	0.22
U.S. PRICE-SUBSIDY	1.86	2.14	2.42	3.35	1.96	2.27	3.34	2.18	2.44
	(MILLION $)								
CHANGE IN COST									
SUBSIDY EXPENDITURE	361.87	256.68	255.05	0.00	1568.86	1231.63	0.00	1103.41	597.19
STORAGE COST[a]	-84.43	-165.07	-229.97	-109.05	-415.57	-700.18	-165.89	-179.41	-256.20
NET SALES LOSS[b]	70.53	0.33	-65.67	0.00	48.50	-78.96	0.00	-3.54	-3.60
CCC INVENTORY VALUE[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	612.00	76.55
NET COST	348.02	91.94	-40.59	-109.05	1201.79	452.49	-165.89	1532.46	413.90
PIK COST[d]	0.00	0.00	0.00	0.00	0.00	14.20	5218.60	362.70	699.44

[a]Cost of CCC storage and FOR storage payments (FOR + CCC case only).

[b]Acquisition cost of stocks minus the value of stock sales.

[c]Value of CCC stocks held at the end of 1984/85 if there is no disposal program.

[d]Value of PIK entitlements to producers.