United States General Accounting Office

GAO

Report to the Honorable
Byron L. Dorgan, U.S. Senate

June 1994

WHEAT SUPPORT

The Impact of Target Prices Versus Export Subsidies

GAO/RCED-94-79

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-255705

June 7, 1994

The Honorable Byron L. Dorgan
United States Senate

Dear Senator Dorgan:

The Export Enhancement Program (EEP) lowers the price of U.S. agricultural products to specific overseas markets in order to increase the U.S. share of world markets and is intended to pressure countries that subsidize agricultural exports to eliminate trade-distorting practices. EEP is particularly important for wheat. Since 1985, more than one-half of all U.S. wheat produced has been exported, and more than half of these exports have received EEP subsidies. EEP expenditures were $6.3 billion from its inception in 1985 through fiscal 1993; 76 percent, or $4.8 billion, of this total was for wheat exports.

Concerned that EEP support for wheat exports does not benefit farmers as much as higher target prices would, you asked us to (1) examine how EEP has affected the income of wheat producers and grain exporters and (2) determine to what extent wheat producers' income would have increased if additional EEP funds had been used for direct income support payments through higher target prices.[1]

To address the first question, we analyzed eight empirical and eight theoretical studies relating to EEP. In general, the empirical studies we reviewed focus principally on the effect of EEP on the export volume and export price of wheat, rather than on the total revenues U.S. producers derive from wheat. We also interviewed experts in the field. To address the second question, we used a well-established econometric model developed by the Food and Agricultural Policy Research Institute (FAPRI). This model projects certain economic indicators, including producers' net income from wheat production. (See app. II for more details on the model and our analysis.) It should be noted, however, that we do not address the question of whether additional funding for EEP and for the target price program is desirable. Rather, we evaluate only the likely impacts of identical funding for each of the two programs on wheat producers' incomes.

[1]The government supports the incomes of producers by ensuring a minimum return, or "target price," for a portion of their wheat production. When the average market price is less than the target price, the U.S. Department of Agriculture supports wheat farmers' income through deficiency payments.

Results in Brief

The Export Enhancement Program generally increased wheat exports by 3 to 11 percent and raised wheat prices by 0.4 to 12 percent, according to the eight empirical studies we reviewed. As exports and prices rose, wheat producers' and marketing firms' income from export sales rose by as much as 18 percent as a result of the program, according to four of the studies we reviewed. The literature we reviewed also indicated that, in the past, the program increased costs associated with domestic commodity programs.

According to our econometric analysis, higher target prices to producers would increase producers' net income from wheat production more than an equivalent level of indirect support through subsidies granted under the Export Enhancement Program. However, by increasing market prices, funding for the program benefits all wheat producers, including those whose acreage devoted to wheat is not enrolled in the federal wheat commodity program—about 20 percent of all wheat acreage. In contrast, direct income support benefits only those producers participating in the commodity program. Moreover, funding for the Export Enhancement Program has impacts that direct income support payments do not, namely, more exports and higher income for grain-marketing firms. In addition, the program may pressure foreign competitors to discontinue practices that limit access to foreign markets and thereby distort trade. However, additional exports would come at a high price, since our analysis forecasted that the government's subsidy for each additional bushel of wheat exported would exceed the farm-level price received for that bushel.

Background

An underlying assumption of U.S. trade policy is that maintaining or expanding the market share of U.S. agricultural exports can provide overall economic benefits to the United States. In the mid-1970s, U.S. wheat exports averaged about 50 percent of the world wheat market. During this period, the European Community (EC) created its Common Agricultural Policy, which encouraged production within the EC and emphasized intra-EC trade. Because of a combination of factors, including this action by the EC, U.S. wheat exports declined in volume as a percentage of the world export market—down to 29 percent in 1985. In May 1985, the Secretary of Agriculture established EEP to address, in part, continuing declines in U.S. agricultural exports and to attempt to pressure trading partners to negotiate seriously to reduce trade barriers and eliminate trade-distorting subsidies.

Subsequently, the Food Security Act of 1985 (P.L. 99-198, Dec. 23, 1985) authorized EEP as an export subsidy program. EEP was also expected to raise producers' income through greater revenue from the targeted markets, which were expected to purchase more of the subsidized commodity from the United States. In theory, EEP also has the potential to raise producers' income from domestic market sales if price increases in that market are not fully offset by decreases in the quantity of wheat sold there. That is, (1) the lower domestic supply raises the price of the subsidized commodity, (2) the quantity demanded remains relatively stable, and (3) the relatively stable demand for the subsidized commodity, multiplied by the higher price, raises income. (See app. I for a discussion of the theoretical basis for targeted export subsidies.)

Under EEP, the U.S. Department of Agriculture's (USDA) Foreign Agricultural Service provides cash bonuses to exporters to make specified U.S. agricultural commodities more price-competitive in targeted overseas markets. (Until Nov. 1991, when the levels of wheat stocks were significantly reduced from 1986 levels, the Foreign Agricultural Service provided grain-in-kind subsidies to exporters rather than cash subsidies.) U.S. exporters recommend commodities and countries for coverage under EEP. To be approved for EEP funding, a proposal must meet several criteria, such as advancing U.S. trade policy on price-competitiveness and maintaining export markets for U.S. agricultural products.

Targeted to only 4 countries in fiscal 1985, EEP support for wheat exports is now available to 78 countries. Since the program began, five countries—Algeria, Egypt, the former Soviet Union, Morocco, and the Peoples Republic of China—have accounted for 75 percent of all EEP wheat bonuses. This information is discussed in more detail in appendix IV.

Higher Export Volume Generated by EEP Benefits Wheat Producers and Grain Exporters

Estimates of the increase in wheat export volume due to EEP that were reported in the empirical studies we reviewed generally fell in the 3- to 11-percent range, although one study did report a 22-percent increase.[2] The empirical studies we reviewed generally report estimates of the increase in prices received for U.S. wheat in domestic and export markets as a result of EEP as follows. The estimates fall in the 0.4- to 12-percent range, although two studies show a slightly higher than 12-percent increase over levels that would have been achieved without EEP. Wheat

[2]The empirical literature we reviewed analyzes data on how EEP affected the price of wheat. In contrast, the theoretical literature we reviewed discusses the effects of export subsidies in general and does not directly consider any data.

producers' and marketing firms' income from export sales rose by as much as 18 percent as a result of EEP, according to the four empirical studies we reviewed that estimated EEP's impact on export income.

These empirical results are consistent with the theoretical literature on targeted export subsidies, which indicates that producers' income can increase when a country provides a small, targeted export subsidy. (See app. I.) These results are also consistent with what most experts we interviewed told us about the effectiveness of EEP.

The empirical studies that have examined the effects of EEP vary in their estimates of the effect of the program because of many factors. First, the results were generated by various techniques that incorporate different assumptions regarding intervention in domestic markets or the importance of prices in the purchasing patterns of importing countries. Second, the time period of analysis differed. And third, the basis for the comparison differed between the studies. In some scenarios, the effect of a given level of EEP funding on volume and prices was compared with the effect of a lower funding level; in other cases, the effect of a given funding level on volume and prices was compared with the effect of no EEP funding.

These empirical studies also indicate that, while the increase in the price of wheat in the United States due to EEP fell in the 2- to 7-percent range, it did reach 12 percent above the expected price of wheat without EEP funding for various periods of time. (See app. I.) Domestic prices would be expected to increase with cash EEP funding because of lower domestic supplies as a result of increased purchases by subsidized countries. Assuming that the lower quantity sold does not fully offset the higher price, wheat producers' income from domestic wheat sales would be higher, according to the theoretical literature we reviewed.

The literature we reviewed also indicated that EEP funding can have an impact on the cost of federal commodity programs when it is provided in redeemable certificates rather than in cash. When this cost is taken into account, it can lower the overall benefit of EEP. For example, one study indicates that, although EEP funding with redeemable certificates will also increase exports, it may increase deficiency payments when the certificates increase the domestic supply and lower the domestic market price. Another study shows that, although exports increased by 2 to 3 percent over a 6-month period, revenues were less than 1 percent greater than without EEP after adjustment for the cost of bonus commodities.

Producers' Income Rises Somewhat More With Higher Target Prices, but EEP Also Increases Exports

According to our econometric analysis, producers' income from wheat production would increase 21 percent more with higher target prices than with equivalent funding from higher EEP subsidies. But unlike higher target prices, higher EEP funding would also benefit producers who have wheat acreage not enrolled in the program—about 20 percent of all wheat acreage—as well as those producers whose acreage is enrolled. Moreover, additional EEP funding would increase U.S. exports and market share. As a result, the income of grain exporters would rise, and trading partners may negotiate seriously to reduce their trade barriers and to eliminate trade-distorting subsidies.[3]

Using the FAPRI model, we examined the effects of additional EEP subsidies by adding an average of $500 million, in each of the years 1993 through 2001, to the model's baseline levels of EEP cash subsidies for wheat.[4] The $500 million annual increase was chosen because of funding authorized by the Omnibus Budget Reconciliation Act of 1990 in the absence of a General Agreement on Tariffs and Trade (GATT) that includes agricultural products by June 1992.[5] The model assumes that a 10-percent decline in the U.S. export price for wheat would result in a 5.5-percent increase in the quantity purchased. While the assumptions about price responsiveness that were used in the FAPRI model are consistent with many analysts' views, some experts suggest that export price responsiveness could be higher than that assumed in the model. To address that view, we examined how our modeling results for this scenario would change with a higher price responsiveness assumed. For this alternative, we assumed that a 10-percent decline in world wheat prices would produce a 10-percent increase in export sales (compared with the 5.5-percent increase originally used). (See app. III.)

Using the model to measure the impact of higher target prices, we increased funding for target price payments by an average of $321 million annually over the same period. The $321 million figure is the model's

[3]According to some leading economists, it is not possible to predict how boosting exports will affect the overall balance of trade. However, it is generally acknowledged that boosting exports of a particular good will likely increase that good's share of total exports in the short run.

[4]As in any modeling system, the results from the FAPRI model are directly related to its underlying assumptions, such as expectations about macroeconomic conditions and beliefs about commodity market behavior.

[5]One billion dollars was authorized for fiscal years 1994 and 1995 if the United States did not enter into an agricultural trade agreement in the Uruguay Round of multilateral trade negotiations under GATT by the end of June 1992.

forecast of the net cost to the government of providing an additional $500 million in EEP subsidies for wheat.[6]

Table 1 shows the changes from the model's baseline forecasts that result from the effects of equivalent increases in funding for the target prices and EEP subsidies.

Table 1: Modeling Results for Eight Economic Indicators Under Scenarios Increasing Target Prices and EEP Funds, Crop Years[a] 1993-2001

	Model's baseline forecast	Changes from baseline with higher target prices (scenario increasing target prices)		Changes from baseline with additional EEP funds (scenario increasing EEP funds)	
Economic indicators	**Annual Average**	**Annual average**	**Percent**	**Annual average**	**Percent**
Producers' net income from wheat production	$ 6.54 billion	+$ 314 million	+4.8	+$ 259 million	+4.0
Domestic wheat market price ($/bu.)	$ 3.22[b]	0	0	+$0.10	+3.1
Target price ($/bu.)	$ 4.00	+$ 0.18	+4.0	0	0
Domestic use (million bu.)	1,257	0	0	–24	–1.9
Export sales	$ 5.27 billion	+$4 million	–0.1	+$ 562 million	+10.7
EEP subsidy ($/bu.)	$ 0.89	0	0	+$ 0.55	+61.8
Net government outlays[c]	$ 7.50 billion	+$ 321 million	+4.2	+$321 million	+4.3
Total wheat use[d] (million bu.)	2,595	0	0	+75	+2.9
Ending wheat stocks (million bu.)	588	0	0	–11	–1.9
U.S. world market share (percent)	39.1	0	0	+1.9	+4.8

Legend

bu. = bushel(s)

[a]Crop year for wheat extends from June 1 to May 31 of the following year.

[b]Price ranged from $2.90 during 1993-94 to $3.53 during 2001-2.

[c]Average of forecasted net expenditures for FY 1994 through 2001.

[d]Wheat use is the sum of domestic use plus the export use of U.S. wheat. Domestic use consists of food, feed, and seed use.

As table 1 shows, producers' income from wheat production would increase by $314 million, or 4.8 percent, under the scenario of higher target prices, compared with $259 million, or 4 percent, with the scenario of additional EEP funding. That is, higher direct income support payments

[6]The outlays for EEP were partially offset by decreases in deficiency payments because of higher domestic market prices for wheat.

would increase producers' net income from wheat production by about 20 percent more than an equivalent level of indirect support through EEP funding. It should be noted, however, that for both scenarios, the overall impact on producers' total income from wheat production was relatively small (4.8 percent and 4 percent for higher target prices and for additional EEP funding, respectively).

Equivalent expenditures for higher target prices lead more directly to an increase in farm income because nearly all of the increased expenditures are translated directly into an 18-cent increase per bushel in direct payments from the government to participating producers. In contrast, with additional cash funding for EEP, some of the money would be transferred to foreign buyers, and some would be spread among those who benefit from higher levels of wheat sales, such as grain-marketing firms. The scenario increasing funding for EEP also differs from the scenario increasing target prices in that all wheat producers' income would rise also because of increased export sales and an increase in the domestic wheat market price. This result is consistent with theoretical expectations regarding targeted export subsidies for agricultural commodities. (See app. I.)

While higher target prices increase producers' income somewhat more than additional EEP funding in this analysis, funding for EEP would have other impacts. First, the higher market prices that EEP produces flow to all producers, not just those participating in the wheat commodity program. EEP increases the receipts of input suppliers and export-related industries also. Second, this scenario has other impacts on the U.S. economy, particularly from world wheat trade. That is, with higher EEP subsidies, export sales and the U.S. share of the world market increased by almost 5 percent above the model's baseline. Greater export sales and a higher share of the world market may help to exert pressure on subsidizing wheat-exporting countries to reduce their trade-distorting practices—a principal goal of U.S. trade policy. And third, since exports would increase with higher EEP subsidies, the income of wheat-marketing firms would also rise. The model did not quantify the increase in these firms' income.

Although the scenario involving EEP shows some benefits at this additional funding level, funding above this level may not yield comparable benefits. The reason is that lowering the price of wheat beyond a certain point may not significantly increase the quantity demanded.

In addition, under this scenario, the government incurred an average annual cost of $3.29 for each additional bushel of wheat exported from 1993 through 2001 that would not have been exported without EEP. This average annual cost per bushel exceeds FAPRI's forecast for the farm-level wheat price of $3.22 for the same period.

Agency Comments

We discussed a draft of this report with the Acting Assistant Secretary for Economics, USDA; the Assistant Administrator for Commodity and Marketing Programs, Foreign Agricultural Service, USDA; and seven other officials/economists from USDA's Economic Analysis Staff, Economic Research Service, Foreign Agricultural Service, and Agricultural Stabilization and Conservation Service. These officials generally agreed with our model's results and our review of the literature. However, they suggested minor technical revisions to our draft. Where appropriate, we incorporated these revisions into the report.

Scope and Methodology

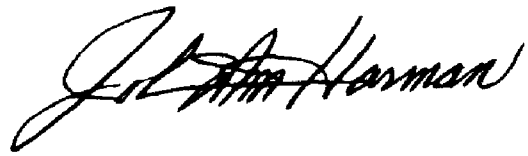
To examine the effects of EEP, we reviewed empirical studies of it and theoretical studies on targeted export subsidies. We limited our review to empirical and theoretical studies published in recognized professional journals and by research organizations. We selected only those empirical studies of EEP that estimate the price and quantity effects of the program. We also met with officials of USDA and major grain-exporting firms and with experts in this area. We used a model developed by FAPRI to project the effect of higher target prices and higher EEP funding on producers' income from wheat production, government costs, the share of the world wheat market, and other economic indicators. FAPRI's baseline reflects that organization's best estimates of the various economic and policy indicators of the domestic and international wheat market for the next decade. The estimates are subject to extensive review by experts in business, government, and academia. We reviewed the documentation for the model, but we did not independently verify the model. We conducted our review from October 1992 through March 1994 in accordance with generally accepted government auditing standards.

Appendix I describes the literature we reviewed. Appendix II discusses the FAPRI model, our adjustments to it, and the model's results. Appendix III presents the results of additional modeling FAPRI did for us that examines the effects of EEP's use of another assumption about price responsiveness. Appendix IV lists EEP bonuses and recipient countries.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 7 days from the date of this letter. At that time, we will send copies to the Secretary of Agriculture. We will also make copies available to others on request.

If you or your staff have any questions about this report, please contact me on (202) 512-5138. Major contributors to this report are listed in appendix V.

Sincerely yours,



John W. Harman
Director, Food
and Agriculture Issues

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Appendix V Major Contributors to This Report

Tables

Abbreviations

a.	acre(s)
bu.	bushel
ARP	Acreage Reduction Program
CAP	Common Agricultural Policy
CCC	Commodity Credit Corporation
CRP	Conservation Reserve Program
EC	European Community
EEP	Export Enhancement Program
ERS	Economic Research Service
FACTA	Food, Agriculture, Conservation, and Trade Act
FAPRI	Food and Agricultural Policy Research Institute
FOB	free on board
FOR	Farmer-Owned Reserve (program)
FSU	Former Soviet Union
GAO	General Accounting Office
GATT	General Agreement on Tariffs and Trade
mil.	million
mt.	metric ton
NAFTA	North American Free Trade Agreement
NFA	normal flexible acreage
USDA	U.S. Department of Agriculture

Evaluation of Literature Reviewed

This appendix discusses the literature on targeted export subsidies and related literature on methodological approaches to modeling international trade. (The studies we reviewed are listed at the end of this appendix.) We selected only those empirical studies of the Export Enhancement Program (EEP) that estimate the effects of EEP on the price of wheat and quantity sold. The theoretical studies examine how export subsidies for an agricultural commodity targeted to specific nations are likely to affect the welfare of the subsidizing country,[1] the subsidized country, and the rest of the world.[2] We limited our review to empirical and theoretical studies that were published in recognized professional journals and by research organizations, including universities.

Empirical Literature Shows That Wheat Export Volume Rose and Domestic Wheat Prices Increased as a Result of EEP

The empirical studies we reviewed focus principally on the effect of EEP on export volume and on export price, rather than on total wheat revenues for U.S. producers. Only one of these studies reports total income from wheat production. This study concludes that wheat farm income, including government payments, was increased through EEP. In all of the studies, wheat exports increased as a result of EEP. While estimates of the percentage of increase in volume generally fell in the 3- to 11-percent range, they did reach 22 percent. Prices received for U.S. wheat in domestic and export markets fell in the 0.4- to 12-percent range. These ranges occur because of many factors. First, the results were generated by various techniques that incorporate different assumptions regarding intervention in domestic markets or the importance of prices in the purchasing patterns of importing countries. Second, the time period of analysis differed. And third, the basis for the comparison differed between the studies; in some scenarios, the effect of a given level of EEP funding on volume and price was compared with the effect of a lower funding level. In other cases, the effect of a given funding level on volume and price was compared with the effect of no EEP funding at all.

Table I.1 highlights the findings for certain indicators of the empirical studies we reviewed. These studies are divided into two categories—nonspatial and spatial equilibrium. The advantages and

[1]The welfare of a country refers to the well-being of individuals within the country as affected by the factors that contribute to their well-being.

[2]As EEP is offered more generally, it may begin to acquire some of the characteristics of a global export subsidy program. This could have welfare implications for the United States, since global cash export subsidies decrease the welfare of the subsidizing country, according to the theoretical literature. Although the literature on global in-kind export subsidies indicates that these subsidies can increase the welfare in the subsidizing country (if the costs of the subsidies are sufficiently low), empirical work has failed to support the welfare-increasing benefits of global in-kind export subsidies.

disadvantages of these two methodologies are discussed in greater detail in table I.1.

Table I.1: Studies Reviewed

		Study results				
Author(s)	**Study period**	**Amount of bonus[a]**	**Export change in percent**	**Price change in percent[b]**	**Other results**	**Modeling characteristics**
Nonspatial studies						
Bailey and Houck	1986-87	$34 to $35 (per mt.)[c]	+20.0[d]	+ 0.4	$204 million in certificates led to $491 million in wheat exports.	EEP provides bonuses in generic certificates to export merchants. Model patterned after FAPRI/CARD trade model.
	1987-88	$29 to $40 (per mt.)	+ 7.0	+12.2	$1 billion in certificates led to $330 million in wheat exports.	
Brooks, Devadoss, and Meyers	1986-87	$23 to $43 (per mt.)	+ 3.2	+ 2.1	Eight to 13 percent of EEP exports were in addition to expected commercial sales. Ability of EEP to expand exports is limited by retaliation of competing exporters.	EEP provides bonuses in generic certificates to export merchants. Impact of EEP determined by running model with no export subsidies.
	1987-88	$24 to $40 (per mt.)	+ 5.5	+ 7.5		
	1988-89	$13 to $25 (per mt.)	+ 5.9	+ 1.7		
Epstein and Carr	1992		+ 17.0[e]	+ 5.4[f]	Net revenue of wheat farmers is $139 million higher, including deficiency payments, which would be $301 million lower.	Impact of EEP in 1992 determined by comparing results of the WEFA model's forecast for eliminating EEP with those assuming that EEP expands exports by 20 percent.
Haley	1991-95	$500 mil.	+7.4-22.2	+1.3-2.3	Net export revenue:[j] + $1.155 billion	Four alternative EEP specifications are compared with the base run.[k] Model is synthetic and includes grain sectors for the former USSR and rest of the world.[l]
		Additional $400 mil.	Additional +4.1-10.6	Additional +1.1-2.2	Additional $50 million	
		Additional $500 mil.	Additional +6.1-9.0	Additional +.5-3.0	Minus $383 million	

(continued)

Author(s)	Study period	Study results: Amount of bonus[a]	Study results: Export change in percent	Study results: Price change in percent[b]	Study results: Other results	Modeling characteristics
Spatial studies						
Abbott, Paarlberg, and Sharples	Annual averages for 1979-81	$384 million[g]	+ 3.3[g]	+ 4.4[g]	Export revenue rises by 7.9 percent. Changes in U.S. welfare and farm income are small. However, EEP subsidies produce large disruptions in world trade.	Other exporters are assumed not to retaliate. Small changes in subsidies can drastically change subsidy costs and the benefits of a targeted subsidy program.
Anania, Bohman, and Carter	1988			+ 12.8[h]	Government incurs costs of $3.54 for each additional bushel of wheat exported. The net cost of the program to the U.S. government is $1.3 billion.	Results sensitive to assumption about whether EEP is a volume-constrained program or not. When EEP exports are assumed to be constrained to 1988 levels, domestic price falls by 2.1 percent
Haley	1986-87	$5.00 to $43.00 (per mt.)	+ 9.8[i]	+ 7.3[i]	EEP causes U.S. export revenue from wheat sales to be 18 percent higher. The U.S. share of the world wheat market is about 1 percent greater because ofEEP.	Assesses effect of EEP on increasing wheat exports in 1986-87 relative to the impact of lower price supports and dollar depreciation.
Seitzinger and Paarlberg	Oct. 1985 through Mar. 1986	$20.2 million	+ 2.0-3.0	+0.2	Export revenues adjusted for the of addditional loan forfeitures under the in-kind EEP are lower for the 6-month period analyzed than they would be without EEP.	Impact of the program cost estimated by comparing the EEP base solution with simulation of the model assuming no EEP.

(Table notes on next page)

Legend

CARD = Center for Agricultural and Rural Development.

FAPRI = Food and Agricultural Policy Research Institute.

mil. = million.

mt. = metric ton.

[a]U.S. government expenditures on EEP bonuses for wheat, measured on a per-unit or aggregate basis.

[b]Prices reported for the nonspatial equilibrium results are farm prices; prices reported for the spatial studies are U.S. border prices.

[c]Per metric ton, equivalent to 36.7 bushels.

[d]This study and the Brooks Devadoss and Meyers study assumed that export subsidies are matched by competitors in individual markets and that countries receive subsidies on all their commercial imports, excluding aid shipments. This assumption overstates the impact of EEP subsidies on U.S. wheat exports and total world wheat trade because subsidies are usually limited to the total EEP sales.

[e]Assumes that about 20 percent of EEP exports would not have been sold without the program.

[f]Calculated from data provided in this report and FAPRI baseline forecast for 1992 wheat farm level price.

[g]Results given are optimal targeted subsidies that maximize farm income.

[h]Results given are for the price of wheat at the U.S. border with EEP exports unconstrained.

[i]The author states that these results (from one of the four scenarios estimated) are the most relevant for evaluating the effects of EEP.

[j]Net export revenue is calculated as the increase in exports multiplied by world prices less the cost of the program, allowing for deficiency payments.

[k]Base run: EEP is funded $500 million annually, 75 percent of which is allocated for wheat. Scenario A: EEP funding is set at zero for 1991-95. Comparison with base for analysis of minimum EEP funding levels. Scenario B: EEP funding is increased to $900 million/year; 75 percent allocated for wheat exports. Scenario C: Same as B, but assumed increased funding of $500 million each year for 1993 and 1994 because of failure to reach a GATT agreement in the Uruguay Round. Scenario D: Same as C, plus elimination of wheat and coarse grain acreage reduction for 1993 and 1994.

[l]The model is synthetic insofar as its structure, and many of its parameter values are based on agricultural trade models developed by others.

Differences Between Nonspatial and Spatial Price Equilibrium Models

The studies we reviewed are based on two different classes of empirical multiple-region models: nonspatial and spatial price equilibrium models. These differences affect the abilities of the model types to address the questions they explore. Nonspatial models have an advantage in their ability to incorporate many policy factors and estimate dynamic results. In

contrast, spatial models can model bilateral trade flows for many countries, which nonspatial models cannot do. The model types also differ in how they link prices between regions and in the mathematical procedure used to solve the models. Each solution's procedure imposes a different set of restrictions on the behavior of variables in the model.

Nonspatial price equilibrium models constitute the simplest class of multiple-region agricultural trade models. They are sets of regional models in which each set is composed of a system of simultaneous equations. The prices in all regions are linked together, and the models are solved subject to the condition that global excess supply has to equal global excess demand. Linear models of this type are solved by matrix inversion; nonlinear models are solved by an iterative procedure.[3]

Two criticisms of this model are common. First, most nonspatial price equilibrium models do not recognize that most countries intervene actively in their domestic agricultural sectors through a variety of price policies, taxes, and subsidies. Second, these models can link prices together in a manner that is not consistent with spatial price equilibrium,[4] and they provide no information on trade flows. They solve only for the net trading position of each country included.

Despite these limitations, nonspatial models have contributed significantly to understanding the interrelations between trading regions because the models can analyze the extent to which world market price shocks are transmitted into domestic markets (through policy reaction functions or price transmission equations). In particular, these models provide insights into the ways that a policy change in one region affects other regions' supply and utilization.

Spatial price equilibrium models make up the most common class of agricultural trade models used for analyzing the effects of a change in government policy. Spatial models endogenize[5] bilateral trade flows between the countries in the model and can also examine the effects of changes in transportation costs on trade flows. Furthermore, prices are directly linked only between those pairs of countries that actually trade with each other. On the negative side, spatial models have been criticized

[3]An iterative procedure is a computation procedure in which replication of a cycle of operations produces results that approximate the desired result more closely.

[4]To be consistent with spatial equilibrium, prices between two locations should differ by the cost of transporting the good from one location to the other.

[5]Endogenize means to determine the values of variables within the modeling system.

because their predictions of trade flows often do not coincide with observed trade flows and because of their assumption that the "law of one price" is valid in international markets.

Findings of Nonspatial Price Equilibrium Models Show That Wheat Exports Have Expanded

The four nonspatial price equilibrium studies that we reviewed concluded that EEP has expanded wheat exports from 3 to 22 percent per year.

With respect to export volume, according to Kenneth Bailey and James Houck, wheat exports expanded 20 percent in the 1986-87 crop year and 7 percent in the 1987-88 crop year. During the 1986-87 crop year, $204 million in certificates led to $491 million in additional wheat exports, at a cost to the government of approximately $1.23 for each additional bushel exported. In 1986-87, world grain supplies were large relative to use, and competition between exporting countries for markets was very keen. In the 1987-88 crop year, $1 billion in certificates led to $330 million in wheat exports, at a government cost for EEP bonuses of approximately $9.77 per additional bushel. The authors explain that EEP was not as effective in 1987-88 because competitors' production fell and there was much less price competition between exporting countries for world markets.

According to Brooks, Devadoss, and Meyers, although wheat exports expanded from 3 to 6 percent from the 1986 through 1988 wheat crop years,[6] 87 to 92 percent of the wheat sold under EEP would have been sold commercially without EEP. The authors state that factors other than EEP played a major role in expanding wheat exports: the lower wheat support price legislated in the 1985 farm bill, depreciation of the U.S. dollar, lower yields in major exporting countries, and increases in import demand by the former USSR, the Peoples Republic of China, and Eastern Europe. This study assumes that other exporters would match EEP-induced price declines in targeted countries. This study is the first analysis of EEP that incorporates retaliatory pricing.

With respect to price, both of these studies conclude that the domestic price of wheat increased by anywhere from less than 1 percent to 12 percent per year. These two studies assume that EEP provided bonuses in the form of generic certificates that could be exchanged for any of the basic commodities in government storage, including wheat. This assumption is important because domestic wheat prices could have been lower as a result of EEP if the release of additional wheat stocks to the

[6]The wheat crop year extends from June 1 to May 31 of the following year.

domestic market exceeded the reduction in domestic wheat supplies because of additional wheat exports. As a result, the domestic price changes in these studies that incorporated EEP as a redeemable certificates program are not directly comparable to domestic price changes from the study by Epstein and Carr (see below) that incorporated EEP as a cash subsidy program.

Epstein and Carr estimate the effect of EEP in 1992 as a cash subsidy program. They do not estimate changes in volume but, instead, assume that 20 percent of the EEP exports in 1992 would be in addition to commercial sales that would have occurred in the absence of EEP. Their estimates reflect the WEFA results modified by Congressional Research Service assumptions.[7] Epstein and Carr conclude that without EEP, domestic wheat prices would be 17 cents lower in 1992 and that farm income would decline by about $139 million. This is the only one of the three EEP-related nonspatial partial equilibrium studies we reviewed that estimates farm income changes.

In his study of EEP under the Food, Agriculture, Conservation, and Trade Act (FACTA) of 1990, Haley incorporates the European Community's (EC) export restitutions and concludes that the EC will be only marginally affected by EEP because the EC can successfully compete against higher EEP funding at a low cost. He developed four scenarios using different assumptions about EEP funding. Overall, the model's results indicate that EEP can help increase U.S. wheat exports for the period. Funding at minimum levels set out in the FACTA would increase total wheat exports for the period by 16 percent over the level with no EEP. However, the program would be subject to diminishing returns for levels higher than those set out in the act. EEP, used in conjunction with relaxed acreage reduction requirements,[8] has the greatest potential for expanding exports but at the expense of increased deficiency payments.

[7]WEFA maintains a U.S. food and agriculture model and a world econometric model that are used to forecast future values for certain economic and policy variables.

[8]Acreage reduction provisions in federal grain commodity programs require participants in the program to set aside a certain portion of their grain base in order to be eligible for federal payments.

Findings of Spatial Price Equilibrium Models Show That EEP Increases Wheat Exports and Prices

The four spatial equilibrium studies we reviewed show that EEP increases wheat exports and prices, as noted in table I.1. In addition, the methodology used in these studies enables the authors to reach various conclusions on the effects of EEP. For example, Abbott, Paarlberg, and Sharples show that U.S. welfare can be increased through EEP if the subsidies are carefully targeted. Anania, Bohman, and Carter conclude that when EEP exports are unconstrained, prices rise but conclude that when EEP exports are constrained, prices decline. In his study of the 1986-87 wheat market, Haley writes that EEP had more of an impact on increasing revenues from wheat exports than did the declining value of the dollar and a reduced support price. Seitzinger and Paarlberg model world wheat trade flows and show that with EEP, the United States displaces the EC in North Africa, while the EC moves into the former USSR and other African markets.

Abbott, Paarlberg, and Sharples conclude that, although farm income and U.S. welfare can be increased by targeted export subsidies, when maximizing farm income is the policy goal, the targeted export subsidy scheme can be very costly. In contrast, when economic surplus is the policy goal, targeted subsidies can be quite small. However, in achieving either of these goals, the subsidy programs produce large disruptions in world trade and yield very small net gains in welfare.

The authors point out that their empirical results are consistent with their theoretical conclusions (presented earlier in this appendix) in several respects. First, a large income effect in the targeted country leads to more price-responsive excess demand and potential increases in welfare for the subsidizing country. Second, a country that has a perfectly inelastic excess demand should receive a subsidy by the United States if the market is shared with a principal competitor of the United States, which has a large excess supply elasticity owing to its stockholding behavior. (Without a U.S. subsidy, this competitor displaces much of the U.S. exports to the shared market.) Third, a low-targeted subsidy is consistent with the theoretical general equilibrium results, which suggest welfare gains for small subsidies only.

In contrast, Anania, Bohman, and Carter argue that EEP cannot be welfare-improving for the United States because the wheat market does not have the characteristics that make it possible for targeted exports to increase national welfare. Specifically, they write that (1) wheat is not a marginal good, (2) excess profits are lacking in the wheat industry, and

(3) the United States has been unable to separate wheat markets and sell a significant share of exports at a higher price in non-EEP markets.

Their results show that the U.S. domestic wheat price rises, exports increase, and domestic consumption declines when in-kind EEP bonuses are provided and the volume of EEP shipments are unconstrained. When the volume of EEP is constrained to 1988 levels for each importer, domestic wheat prices are lower, wheat exports in targeted export markets increase, and wheat exports in nontargeted export markets decrease.

In analyzing EEP for the 1986-87 crop year, Haley discusses four alternative responses by the EC if EEP were to be removed. The different responses relate to various strategies of the EC for its own subsidy program. Overall, he concludes that EEP raised U.S. wheat price between 7 and 22 percent, U.S. wheat volume between 10 and 31 percent, and U.S. wheat export revenue between 18 and 61 percent. For what he considers the most relevant scenario for evaluating EEP—that the EC selected targeted subsidies because of EEP and, in EEP's absence, would continue to provide only general export subsidies—EEP was shown to increase the U.S. wheat price by 7.3 percent and increase wheat export volume by 9.8 percent. Under the scenario that assumes that the EC would have targeted subsidies even in the absence of EEP, he shows that EEP increased the wheat price by 22.4 percent and U.S. wheat exports by 31.2 percent.

Seitzinger and Paarlberg estimate the impact of EEP by comparing the baseline solution (which incorporates EEP) with simulation of the spatial price equilibrium model under no EEP and conclude that world trade increases by less than 1 percent from October 1985 through March 1986. Nash's bargaining game models representing negotiations of EEP sales are combined with a quarterly spatial price equilibrium model representing non-EEP world wheat trade. Seitzinger and Paarlberg's model results also show that, although the United States displaces the EC in north Africa, the EC compensates for this displacement by increasing its wheat exports to the former USSR and other African markets. Furthermore, they point out that as the EC displaces Australia in the former Soviet market, Australia ships increasingly to the developed Asia market that was given up by the United States.

This paper concludes that, although gross export revenues from wheat increased with EEP, the net export revenues increased minimally or declined. For both October through December 1985 and January through March 1986, net revenues increased by less than 1 percent when the gross

revenues were adjusted for the cost of the bonus commodities. However, when net revenues are adjusted for the additional costs of Commodity Credit Corporation (CCC) loan forfeitures, wheat net export revenues fell below levels achieved in the absence of EEP.

Empirical Literature Reflects Principles Developed in Theoretical Studies

Some aspects of the empirical studies we cited in the prior section reflect principles developed by the theoretical work we reviewed. First, several empirical studies model EEP as an extension of the classic price discrimination model developed by reviewed theoretical articles. Second, some studies model the in-kind EEP as an exogenous increase in supply of the subsidized good, as suggested by theoretical work. Third, the presence of government commodity price and income support programs is demonstrated empirically to make a difference in the costs of EEP as the theoretical literature suggests.

EEP Discussed as an Extension of the Price Discrimination Model

Several studies incorporate EEP into an extension of the classic price discrimination model portrayed in the theoretical literature. As developed in the theoretical literature, the price discrimination model demonstrates that profits can be maximized by subsidizing the market with greater responsiveness to price change and taxing the market with less responsiveness to price change. In the theoretical literature relating specifically to targeted export subsidies, a foreign market(s) is selected for subsidization (because it is determined to be more responsive to price change) and the domestic market for taxation through higher prices (because it is determined to be relatively less responsive to price change).

For example, Abbott, Paarlberg, and Sharples develop a spatial equilibrium model in which the People's Republic of China and Eastern Europe are the markets selected for targeting because their excess demand functions are among the most responsive to price change of any countries included in the study. When economic surplus is maximized in this study, these markets reveal a large income effect from the price decline and a high price elasticity of demand. This result is consistent with the theoretical principles we reviewed that extend the classic price discrimination model to targeted export subsidies.

Haley also demonstrates the principles of applying the price discrimination model to targeted subsidies in his modification of the Abbott, Paarlberg, and Sharples work. The modification consists of analyzing two commodities with the objective of maximizing revenue from

export sales, less subsidy costs. In Haley's study, China, with the highest excess demand elasticity of all countries analyzed, significantly increases its imports of wheat from the United States in all four scenarios analyzed. This occurs even when the EC targets its wheat subsidies to maximize its export revenue and when U.S. export revenue, less subsidy costs, is maximized.

In-Kind EEP Subsidy Discussed as an Outward Shift in Supply

The empirical literature indicates that with an in-kind subsidy, the supply of the subsidized commodity available to the market will increase. The increase occurs because, prior to the introduction of the in-kind subsidy program, the government-stored subsidized commodity has been isolated from the market through legal restrictions on its release. An in-kind subsidy is provided under EEP in the form of generic certificates that are redeemable for a number of government-stored commodities, including the subsidized commodity. The literature emphasizes that the effects of a cash export subsidy will be different from those of an in-kind export subsidy, since a cash export subsidy will have the effect of decreasing supply available to the domestic market and raising price. In contrast, an in-kind subsidy will increase domestic supply and decrease domestic price unless the export market is very responsive to price change.

In their studies, Bailey and Houck, and Brooks, Davidoss, and Meyers incorporate the in-kind characteristics of EEP by shifting the United States' supply for wheat outward. The aggregate U.S. supply shifts because wheat stocks that were isolated from the market are released through EEP's payment of export bonuses in the form of generic certificates redeemable for government-held wheat (and other commodity) stocks. Even though the aggregate U.S. wheat supply curve shifts, only targeted importing countries are offered the subsidized exports. In the models, differences in the values of price transmission for individual wheat-importing countries permit targeted countries alone to "see" the lower price offered through EEP.

Literature Shows That Features of Federal Commodity Programs Have an Impact on the True Costs of EEP

The presence of government commodity price and income support programs is demonstrated empirically to make a difference in the true cost of EEP as indicated by the empirical and theoretical literature. We discuss two features of government commodity price and income support programs featured in the literature: mandatory acreage reduction features and price and income support features. Mandatory acreage reduction refers to a requirement that voluntary participants in the federal programs

must, at times, reduce their planted acreage to be eligible for the program's benefits. The price and income support features of the federal commodity programs refer to the government's obligation: to support a given price through the removal of commodity supplies from the market and to provide direct payments to the program's participants in the amount of the difference between a constant target price and the actual market price (or the support price, whichever is higher).

Haley demonstrates that when there are no mandatory acreage reductions in the wheat program, increased deficiency payments somewhat offset the benefit of higher exports and add to the true cost of EEP. These results come from a comparison of two scenarios in which the cost of the EEP bonus to the government for each is $1.4 billion per year. However, mandatory acreage reductions were specified for one scenario and not for the other. With no mandatory acreage reductions, the $1.4 billion expenditure causes exports to increase by 8.3 percent in 1993 and 13.6 percent in 1994. However, deficiency payments rise by $147 million over the 2-year period, somewhat offsetting the advantages of the increased wheat exports. With mandatory acreage reductions, wheat exports are 6.1 percent higher in 1993 and 9 percent higher in 1994. However, net export revenue is somewhat lower than in the baseline, when the government cost of the EEP bonus is $500 million.

Anania, Bohman, and Carter's results are similar in that EEP funding increased wheat exports in 1988 but also increased the cost of deficiency payments by $140.3 million. Budgetary costs of increased deficiency payments were $74.30 higher per additional metric ton exported than they would have been without EEP. If the value of stocks released as in-kind subsidies is included in the calculations, the cost per metric ton of additional wheat exports is $469, or $12.77 per bushel.

Seitzinger and Paarlberg report that total wheat exports rose by 2 to 3 percent from October 1, 1985, through March 31, 1986, because of EEP, but the increase in export revenues shrank to less than 1 percent when adjusted for the government's cost of the bonus commodities. If the costs of additional loan forfeitures were also recognized as a cost of EEP, U.S. export revenues adjusted for the program's costs were found to fall below levels achieved in the absence of EEP.

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Methodology for Modeling Effects of Higher Funding for EEP

This appendix describes the modeling system we used to estimate the effects of an additional $500 million in EEP funds for supporting targeted wheat exports. It also presents the results of our modeling. Given the uncertainty associated with forecasting from modeling systems, the results reflect the direction and a rough estimate of the magnitude of change in selected variables.

Description of Modeling System Used

We used an econometric modeling system developed and maintained by the Food and Agricultural Policy Research Institute (FAPRI). FAPRI has developed models of the trade and market structures of the wheat, feed grain, oilseed, and livestock sectors for major importers, exporters, and consuming countries around the world. Table II.2 details U.S. wheat supply and utilization results under baseline assumptions.[1]

Under the world trade model, the international component has six exporting countries or regions and 15 importing countries or regions. Historically, almost three-quarters of the world's wheat was produced in the Former Soviet Union (FSU), China, India, the United States, Canada, Australia, and the EC. While production has been greatest among these countries, exports have primarily come from the United States, Canada, Australia, the EC, and Argentina. Some producers, such as Canada and Australia, have historically produced wheat for foreign customers, with an average of 75 percent of their production going toward exports. Countries like China and those associated with the FSU, while having high production, must also import wheat in order to meet their needs.

In the U.S. model, wheat supply and demand are specified with particular detail. The supply side incorporates the major government policy parameters of the FACTA and the Omnibus Budget Reconciliation Act of 1990. The level of producers' participation in the wheat commodity program is a major component. The model estimates the decision of producers to participate as a function of expected net returns in and out of the program for both the crop in question and competing crops. The calculation of expected program returns incorporates policy parameters such as target prices, loan rates, set-aside rates, and flex rates. Also estimated are the number of acres that are planted outside of the program. These acres are estimated as a function of expected market returns for wheat and competing crops, as well as acreage enrolled in the wheat program. The domestic demand is specified with equations estimated for each of the domestic demand components as well as the 9-month loan and

[1]All tables appear at the end of this appendix.

free stock categories. Feed demand is estimated as a function of the prices of wheat, corn, and cattle. Also included in the domestic feed demand is the number of cattle and poultry. Wheat has become increasingly important in poultry rations in corn-deficit areas. Per-capita food use is estimated primarily as a function of the wheat price and consumer income. Nine-month loan stocks depend on the wheat price, the loan rate, and the quantity of wheat that is eligible to be placed under loan. Free stocks are estimated as a function of the wheat price, production, production in time t+1, and government-held stocks. Future production is included to capture expectations of future prices.

During analysis, the modeling system was solved by passing price and export information between the U.S. and world trade models. Although the U.S. Gulf of Mexico price—the export price at the Gulf of Mexico ports—is derived from the domestic model, it also functions as the world price in the trade model. Where appropriate, import and export levels of countries in the trade model react to the new world price. Given this price, the world model generates the level of wheat exports for the United States. The U.S. and world models continue to iterate until an equilibrium is achieved.[2]

In order for the models to reach an equilibrium in fewer iterations, the U.S. model contains a reduced-form export equation.[3] This equation is designed to mimic the responses of the world trade model to changes in U.S. prices. The parameters of this equation are determined by first shocking the U.S. wheat price in the world model and observing the reaction of U.S. exports. These reduced-form equations incorporate 3 years of lagged price information, allowing for the long-run response effects to be included. For example, as prices decline this year, countries that allow changes in international prices to be transmitted to their economies will adjust their short-run consumption practices, giving immediate changes in export demand. Also, production will adjust during the next year in exporting and importing countries in response to those same price changes. This will affect the export demand for U.S. wheat in subsequent years.

To evaluate the model's overall performance, a dynamic simulation of the model was run for the period 1970 to 1989 to test the predictions of the model against actual prices for that period. The U.S. wheat farm price was found to exhibit an 8-percent Root Mean Square Error, indicating that the model performs well.

[2]See footnote 3 in appendix I.

[3]A reduced-form equation is one in which a variable whose value is determined within a model is expressed as a function of only those variables whose values are determined outside of the model.

Baseline Assumptions

The FAPRI baseline reflects FAPRI's best estimates of the various economic and policy indicators of the domestic and international wheat market for the next decade. The estimates are subject to extensive review by experts in business, government, and academia.

The FAPRI baseline provides a set of reference outcomes under the conditions that government policies are not changed and that random events such as droughts and floods do not occur. For domestic policies, the baseline incorporates provisions of both FACTA and the Omnibus Budget Reconciliation Act of 1990. Provisions of the two acts are assumed to be extended throughout the projection period (crop year 2001-2). Our estimation of the effects of equivalent increases in funding for target prices and EEP were based on differences from the 1993 FAPRI baseline.

With regard to other countries, several factors are incorporated. For the EC, the reforms of the Common Agricultural Policy (CAP) adopted in the spring of 1992 are incorporated into the baseline. In terms of trade policies, neither the Uruguay Round of the GATT nor the North American Free Trade Agreement (NAFTA) agreements are incorporated into the baseline, since neither of these had been signed into law when the baseline was developed in early 1993.[4] In addition, as with any baseline, a number of areas contain much uncertainty. In this baseline, one such area of uncertainty is the FSU. In 1993, reports of reduced animal inventories have come out of the FSU. Because of depressed economic conditions in the FSU, FAPRI has assumed that the FSU will continue to experience declines in animal inventories and in grain demand. Since the FSU has traditionally been a major importer of U.S. grains as well as one of the leading beneficiaries of EEP subsidies, these assumptions have a significant impact on the outlook for U.S. wheat.

In the FAPRI baseline, the U.S. wheat situation is characterized by weak export demand in the short run and, at the same time, a relatively low level of stocks. The weak demand is due in large part to the situation in the FSU, because wheat exports are expected to decline in 1993-94 and not return to 1992-93 levels until 1997-98. Along with the weakness in export demand, government and commercial stocks of wheat remain fairly low; the government holds a minimum amount of wheat stocks. Under the baseline, U.S. seasonal average farm prices generally stay in the range of $2.90 to

[4]Subsequently, in November 1993, the Congress ratified NAFTA, which went into effect on January 1, 1994. In addition, the Uruguay Round negotiations of GATT were completed on December 15, 1993. The Congress is expected to vote on the agreement during the first half of 1994. The agricultural section pertaining to export subsidies requires that a program like EEP be reduced (from a base period) 21 percent in volume and 36 percent in budget outlays over the 6-year period, 1995-2000.

$3.53 per bushel. At these prices, returns to participants remain $15 to $25 higher per acre than returns to nonparticipants. Consequently, with low set-aside rates, participation remains at approximately 80 percent.

In recent years, budget pressures have brought about reduced government support for U.S. agriculture—such as reduced government-owned stockpiles of grain, frozen target prices, and normal flexible acreage (NFA). Under the 1993 baseline, this reduced level of support is expected to continue. With the exceptions of fiscal years 1993 and 1994, net CCC outlays are between $6 billion and $8 billion per year. These outlays include total annual EEP spending of $950 million, approximately $490 million of which is to be spent on wheat each year.

Application of the FAPRI Modeling System to Our EEP and Target Price Scenarios

The FAPRI modeling system was used to analyze the effects of spending an equivalent amount under two scenarios. Under the EEP scenario, wheat subsides under EEP were increased an average of $500 million per year from 1993-94 through 2001-2. Under the target price scenario, funding was increased for wheat target prices by an average of $321 million annually. The $321 million was the model's forecast of the net cost to the government of providing an additional $500 million in EEP subsidies under the first scenario. The net cost is calculated by subtracting the decrease in deficiency payments for wheat from the government's expenditure on EEP.

Table II.2 presents the model's results for U.S. wheat supply and utilization under the EEP scenario. Table II.3 presents the differences between the baseline results and the results of the EEP scenario. Tables II.4 and II.5 present results of the target price analysis and compare those results with the model's baseline.

The reduced-form export equations underwent some modifications for our analysis. Under the FAPRI baseline, quantities of both EEP and non-EEP wheat exports are determined in the same equation. Additionally, both per-ton and total subsidy levels are also known. For our analysis, the U.S. model was modified to include separate reduced-form equations for EEP and non-EEP exports. The EEP equation reacts to the price net of the subsidy level, while the non-EEP equation responds to the price only. The aggregate reduced-form export equation has a short-term own-price elasticity of –0.55. Again, these reduced-form equations represent the structure and reactions of the FAPRI international wheat model. The two equations will mimic responses to changes in the U.S. wheat price as well as changes in the EEP subsidy levels.

With the export equations aligned to baseline levels of exports, prices, and subsidy levels, the per-unit subsidy level was increased to the level needed to raise EEP spending by $500 million per year. New equilibrium prices and quantities were found and used to determine aggregates such as producer income and government costs. In examining the impact of additional EEP subsidies, we used an elasticity or responsiveness of U.S. exports to changes in the U.S. wheat price of –0.55. This is the elasticity used in the FAPRI baseline, which was again used to produce the $321 million net cost of the additional EEP bonuses. Table II.2 shows the model's results for U.S. wheat supply and utilization under the first EEP scenario.

There has been considerable debate among economists regarding the elasticity, or responsiveness, of U.S. exports to changes in U.S. wheat prices. Some contend that the elasticity is much larger than the –0.55 estimated in the FAPRI baseline. In order to determine the robustness of the results, a scenario was run in which an elasticity of –1.0 was imposed on the reduced-form export equations. In short, the parameters on reduced-form equations were adjusted to reflect the higher elasticity, and the same experiment regarding higher EEP spending was repeated. The results of this scenario are presented in appendix III.

We made some changes to the assumptions incorporated in the FAPRI baseline. First, under the FAPRI baseline, an Acreage Reduction Program (ARP) rate of 5 percent was assumed for wheat for crop years 1994-95 through 2000-1. This assumption was based on the price and stocks-to-use levels and the guidelines laid out in the FACTA and the Omnibus Budget Reconciliation act. Under our EEP scenario, we lowered the ARP rate to zero beginning in 1994-95. We assumed that aggressive use of EEP would require additional wheat production.[5]

Second, under the baseline, Conservation Reserve Program (CRP) contracts are assumed to expire and not be extended. Beginning in 1996, as these contracts expire, the land under CRP will become eligible to be returned to production. Under the baseline, it was assumed that 35 percent of the land in the CRP would return to production in the wheat program and 15 percent to production outside the program. In addition, 20 percent was assumed to be enrolled in the 0/92 program. This left approximately 30 percent to be divided among a number of other uses such as hay, pasture, or trees.

[5]Department of Agriculture officials believe that the price effect of raising the ARP from zero to 5-percent is about 6 cents per bushel. This relationship implies that the market price of wheat would likely be 6 cents higher under a 5-percent ARP and the corresponding deficiency payment per eligible bushel would likely decline about 6 cents.

Under the EEP scenarios, additional EEP spending resulted in higher market prices. Because of the higher prices, the CRP assumptions of the baseline were adjusted to bring more of the land back to production. For the E = –0.55 scenario, 18 percent of the land in the CRP program returns to the 0/92 program and 18 percent returns to production outside of the program. The 0/92- and nonprogram-planted assumptions are 15 percent and 22 percent, respectively, under the E = –1.0 scenario. It should be pointed out that a lower percentage returning into the 0/92 program implies that more acreage is coming back into production under the wheat program.

And third, we made adjustments to the baseline assumptions on imports. Historically, wheat imports have remained relatively small. The baseline holds wheat imports constant at 55 million bushels per year. Under the scenarios, with price and subsidy levels changing, this assumption was relaxed and wheat imports were increased.

The target price scenario was developed by running the model until $321 million was spent on direct payments to producers through a rise in the target price. After a few model runs, an increase in the target price from $4 per bushel to $4.18 per bushel was shown to cost $321 million per year.

Table II.1: U.S. Wheat Supply and Utilization Under the FAPRI Baseline, 1993-94 to 2001-2

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Program									
ARP rate	0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
NFA rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Participation rate	82.1%	83.7%	83.3%	78.9%	77.5%	77.6%	79.4%	78.5%	76.8%
Area (acres in millions)									
Base area	78.7	78.7	78.3	78.6	81.2	83.2	84.4	85.5	85.5
ARP/0-92	5.0	7.6	7.6	7.2	7.7	8.2	8.7	8.9	8.7
CRP idled	10.9	10.9	11.4	10.8	7.2	4.3	2.6	1.1	1.0
NFA	–1.5	–1.8	–1.8	–1.7	–1.8	–1.3	–1.4	–1.3	–1.4
Payment planted	48.4	46.8	46.3	43.9	44.2	45.0	46.6	46.4	45.4
Planted area	72.9	72.0	72.5	74.0	75.3	77.6	77.6	78.4	78.4
Harvested area	63.0	61.9	62.3	63.8	64.9	66.9	66.7	67.5	67.5
Yield (in bushels per acre)									
Actual	38.3	38.7	39.0	39.2	39.3	39.4	39.7	39.9	40.2
Program	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4

(continued)

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Supply (bushels in millions)	2,963	3,041	3,053	3,097	3,170	3,272	3,315	3,356	3,379
Beginning stocks	493	587	569	544	562	581	611	610	614
Production	2,415	2,399	2,429	2,498	2,553	2,636	2,649	2,692	2,710
Imports	55	55	55	55	55	55	55	55	55
Domestic use (bushels in millions)	1,243	1,242	1,227	1,242	1,249	1,272	1,277	1,280	1,281
Feed, residual	314	307	288	296	294	311	310	309	307
Seed	94	95	97	99	102	102	104	104	104
Food, other	835	840	842	847	852	859	864	867	870
Exports (bushels in millions)	1,133	1,231	1,283	1,293	1,341	1,389	1,428	1,462	1,483
EEP exports	474	507	522	522	544	566	577	584	588
EEP as a percentage of total exports	41.9%	41.2%	40.7%	40.4%	40.6%	40.7%	40.4%	40.0%	39.6%
Total use	2,376	2,473	2,510	2,535	2,590	2,661	2,705	2,742	2,765
Ending stocks (bushels in millions)	587	569	544	562	581	611	610	614	614
FOR, special program	0	0	0	0	0	0	0	0	0
CCC inventory	150	150	150	150	150	150	150	150	150
9-month loan	89	69	47	43	47	51	54	50	45
"Free" stocks	349	350	347	369	384	410	406	415	419
Prices and returns									
Farm price/bu.	$2.90	$2.91	$3.26	$3.35	$3.31	$3.15	$3.21	$3.35	$3.53
Loan rate/bu.	2.45	2.33	2.21	2.22	2.29	2.30	2.36	2.37	2.39
Target price/bu.	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
FOB Gulf price/mt.	131.20	131.40	146.70	150.32	148.94	141.71	144.46	150.33	158.15
Variable expenses/a.	57.96	59.72	62.18	64.55	66.66	68.75	70.67	73.00	75.81
Participant returns/a.	91.62	84.22	86.01	85.07	83.31	79.90	79.59	79.39	79.53
Nonparticipant returns/a.	57.23	56.83	68.97	70.40	67.63	59.19	60.71	64.43	69.82

Legend

a. = acre.

bu. = bushel.

FOB = free on board.

FOR = Farmer-Owned Reserve (program).

mt. = metric ton.

Table II.2: EEP First Scenario for U.S. Wheat Supply and Utilization, 1993-94 to 2001-2

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Program									
ARP rate	0%	0%	0%	0%	0%	0%	0%	0%	0%
NFA rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Participation rate	82.1%	84.6%	84.2%	79.4%	77.3%	77.9%	80.0%	79.1%	77.3%
Area (acres in millions)									
Base area	78.7	78.7	78.3	78.6	81.2	83.2	84.4	85.5	85.5
ARP/0-92	5.0	4.3	4.3	4.1	4.5	4.9	5.2	5.4	5.3
CRP idled	10.9	10.9	11.4	10.8	7.2	4.3	2.6	1.1	1.0
NFA	–1.5	–1.5	–1.5	–1.4	–1.4	–1.0	–1.1	–1.0	–1.1
Payment planted	48.4	49.1	48.5	45.8	45.7	46.9	48.8	48.6	47.5
Planted area	72.9	74.1	74.6	76.2	77.9	80.1	80.0	80.9	80.8
Harvested area	63.0	63.9	64.3	65.9	67.4	69.2	69.0	69.7	69.7
Yield (in bushels per acre)									
Actual	38.3	38.5	38.8	38.9	39.1	39.2	39.5	39.7	39.9
Program	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4
Supply (bushels in millions)	2,973	3,097	3,121	3,166	3,250	3,350	3,389	3,427	3,447
Beginning stocks	493	568	562	536	551	575	603	599	600
Production	2,415	2,461	2,494	2,565	2,634	2,710	2,721	2,764	2,783
Imports	65	68	66	65	65	65	65	65	65
Domestic use (bushels in millions)	1,225	1,220	1,200	1,210	1,222	1,249	1,255	1,257	1,258
Feed, residual	296	285	262	266	269	289	289	287	286
Seed	97	98	100	102	105	105	107	107	106
Food, other	832	837	838	842	848	855	860	863	866
Exports (bushels in millions)	1,179	1,316	1,386	1,405	1,453	1,497	1,535	1,570	1,591
EEP exports	530	608	650	671	695	712	719	724	725
EEP as a percentage of total exports	45.0%	46.2%	46.9%	47.8%	47.8%	47.5%	46.8%	46.1%	45.6%
Total use	2,405	2,535	2,586	2,615	2,675	2,746	2,790	2,827	2,849
Ending stocks (bushels in millions)	568	562	536	551	575	603	599	600	598
FOR, special program	0	0	0	0	0	0	0	0	0
CCC inventory	150	150	150	150	150	150	150	150	150
9-month loan	82	66	44	40	45	53	56	51	46

(continued)

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
"Free" stocks	337	346	341	361	380	401	393	399	402
Prices and returns									
Farm price/bu.	$2.98	$2.99	$3.38	$3.51	$3.44	$3.25	$3.30	$3.44	$3.62
Loan rate/bu.	2.45	2.33	2.21	2.25	2.34	2.38	2.44	2.45	2.47
Target price/bu.	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
FOB Gulf price/mt.	134.31	134.92	151.67	157.43	154.55	145.97	148.38	154.49	162.23
Variable expenses/a.	57.96	59.72	62.18	64.55	66.66	68.75	70.67	73.00	75.81
Participant returns/a.	92.27	88.90	90.94	90.38	88.10	84.34	83.96	83.75	83.82
Nonparticipant returns/a.	59.99	59.37	72.74	76.08	71.85	62.29	63.54	67.46	72.77

Legend

a. = acre.

bu. = bushel.

FOR = Farmer-Owned Reserve (program).

mt. = metric ton.

Table II.3: First EEP Scenario—U.S. Wheat Supply and Utilization—Difference From FAPRI Baseline, 1993-94 to 2001-2

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Program									
ARP rate	0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%
NFA rate	0%	0%	0%	0%	0%	0%	0%	0%	0%
Participation rate	0%	1.0%	0.8%	0.5%	-0.2%	0.2%	0.5%	0.6%	0.5%
Area (acres in millions)									
Base area	0	0	0	0	0	0	0	0	0
ARP/0-92	0	-3.3	-3.2	-3.1	-3.2	-3.3	-3.5	-3.5	-3.4
CRP idled	0	0	0	0	0	0	0	0	0
NFA	0	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3
Payment planted	0	2.3	2.1	1.9	1.5	1.9	2.1	2.2	2.1
Planted area	0	2.1	2.2	2.3	2.7	2.5	2.4	2.4	2.4
Harvested area	0	1.9	2.0	2.1	2.5	2.3	2.2	2.2	2.2
Yield (in bushels per acre)									
Actual	0	-0.202	-0.205	-0.213	-0.253	-0.236	-0.229	-0.23	-0.229
Program	0	0	0	0	0	0	0	0	0

(continued)

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Supply (bushels in millions)	10	56	68	69	79	78	74	71	68
Beginning stocks	0	–19	–7	–8	–11	–6	–8	–11	–14
Production	0	62	64	67	80	74	72	72	73
Imports	10	13	11	10	10	10	10	10	10
Domestic use (bushels in millions)	–17.71	–22.08	–26.76	–31.83	–26.84	–22.87	–22.04	–22.69	–23.48
Feed, residual	–17.12	–21.44	–25.2	–30.32	–25.48	–21.75	–21.01	–21.6	–21.21
Seed	2.8367	2.891	3.0003	3.564	3.3282	3.2297	3.2404	3.2299	2.0313
Food, other	–3.425	–3.536	–4.556	–5.077	–4.689	–4.355	–4.274	–4.324	–4.302
Exports (bushels in millions)	46.728	85.324	103.03	111.96	112.33	108.25	107.25	108.1	107.32
EEP exports	56.173	100.46	127.74	149.71	150.96	145.67	142.35	139.66	136.76
EEP as a percent of total exports	3.1%	5.0%	6.2%	7.4%	7.3%	6.8%	6.5%	6.1%	5.9%
Total use	29.018	63.243	76.271	80.122	85.483	85.374	85.204	85.413	83.841
Ending stocks (bushels in millions)	–19.1	–7.307	–8.263	–10.92	–6.12	–7.521	–10.95	–14.34	–15.68
FOR, special program	0	0	0	0	0	0	0	0	0
CCC inventory	0	0	0	0	0	0	0	0	0
9-month loan	–7.073	–3.109	–3.095	–2.721	–1.498	1.2999	2.0357	1.663	1.2735
"Free" stocks	–12.03	–4.197	–5.168	–8.2	–4.622	–8.821	–12.99	–16	–16.96
Prices and returns									
Farm price/bu.	$0.07	$0.08	$0.11	$0.16	$0.13	$0.10	$0.09	$0.10	$0.09
Loan rate/bu.	0	0	0	0.03	0.05	0.08	0.08	0.08	0.08
Target price/bu.	0	0	0	0	0	0	0	0	0
FOB Gulf price/mt.	3.11	3.52	4.96	7.11	5.61	4.25	3.92	4.16	4.08
Variable expenses/a.	0	0	0	0	0	0	0	0	0
Participant returns/a.	0.65	4.68	4.94	5.32	4.79	4.45	4.37	4.36	4.29
Nonparticipant returns/a.	2.76	2.54	3.77	5.68	4.22	3.10	2.83	3.03	2.95

Legend

a. = acre.

bu. = bushel.

FOR = Farmer-Owned Reserve (program).

mt. = metric ton.

Table II.4: Target Price Scenario—U.S. Wheat Supply and Utilization, 1993-94 to 2001-2

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Program									
ARP rate	0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
NFA rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Participation rate	82.1%	85.5%	85.1%	80.9%	79.6%	79.6%	81.2%	80.3%	78.6%
Area (acres in millions)									
Base area	78.7	78.7	78.3	78.6	81.2	83.2	84.4	85.5	85.5
ARP/0-92	5.0	7.8	7.7	7.4	7.9	8.4	8.9	9.0	8.9
CRP idled	10.9	10.9	11.4	10.8	7.2	4.3	2.6	1.1	1.0
NFA	–1.5	–1.8	–1.8	–1.7	–1.8	–1.3	–1.4	–1.4	–1.4
Payment planted	48.4	47.9	47.3	45.1	45.4	46.2	47.7	47.6	46.5
Planted area	72.9	71.9	72.4	73.9	75.2	77.5	77.5	78.4	78.4
Harvested area	63.0	61.9	62.3	63.7	64.9	66.8	66.7	67.4	67.4
Yield (in bushels per acre)									
Actual	38.3	38.7	39.0	39.2	39.3	39.4	39.7	39.9	40.2
Program	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4
Supply (bushels in millions)	2,963	3,040	3,053	3,096	3,169	3,271	3,314	3,356	3,378
Beginning stocks	493	588	569	544	562	582	611	610	615
Production	2,415	2,397	2,429	2,496	2,552	2,634	2,647	2,690	2,708
Imports	55	55	55	55	55	55	55	55	55
Domestic use (bushels in millions)	1,243	1,241	1,226	1,241	1,248	1,272	1,277	1,280	1,282
Feed, residual	314	306	287	296	294	310	309	309	307
Seed	94	95	97	99	102	102	103	104	104
Food, other	835	840	842	847	852	859	864	867	870
Exports (bushels in millions)	1,133	1,229	1,282	1,292	1,339	1,388	1,427	1,461	1,482
Total use	2,375	2,470	2,508	2,533	2,588	2,659	2,704	2,741	2,764
Ending stocks (bushels in millions)	588	569	544	562	582	611	610	615	615
FOR, special program	0	0	0	0	0	0	0	0	0
CCC inventory	150	150	150	150	150	150	150	150	150
9-month loan	89	70	48	44	48	53	55	51	46
"Free" stocks	349	349	346	369	384	409	405	414	419
Prices and returns									
Farm price/bu.	$2.90	$2.91	$3.26	$3.35	$3.32	$3.15	$3.21	$3.35	$3.53

(continued)

Factors measured	Crop years 1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-1	2001-2
Loan rate/bu.	2.45	2.33	2.21	2.22	2.30	2.30	2.36	2.37	2.39
Target price/bu.	4.00	4.18	4.18	4.18	4.18	4.18	4.18	4.18	4.18
FOB Gulf price/mt.	131.21	131.63	146.79	150.41	149.02	141.84	144.55	150.42	158.24
Variable expenses/a.	57.96	59.72	62.18	64.55	66.66	68.75	70.67	73.00	75.81
Participants returns/a.	91.62	89.11	90.86	89.93	88.17	84.77	84.45	84.25	84.39
Nonparticipants returns/a.	57.23	57.05	69.06	70.51	67.72	59.32	60.80	64.53	69.92

Legend

a. = acre.

bu. = bushel.

FOR = Farmer-Owned Reserve (program).

mt. = metric ton.

Table II.5: Target Price Scenario—U.S. Wheat Supply and Utilization—Difference From FAPRI Baseline, 1993-94 to 2001-2

Factors measured	Crop years 1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-1	2001-2
Program									
ARP rate	0%	0%	0%	0%	0%	0%	0%	0%	0%
NFA rate	0%	0%	0%	0%	0%	0%	0%	0%	0%
Participation rate	0%	1.8%	1.7%	2.0%	2.1%	2.0%	1.8%	1.8%	1.8%
Area (acres in millions)									
Base area	0	0	0	0	0	0	0	0	0
ARP/0-92	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
CRP idled	0	0	0	0	0	0	0	0	0
NFA	0	0	0	0	0	0	0	0	0
Payment planted	0	1.0	1.0	1.2	1.2	1.2	1.1	1.1	1.2
Planted area	0	–0.1	0	–0.1	0	–0.1	0	–0.1	0
Harvested area	0	–0.1	0	–0.1	0	0	0	0	0
Yield (in acres per bushel)									
Actual	0	0	0	0	0	0	0	0	0
Program	0	0	0	0	0	0	0	0	0
Supply (bushels in millions)	0	–2	–1	–1	–1	–1	–1	–1	–1

(continued)

	Crop years								
Factors measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Beginning stocks	0	0	0	1	0	1	1	1	1
Production	0	–2	–1	–2	–1	–2	–1	–1	–1
Imports	0	0	0	0	0	0	0	0	0
Domestic use	0	–1	0	0	0	0	0	0	0
Feed, residual	0	0	0	0	0	0	0	0	0
Seed	0	0	0	0	0	0	0	0	0
Food, other	0	0	0	0	0	0	0	0	0
Exports (bushels in millions)	0	–1	–1	–1	–1	–1	–1	–1	–1
Total use	0	–2	–1	–1	–2	–2	–1	–1	–1
Ending stocks (bushels in millions)	0	0	1	0	1	1	1	1	0
FOR, special program	0	0	0	0	0	0	0	0	0
CCC inventory	0	0	0	0	0	0	0	0	0
9-month loan	0	1	1	1	1	1	1	1	1
"Free" stocks	0	–1	0	–1	–1	–1	–1	–1	–1
Prices and returns									
Farm price/bu.	$0	$0.01	$0	$0	$0	$0	$0	$0	$0
Loan rate/bu.	0	0	0	0	0	0	0	0	0
Target price/bu.	0	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
FOB Gulf price/mt.	0	0.23	0.09	0.10	0.08	0.13	0.09	0.09	0.09
Variable expenses/a.	0	0	0	0	0	0	0	0	0
Participant returns/a.	0	4.89	4.86	4.87	4.86	4.87	4.86	4.87	4.87
Nonparticipant returns/a.	0	0.22	0.09	0.11	0.09	0.13	0.09	0.10	0.10

Legend

a. = acre.

bu. = bushel.

FOR = Farmer-Owned Reserve (program).

mt. = metric ton.

Analysis of Second EEP Price-Responsiveness Scenario

While the price-responsiveness assumptions used in the FAPRI model are widely accepted, some experts suggest that export price responsiveness could be higher than assumed in the model.

To address that view, we examined how our modeling results for the EEP scenario would change with a higher price-responsiveness assumption. We assumed that a 10-percent decline in world wheat prices would produce a 10-percent increase in export sales (compared with the 5.5-percent increase originally used). Table III.1 compares the results of this second price-responsiveness scenario (EEP scenario 2) with the EEP scenario price-responsiveness scenario presented in our letter (EEP scenario 1).

Table III.1: Modeling Results for Eight Indicators Under Two EEP Scenarios, 1993-2001

Economic indicators	EEP scenario 1[a]	EEP scenario 2[b]—change from EEP scenario 1	
	Annual average	Annual average	Percent
Farmers' net income from wheat production (dollars in billions)	$6.800	+$0.07	+1.0
Domestic wheat price (bu.)	$3.32	+$0.05	+1.5
Domestic use (bu. in millions)	1,233	–3	–0.2
Export sales (dollars in billions)	$5.834	+$0.213	+3.7
EEP subsidy (bu.)	$ 1.44	–$0.15	–10.4
Total wheat use[c] (bu. in millions)	2,670	+27	+1.0
Ending wheat stocks (bu. in millions)	577	0	0
U.S. market share	41.0%	[d]	

Legend: bu. = bushel(s).

Note: We did not compare EEP scenario 2 with the model's baseline because EEP scenario 2 incorporates the change in two variables—level of funding and price responsiveness—and it is not possible to isolate the changes in the results due to either variable alone.

[a]The price responsiveness for export wheat demand is –0.55.

[b]The price responsiveness for export wheat demand is –1.00.

[c]Wheat use is the sum of domestic use plus export use of U.S. wheat. Domestic use consists of food, feed, and seed use.

[d]The FAPRI world model is unable to calculate market share for any elasticity but that assumed in the model's baseline.

As table III.2 indicates, farmers' income from wheat production would result in a greater increase in a more price-responsive market and exports would rise even further. This increase occurs because the volume of

exports increases more under EEP scenario 2 with a given total subsidy level than under scenario 1.

In addition, under EEP scenario 2, as price declines and the quantity demanded increases, the per-bushel EEP subsidy declines by about 10 percent. As shown in table III.1, this decline is sufficient to generate export sales that are about 3.7 percent higher than under EEP scenario 1. Moreover, the domestic wheat price and total wheat use increase.

Finally, the cost to the government for EEP wheat subsidies would decrease from $321 million expected at the 10-percent/5.5-percent price-responsiveness scenario to $86 million at the 10-percent/10- percent price-responsiveness scenario.[1] This decrease occurs because, first, as discussed earlier, wheat exports would be proportionately higher when the price is lowered. Second, when more wheat is exported, there is less available in the domestic market, which raises domestic market prices. These higher wheat prices, in turn, lower government costs under the wheat commodity program, thereby offsetting a higher proportion of the increased EEP expenditures.

Table III.2: Second EEP Scenario—U.S. Wheat Supply and Utilization, 1993-94 to 2001-2

	Crop years								
Factors Measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Program									
ARP rate	0%	0%	0%	0%	0%	0%	0%	0%	0%
NFA rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Participation rate	82.1%	83.1%	82.5%	77.8%	75.9%	76.5%	78.7%	77.8%	76.0%
Area (acres in millions)									
Base area	78.7	78.7	78.3	78.6	81.2	83.2	84.4	85.5	85.5
ARP/0-92	5.0	4.1	4.1	3.9	4.2	4.5	4.8	5.0	4.9
CRP idled	10.9	10.9	11.4	10.8	7.2	4.3	2.6	1.1	1.0
NFA	–1.5	–1.2	–1.3	–1.1	–1.2	–0.7	–0.9	–0.8	–0.9
Payment planted	48.4	48.5	47.9	45.3	45.3	46.6	48.6	48.5	47.3
Planted area	72.9	74.8	75.6	77.2	79.2	81.3	81.3	82.2	82.2
Harvested area	63.0	64.5	65.2	66.8	68.5	70.3	70.1	70.9	70.9
Yield (in bushels per acre)									
Actual	38.3	38.5	38.7	38.9	39.0	39.0	39.3	39.5	39.8

(continued)

[1]If we could evaluate a target price scenario relative to the second EEP scenario, there would be $86 million available for raising target prices. This is in contrast to the target price scenario under the baseline elasticity assumption in which $321 million was available for raising target prices.

	Crop years								
Factors Measured	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-2000**	**2000-1**	**2001-2**
Program	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4
Supply (bushels in millions)	2,971	3,110	3,148	3,195	3,284	3,385	3,425	3,463	3,481
Beginning stocks	493	563	561	539	554	577	604	598	598
Production	2,415	2,482	2,524	2,594	2,669	2,747	2,759	2,804	2,822
Imports	63	65	63	62	62	62	62	62	62
Domestic use (bushels in millions)	1,219	1,213	1,196	1,208	1,220	1,247	1,253	1,255	1,255
Feed, residual	290	278	258	263	266	285	285	284	283
Seed	98	99	101	104	107	107	109	109	107
Food, other	831	836	837	841	847	855	859	863	866
Exports (bushels in millions)	1,189	1,336	1,413	1,433	1,487	1,534	1,574	1,611	1,631
EEP exports	564	667	727	763	787	802	807	809	808
EEP as a percentage of total exports	47.4%	49.9%	51.4%	53.2%	53.0%	52.3%	51.3%	50.3%	49.5%
Total use	2,408	2,549	2,609	2,642	2,707	2,781	2,827	2,866	2,886
Ending stocks (bushels in millions)	563	561	539	554	577	604	598	598	595
FOR, special program	0	0	0	0	0	0	0	0	0
CCC inventory	150	150	150	150	150	150	150	150	150
9-month loan	80	63	43	41	46	54	57	53	47
"Free" stocks	334	348	346	363	381	400	391	395	398
Prices and returns									
Farm price/bu.	$3.04	$3.07	$3.43	$3.55	$3.48	$3.28	$3.34	$3.48	$3.65
Loan rate/bu.	2.45	2.33	2.21	2.28	2.37	2.42	2.47	2.48	2.49
Target price/bu.	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
FOB Gulf price/mt.	137.19	138.39	154.00	159.02	155.92	147.47	149.85	155.89	163.54
Variable expenses/a.	57.96	59.72	62.18	64.55	66.66	68.75	70.67	73.00	75.81
Participants returns/a.	92.88	89.45	91.13	90.41	88.01	84.29	83.88	83.63	83.67
Nonparticipants returns/a.	62.54	62.26	74.51	77.18	72.69	63.25	64.45	68.29	73.50

Legend:

a. = acre.

bu. = bushel.

FOB = free on board.

mt. = metric ton.

EEP Wheat Bonuses and Country Destinations, 1985 Through March 17, 1994

Country	1985	1986	1987	1988
Soviet Union/FSU	$0	$0	$166,095,381	$281,798,920
China	0	0	63,506,409	177,569,861
Egypt	10,920,275	23,881,846	52,566,539	51,612,030
Algeria	0	34,025,157	60,716,371	61,251,808
Morocco	0	22,938,732	68,106,688	41,047,134
The Phillippines	0	3,325,456	6,438,199	17,340,133
Poland	0	0	37,375,910	41,859,812
Tunisia	0	12,878,354	1,844,619	17,410,984
India	0	0	0	42,559,046
Sub-Saharan Africa	0	0	0	0
The Republic of Yemen	0	1,048,898	3,242,874	4,021,371
Sri Lanka	0	1,779,580	5,725,662	6,279,782
Jordan	0	4,016,732	8,558,924	758,417
Iraq	0	0	17,230,295	21,201,530
Pakistan	0	0	0	0
Bangladesh	0	0	8,825,420	3,638,882
Mexico	0	0	0	25,713,777
Colombia	0	0	0	8,630,019
Turkey	0	13,259,845	9,932,702	0
West & Central African countries	0	0	4,310,502	6,307,165
Brazil	0	0	1,601,490	0
Yugoslavia	0	7,278,721	17,486,052	0
South Africa	0	0	0	0
Venezuela	0	0	0	0
Zaire	0	2,042,126	3,025,190	1,802,251
Trinidad and Tobago	0	0	0	0
Norway	0	0	0	0
Romania	0	0	0	0
Bulgaria	0	0	0	5,652,590
Senegal	0	0	4,648,294	0
Lebanon	0	0	0	0
Finland	0	0	0	2,713,151
Slovenia	0	0	0	0
East European Countries	0	0	0	0
Malta	0	0	0	0
Kuwait	0	0	0	0
Cyprus	0	0	0	0
Benin	0	446,089	363,963	0

1989	1990	1991	1992	1993	1994	Total
$96,706,751	$75,822,425	$143,206,785	$349,596,280	$114,251,636	$32,918,316	**$1,260,396,493**
109,974,489	49,124,924	244,410,712	90,538,934	119,194,832	53,472,250	**907,792,411**
25,079,721	18,891,877	82,696,974	180,091,945	78,751,866	84,148,095	**608,641,168**
17,462,821	35,663,944	91,738,704	47,184,072	39,470,961	53,871,930	**441,385,768**
9,698,911	5,934,169	18,542,543	17,732,285	77,930,238	19,971,328	**281,902,027**
4,310,306	6,452,021	54,990,972	33,027,670	39,672,735	49,748,560	**215,306,052**
142,602	0	0	3,477,000	10,676,915	0	**93,532,239**
0	7,686,821	15,217,040	6,235,520	19,464,340	12,435,0097	**93,172,777**
0	0	0	0	32,868,976	0	**75,428,022**
0	0	14,970,195	7,159,366	84,154,317	44,422,522	**150,706,399**
372,966	3,392,608	21,228,141	4,410,490	33,128,637	7,283,338	**78,129,322**
3,090,840	6,832,691	6,787,722	15,331,320	12,141,940	13,913,000	**71,882,536**
2,237,979	7,378,819	18,635,183	1,284,048	14,520,603	13,872,882	**71,263,587**
4,848,574	7,017,470	0	0	0	0	**50,297,870**
0	0	0	22,002,266	21,673,180	21,176,250	**64,851,696**
5,471,262	0	1,422,900	13,892,344	4,715,250	3,581,200	**41,547,259**
4,367,740	2,216,718	0	0	4,261,032	14,970,215	**51,529,482**
2,049,879	2,242,558	15,689,692	0	0	0	**28,612,148**
522,703	1,284,068	0	0	3,784,178	4,094,418	**32,877,914**
1,271,628	10,472,331	5,023,776	0	0	0	**27,385,402**
0	0	20,135,852	873,250	3,667,607	0	**26,278,199**
119,070	314,437	0	0	0	0	**25,198,280**
0	0	0	0	19,999,277	3,677,400	**23,676,677**
0	0	0	8,949,044	3,187,751	0	**12,136,795**
737,899	1,123,901	2,198,564	0	0	0	**10,929,931**
0	0	4,520,394	3,520,890	2,212,550	2,957,355	**13,211,188**
0	0	2,481,088	2,596,867	7,031,758	1,075,390	**13,185,102**
0	0	0	0	7,745,086	0	**7,745,086**
0	0	0	0	0	0	**5,652,590**
0	0	0	0	0	0	**4,648,294**
0	0	0	0	8,505,799	5,687,105	**14,192,904**
321,724	30,130	937,679	0	279,100	526,350	**4,808,134**
0	0	0	0	4,482,486	1,750,344	**6,232,830**
0	0	0	2,969,650	579,600	0	**3,549,250**
0	0	1,794,898	348,600	1,346,440	336,240	**3,826,178**
0	0	1,072,372	917,000	1,295,405	0	**3,284,777**
0	0	0	1,066,360	2,529,424	2,138,271	**5,734,055**
0	0	0	0	0	0	**810,053**

(continued)

Country	1985	1986	1987	1988
The Canary Islands	0	0	0	365,805
Bahrain and Kuwait	0	0	0	0
Nicaragua	0	0	0	0
Honduras	0	0	0	0
Wheat EEP total	**10,920,275**	**126,921,536**	**541,601,483**	**819,534,468**
EEP total	**22,476,943**	**256,250,081**	**927,758,652**	**1,013,655,284**
Percentage of EEP for wheat	**48.6**	**49.5**	**58.4**	**80.8**

1989	1990	1991	1992	1993	1994	Total
141,102	0	0	0	0	0	**506,907**
0	0	0	0	1,301,850	1,929,570	**3,231,420**
0	0	0	0	0	1,634,979	**1,634,979**
0	0	0	0	0	1,295,951	**1,295,951**
288,928,967	**241,881,914**	**767,702,185**	**813,205,199**	**774,825,767**	**452,888,356**	**4,838,410,152**
338,765,018	**311,750,732**	**916,599,231**	**968,198,566**	**967,277,923**	**597,678,912**	**6,320,411,342**
85.3	**77.6**	**83.8**	**84.0**	**80.1**	**75.8**	**76.6**

Note: Years are in fiscal years.

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