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U.S. Export Subsidies in Wheat: Strategic Trade Policy or An Expensive Beggar-My-Neighbor tactic?

by

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U.S. EXPORT SUBSIDIES IN WHEAT: STRATEGIC TRADE POLICY OR AN EXPENSIVE BEGGAR-MY-NEIGHBOR TACTIC?

Abstract

This paper examines the domestic and international impacts of the United States' Export Enhancement Program (EEP) in the wheat market. EEP uses targeted in-kind subsidies to expand U.S. exports and was specifically designed to compete with subsidized exports from the European Community (EC). Theoretically, we argue that the EEP program cannot be a welfare improving trade policy for the U.S., even when considering strategic trade theory. We then model EEP as an in-kind, constrained targeted export subsidy and determine its price, quantity and budgetary effects. Our empirical results show that no exporting country gains from EEP and that the intended loser, the EC, is only slightly harmed. We find only a small increase in U.S. wheat exports due to the export subsidies. EEP is an expensive program - based on our estimates, the cost of additional wheat exports under EEP reached $469 per metric ton in 1988.

U.S. EXPORT SUBSIDIES IN WHEAT: STRATEGIC TRADE POLICY OR AN EXPENSIVE BEGGAR-MY-NEIGHBOR TACTIC?

The Uruguay Round of GATT negotiations has focused unprecedented attention on agricultural trade. Export subsidies, particularly those used by the U.S. and the European Community (EC) in wheat have been at the center of discussions. Are the U.S. subsidies part of a strategic trade plan or an expensive beggar-my-neighbor tactic?

The U.S. Export Enhancement Program (EEP) is an export subsidy program meant to increase U.S. agricultural exports. It was established as part of the 1985 Farm Bill in order to meet subsidized competition from the EC in certain targeted markets, and has been continued under the 1990 Farm Bill[1]. The EEP has played an important role in U.S. wheat exports. For example, in 1987, over 70% of all U.S. wheat exports were EEP sales. Since the program began in 1985 the U.S. has spent 3 billion dollars in EEP subsidy payments. The EEP lowered the international wheat price with the intent of increasing market share in targeted destinations (Oleson). The EEP has been a highly visible and controversial part of U.S. farm policy. While EEP still receives strong support from the USDA and some farm groups, the Office of Management and Budget and some grain companies have questioned the effectiveness of the EEP (Cloud).

This paper evaluates EEP using both the program's stated goals and the theoretical literature on export subsidies. The literature is reviewed to identify cases under which export

[1] The 1990 Farm Bill authorized EEP expenditures of $500 million per year for the five years (1991-95) covered by the legislation. In addition, the 1990 bill provides for $1 Billion in enhanced EEP expenditures if the General Agreement on Tariffs and Trade (GATT) fails and or if there is no GATT agreement by 1992.

subsidies can be welfare increasing. We find that EEP failed to meet both its stated criteria and any theoretical conditions under which export subsidies could be welfare increasing. The model results show that U.S. producers are unaffected by EEP because they receive a support price that lies above the market clearing price both with and without EEP. U.S. consumers and agribusiness gained because EEP lowered the domestic price. The domestic market price falls because the release of wheat from government stocks exceeds any boost in exports attributable to EEP. Although this was not expected to be the case, U.S. taxpayers lose because the government expenditure for deficiency payments increases. The EC is not unduly harmed as a result of EEP. Foreign importers gain (especially the Soviet Union and China) and other foreign exporters lose (Australia, Canada, and Argentina).

The paper proceeds as follows. First, the EEP program is discussed and the stated objectives are presented. Second, the literature on export subsidies is reviewed to assess if the conditions under which export subsidies may be welfare improving apply to EEP and the wheat market. A conceptual model is developed to analyze the combined effects of in-kind and volume constrained targeted export subsidies. Then, an empirical spatial equilibrium model is used to measure the effects of EEP in 1988. Finally, the results of the model and implications for EEP are discussed.

EEP Operations and Objectives

EEP subsidies differ from cash export subsidies in that they are in-kind subsidies and targeted to specific countries. Sales under the EEP program are initiated by U.S. Government announcements that specify for each specific targeted market the maximum quantity of the

commodity which may be exported under the initiative. EEP subsidies are paid in generic certificates which may be exchanged for an equivalent value of commodities from Government stocks. Since the EEP was introduced, the government has given away $3.1 billion[2] worth of stocks and approximately forty percent of U.S. wheat exports have been subsidized through this mechanism. Further descriptions of the program can be found in Ackerman and Smith, Glauber, Seitzinger and Paarlberg(1989a), and in GAO (1987, 1990).

The expressed goal of EEP was to "help make U.S. commodities more competitive by offsetting subsidies or other unfair trade practices" (Ackerman and Smith, p.5) in targeted markets. The original criteria of the program were a) budget neutrality, b) cost effectiveness, c) additionality, and d) targeting. Budget neutrality and cost effectiveness were criteria designed to ensure that EEP sales should not increase budget outlays and that EEP should result in a net gain to the U.S.. Additionality required that EEP sales were not to displace commercial exports and targeting required that the program be targeted to countries were the EC was subsidizing heavily. Our theoretical and empirical model is used to evaluate these stated criteria.

Theoretical support for export subsidies

Recent developments in trade theory suggest that export subsidies can be part of a first best trade policy. Models where subsidies are optimal assume either failure to exploit the optimal tariff or imperfectly competitive markets (i.e. strategic trade theory). In this section, the hypotheses and the theoretical arguments are presented and the relevancy to EEP subsidies is discussed.

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[2] As of January 15, 1991.

Arguments in support of global export subsidies using the perfectly competitive model of international trade literature arise from failure of an exporting country to exploit market power in another good. Relevant work includes Feenstra; and Itoh and Kiyono. Itoh and Kiyono use a three good model to show that subsidies on marginal goods (defined as goods not exported at all or exported in small quantities under free trade) can increase welfare in the subsidizing country. A subsidy on marginal goods causes their production to increase and the supply of non-marginal goods to decrease, thereby raising the price of the non-marginal goods and increasing the exporter's terms of trade.

Feenstra also employs a three good model and demonstrates that it is possible for the pattern of substitutability and complementarity across goods to allow for subsidies to increase welfare. The necessary condition is that the subsidized export is a stronger substitute of another good, or stronger complement of an import good, in the subsidizing country than abroad. The "distortion" in Feenstra's model is the failure to exploit market power in the second or third market.

The U.S. has a large market share in the international wheat market. This is also true for many other agricultural commodities. EEP subsidies lead to terms of trade losses in wheat as well as other grains where the U.S. is also a large exporter. Given the importance of wheat to U.S. agriculture, it is unlikely that welfare losses in wheat could be outweighed by terms of trade gains in other commodities whose exports contract. Therefore, the arguments by Feenstra and Itoh and Kiyono do not apply to EEP subsidies.

As an alternative to global export subsidies, Abbott, Paarlberg and Sharples (APS) have examined targeted export subsidies and found they can be welfare improving. Dutton later

showed the APS result arises because they first constrain the export tax to the rest of the world to be zero and then it becomes theoretically possible for the best export tax to the targeted country to be negative. APS use a spatial equilibrium model to calculate optimal U.S. subsidies for the wheat market and find that both the subsidies and welfare gains are extremely small.

The APS and Dutton result hinges on differences in import demand elasticities and the existence of market power by the exporting country. The exporting country must be able to separate markets and effectively sell at different prices in different markets. In contrast, we argue below that the U.S. has not been able to separate markets and therefore has been unable to limit EEP to a program which is potentially welfare improving.

Bohman, Carter, and Dorfman analyze the theoretical terms of trade and welfare effects of targeted export subsidies on other exporters and importers in a three country model. They find that in general, the qualitative effects of a targeted export subsidy differ little from those of a global export subsidy. A targeted export subsidy program is likely to be a sub-optimal trade policy.

The new trade theory[3] shows that export subsidies can be first best policies in models with imperfectly competitive markets. The subsidies allow the home country's firm to capture oligopolistic profits at the expense of foreign competitors. The subsidy results in a welfare gain because the cost of the subsidy is less than the mark-up of price over marginal cost for additional exports. Increasing returns to scale (often associated with high fixed costs) are associated with these types of industries. In addition, reduced production by competing exporters increases the likelihood that subsidies are welfare improving. American agriculture, and the U.S. wheat

[3]Krugman surveys the literature on the new trade theory.

industry in particular, do not fit this model based on production technologies. There is not only a lack of excess profit in U.S. wheat production, but in fact it's an industry that requires domestic subsidies that should be included in any welfare analysis of increased exports.

In a recent application of the new trade theory to agriculture, Thursby and Thursby examined the relevance of strategic trade theory for U.S. and Canadian wheat exports to Japan. They find the market is non-competitive but this should not be taken to imply that there is a potential role for subsidies to shift profits. They did not consider the role of export subsidies because Japan is currently ineligible for export subsidies from the U.S..

A final theoretical argument for export subsidies is that they could be part of a dynamic multi-period game with the intent of reducing other exporter subsidies (i.e. EC export subsidies). EEP's ability to achieve this goal depends on the costs it imposes on the EC. Our empirical model below calculates the "threat" to the EC caused by EEP.

The theoretical literature therefore generates the following hypotheses which are relevant to our analysis of EEP.

(1) Terms of trade effect. Changes in the world price determine the welfare impact on other exporters and importers. This will be analyzed in both our conceptual and empirical model. The terms-of-trade effects on other goods are not explicitly considered.

(2) U.S. market power. The ability of the U.S. to separate markets is necessary for targeted subsidies to be welfare improving. Also, imperfect competition provides a possible argument for export subsidies. The qualitative analysis of the evolution of EEP will address the question of U.S. market power.

(3) Strategic value vis a vis EC. Can EEP convince the EC to abandon its export restitution

payments? The ability of EEP to "punish" the EC by reducing its exports or increasing the cost of its export restitution payments is analyzed with the empirical model by simulating the additional budgetary cost to both the U.S. and the EC.

U.S. Wheat Exports, EEP and Overseas Sales to China and the USSR

Targeted export subsidies are potentially welfare improving (as a second-best policy) if the subsidizing country has the ability to separate markets. This section examines U.S. market power in the wheat market with a historical qualitative analysis. The evolution of EEP over time shows that U.S. did not have sufficient market power to isolate EEP markets. Consequently, the U.S. sold wheat under EEP that could have been sold commercially and it also suffered a terms-of-trade loss on its commercial sales to non-targeted markets.

The U.S. attributed part of the decline in wheat exports in the mid-1980s to EC export subsidies. U.S. wheat exports fell from 48 million tonnes (mmt) in fiscal 1981-82 to 25 mmt in 1985-86. In order to regain this so-called "lost" market share, the 1985 Food Security Act simultaneously lowered loan rates and introduced the EEP.

The growth of the EEP wheat program is documented in Table 1. The number of targeted countries has increased rapidly since the program began in 1985. Simultaneously, the volume of EEP wheat sales increased from 1.75 mmt in 1985 to 22.5 mmt in 1987. The weighted average bonuses reached a peak in 1987 when they were approximately 28 percent of export unit value plus the bonus. The dollar value of the bonuses declined in 1988 and 1989, but then increased again in 1990.

The program was initially targeted towards countries where the U. S. competes directly with

Table 1. Export Enhancement Program Wheat Sales (1985-1990)

Year	Number of countries importing wheat under EEP	Volume of EEP sales (mmt)	Percent of U.S. exports	Percent of EEP sales to USSR and China	Wghtd Avg. Bonus ($/mt)	Bonus as % of (Export Unit Value + Bonus)
1985	4	1.75	7	0	$30	17
1986	12	5.48	22	0	$31	20
1987	21	22.50	73	56	$38	28
1988	20	21.78	54	50	$24	17
1989	20	14.88	41	57	$16	9
1990*	19	12.38	48	53	$22	14

* 1990 data up to 11/30/90. Other years are full calendar year.

Source: USDA, ERS. FATUS, various issues for export data. Calendar year EEP sales and bonuses calculated from USDA, ERS database of
USDA, FAS press releases.

the EC. The countries which received targeted subsidies in 1986 were Algeria, Egypt, Jordan, Morocco, North Yemen, Philippines, Senegal, Sri Lanka, Tunisia, Turkey, Yugoslavia, and Zaire. In North Africa, EEP has increased U.S. market share mainly at the expense of the EC. However, the program has also harmed other exporters.

When the EEP was proposed, U.S. policy makers claimed that other exporters would not be harmed by EEP. Such insulation was to have been provided by subsidizing exports to only those markets where the EC gained large market shares in the early 1980s. However, market separation does not exist in practice. In markets where multiple exporters are active, it is not possible to gain market share only at the expense of the EC unless the U.S. subsidizes other competitors' exports as well as its own. Even if markets existed where the U.S. and EC were the only competitors, the U.S. gaining market share in these markets means increasing EC competition in third markets at the expense of other competitors. Our empirical model quantifies these trade diversion effects of EEP.

Soviet and Chinese Markets

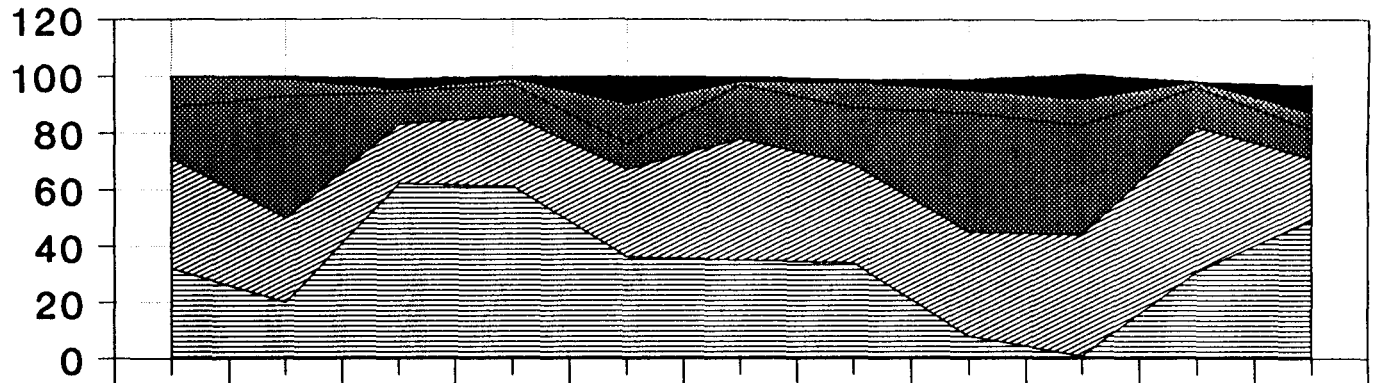
Developments in the Soviet and Chinese wheat markets during the EEP program provides further evidence that the U.S. was unable to separate markets and implement an effective targeted subsidy program. Both countries were initially excluded from the EEP. The Soviets and Chinese claimed that ineligibility from EEP subsidies was discrimination against them and they refused to purchase wheat from the U.S. and in 1986 their imports from the U.S. approached zero. The Chinese showed no interest in renewing their long term agreement (LTA) with the U.S. and at the same time, the Soviets reneged on their LTA with the U.S.. Then, in 1987 the U.S. backed

down and made the Soviet Union and China eligible for U.S. export subsidies and these two countries soon became large importers of U.S. wheat once again. As shown in Table 1, the U.S.S.R. and China have accounted for anywhere between 50 to 57 percent of total EEP wheat exports since 1987. Virtually every ton exported from the U.S. to these two countries has been subsidized since then. In addition, more money was spent on the EEP after the Soviets and Chinese became eligible than before.

Further examination of each of these markets puts these events in the proper context of other exporters etc. The U.S. first began exporting wheat to China in crop year 1972/73. Prior to this, Canada was the primary supplier. In the recent past the largest suppliers have been Canada, Australia and the U.S.. Figure 1 summarizes market share data in China from 1978/79 to 1988/89. Of the top three exporters into this market, Canada has the largest and most stable market share. Traditionally, China imports hard red spring wheat (CWRS) from Canada; soft red winter (SRW) from the United States; and white wheat from Australia. Originally the EEP was not offered to China and partially for this reason the Chinese refused to renew their Long Term Agreement (LTA) with the U.S.. China's wheat imports from the U.S. fell to zero (see Figure 1) and this "coerced" the U.S. government into offering EEP sales to the Chinese.

EEP shipments to China demonstrate clearly that the program was no longer limited to "fighting" the EC. The EC was not an important supplier of wheat to China. EEP shipments to China contributed to a rise in the U.S. market share in 1987/88 to 31 percent from near zero. This increase came largely at the expense of Australia whose market share fell from 39 to 14 percent. From a quality standpoint Australian and U.S. wheats are closer substitutes than are Canadian and U.S. wheats (Wilson et. al.).

Figure 1. Market Shares in China's Wheat Imports (July/June Fiscal Year)



	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	0	1	4	1	10	2	1	4	9	0	10
Argentina	11	6	1	2	14	1	9	8	9	2	6
Australia	18	43	11	11	9	19	20	42	39	14	10
Canada	39	30	21	25	31	43	35	37	43	51	22
US	32	20	62	61	36	35	34	8	1	31	49

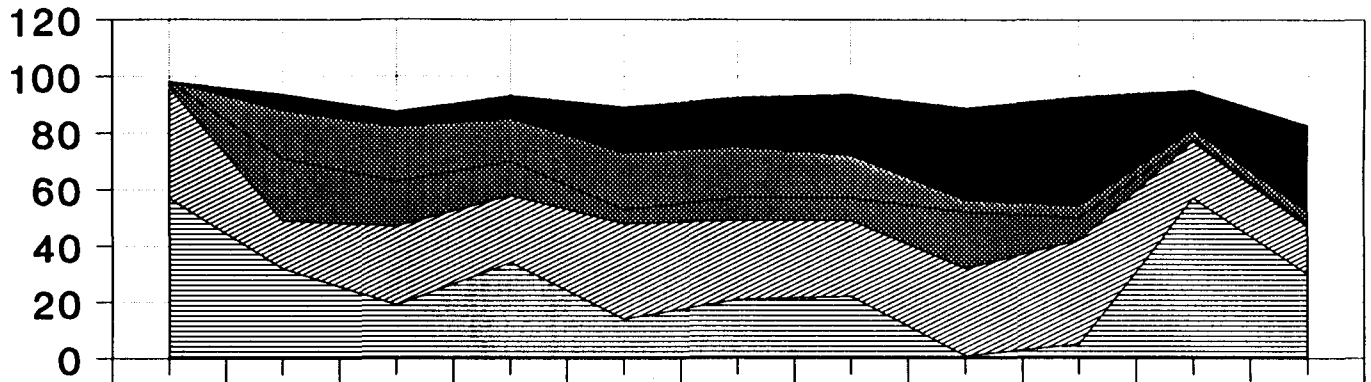
Source: USDA/ERS/CPE (unpublished data)
Years listed are the first year of the marketing year.

From the U.S. perspective, the Soviet market exhibits many similar characteristics to that of China (see Figure 2). The United States was not a major supplier to the Soviets until the early 1970s and the U.S. market share has always been very unstable. In the late 1970s the United States enjoyed a high market share in the USSR, largely because the Soviets believed the United States was the only exporter capable of consistently exporting large volumes of grain year after year. This bilateral relationship fell apart when the United States imposed the 1980 grain embargo. After the embargo was lifted the Soviets changed their buying strategy and "punished" the United States by purchasing small amounts of U.S. wheat. Other suppliers were actively sought by the Soviet Union, and, in particular, the European Community started exporting wheat to the U.S.S.R.. The EC market share went from zero before the embargo to a high of about 39 percent in 1986/87. As stated earlier, the Soviets refused to purchase any wheat without subsidies. The United States regained pre-embargo market share in the USSR by including it among the countries targeted by EEP. In the 1988/89 and 1989/90 fiscal year almost all U.S. wheat sales to the Soviet Union were EEP sales. According to USDA data EEP subsidies on Soviet wheat purchases averaged about $20 per mt in 1989/90, compared to $21 in 1988/89, $32 in 1987/88 and $42 in 1986/87. As shown in Figure 2 the EEP sales have displaced all three other large exporters and not just the EC.

The inability to separate markets targeted by EEP results from the United States' lack of market power in the wheat market.[4] The United States is unable to act as a price discriminating monopolist. The large size of the Soviet and Chinese markets relative to the small North African

[4] The only evidence of long term price discrimination in the wheat market by the U.S. is concessional sales to developing countries (Skully). These markets would probably not exist without large subsidies.

Figure 2. Market Shares in USSR's Wheat Imports (July/June Fiscal Yr)



	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	0	5.8	5.6	8.4	16.3	17.6	21.7	33.1	38.8	14.4	31
Argentina	0	17	19	15	20	18	15	4	4	3	4
Australia	2	22	16	12	5	8	8	20	8	1	1
Canada	39	17	28	24	34	28	27	31	37	20	17
US	57	32	19	34	14	21	22	1	5	57	30

US Canada Australia Argentina EC

Source: USDA/ERS/CPE (unpublished data)
Years listed are the first year of the marketing year.

markets means that attempting to target subsidies to small markets is a costly strategy. The U.S. has ended up sacrificing commercial non-subsidized sales in the larger markets in an (unsuccessful) attempt to punish the EC in the smaller markets.

Modeling Targeted Export Subsidies In-Kind

The theoretical model developed in this section incorporates the targeted, in-kind and constrained nature of EEP subsidies and incorporates key elements of U.S. grain policy. Modeling EEP as in-kind rather than cash, or as volume constrained rather than unconstrained, strongly affects the direction and magnitude of price changes. The model shows the price, quantity, and budgetary effects of EEP.

To introduce our model we first consider the effects of a general in-kind export subsidy. We assume that a fixed percentage of the subsidy certificates is redeemed for the same commodity (e.g. wheat) being modeled (rather than being redeemed for another commodity such as corn) and that the volume of subsidized exports is constrained[5].

Houck investigated the theoretical implications of in-kind subsidies. In his model the in-kind subsidies cannot be sold on the domestic market. The same approach in a non-spatial equilibrium modeling framework is taken by Brooks, Devadoss and Meyers who assume that EEP subsidies are matched by all competitors. A non-spatial equilibrium model is used by Bailey and

[5] EEP sales are initiated by U.S. government announcements which specify the maximum quantity of exports to a particular targeted market.

Houck as well. Spatial equilibrium models assuming EEP can be modeled as a cash subsidy have been used by Haley; Kahn and Meilke; and Seitzinger and Paarlberg (1989b, 1990). Seitzinger and Paarlberg (1989b, 1990) include in their model a stock release variable designed to capture the in-kind effect of EEP subsidies. Other studies of EEP [Bailey and Houck; Brooks, Devadoss and Meyers; Haley; Seitzinger and Paarlberg (1989b, 1990); and Kahn and Meilke] all assume the volume of subsidized exports to be unconstrained. Volume unconstrained cash subsidies cause the domestic price to rise. However, this may not be the case with volume unconstrained in-kind subsidies [Brooks, Devadoss and Meyers; Australian Bureau of Agricultural Economics]. This is an important difference given that about one-third of U.S. wheat sales are domestic. Chambers and Paarlberg argue that in a general equilibrium framework an in-kind export subsidy unequivocally lowers domestic prices. If, as in this paper, EEP is modeled in a partial equilibrium framework as a volume constrained, targeted and in-kind export subsidy, domestic prices decline.

The case of a general volume constrained in-kind subsidy is shown in Figure 3, where country A is the subsidizing country, and all the other countries (both importing and exporting) are aggregated with the rest of the world. The results for a general subsidy are not qualitatively different from those for a targeted subsidy. Without a subsidy the initial equilibrium price is P, with quantity X being traded. The export subsidy has two main effects: (a) a stock release effect and (b) a subsidy effect. The size of the stock release effect is directly related to the proportion of in-kind certificates redeemed for the same commodity. If some of the in-kind subsidy certificates are redeemed for the same commodity, the domestic supply in country A rotates

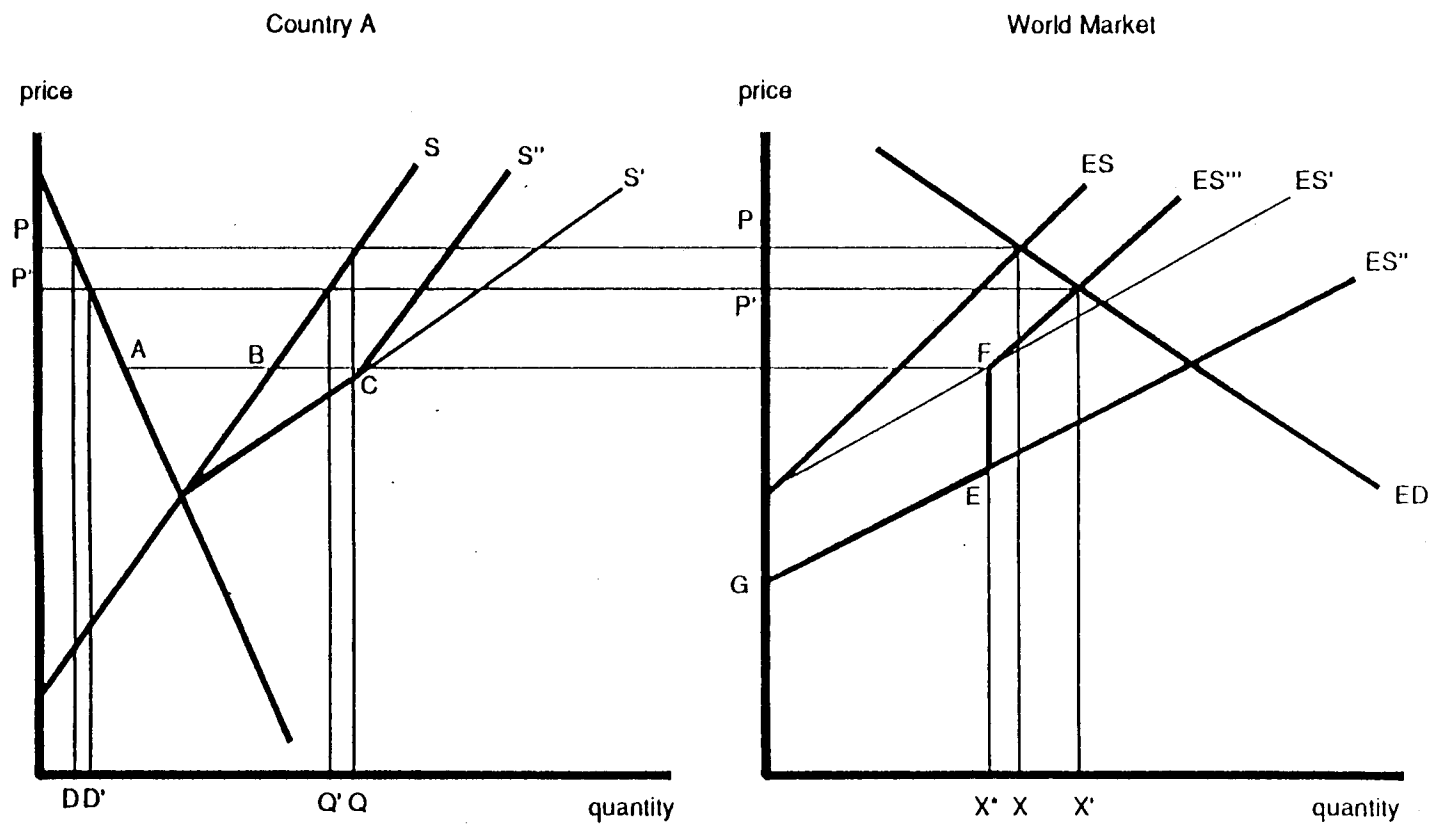


Fig. 3 A General, Volume Constrained, in-Kind Subsidy.

clockwise from S to S', above the equilibrium price in autarky.[6] The larger the percentage of the certificates redeemed for the same commodity the greater the extent of the rotation. The stock release effect rotates the domestic supply curve because the released stocks may be sold on the domestic market as well as on the world market.

If none of the certificates are redeemed for the same commodity (e.g. wheat) then the stock release effect is zero and S does not rotate at all. However, even with a zero stock release effect there still exists a subsidy effect. The subsidy effect reflects the cash value of the export subsidy and is independent of how the certificates are redeemed. It simply gives the per unit value of the subsidy and is represented by a parallel downward shift of the excess supply curve. This effect shifts the excess supply curve (from ES' to ES'') because the subsidy only applies to exports.

If we assume that exports eligible for the subsidy cannot exceed X*, the relevant excess supply becomes GEF-ES'''. The kink in ES''' comes about because the in-kind subsidy cannot be awarded to exports exceeding AC. The maximum in-kind export bonus is BC and thus the excess supply curve becomes kinked.

As drawn in Figure 3, the excess demand (ED) intersects with ES''' to the right of the kink, which means the constraint is binding. When this is the case the subsidy effect becomes irrelevant, i.e. it does not effect either the quantity traded or the equilibrium price. The effects of the policy are now solely due to its stock release component - to the in-kind bonuses (BC) delivered on the volume of exports entitled to receive the subsidy (X^*). This makes prices in all

[6] In Figure 3 the shifting of country A's supply function from S to S' is assumed to be proportional to the volume exported, but, in general, this does not have to be the case.

countries unequivocally decline, while if the constraint on the volume of subsidized exports was not binding, domestic price may have either risen or fallen. The amount traded increases from X to X' and price falls in all countries from P to P'. Importers increase their imports and exporters different from A decrease their exports. Country A's domestic production decreases (from Q to Q') and domestic consumption increases from D to D'. As long as the domestic supply and the excess demand faced in the world market have finite elasticities, a volume constrained, in-kind export subsidy (either targeted or non-targeted) results in an increase of the volume exported which is smaller than the volume of the in-kind subsidies.

In Figure 4 a volume constrained in-kind export subsidy with a minimum guaranteed producer price (e.g. a "target price") in the export subsidizing country -- like the one which is in place for wheat in the U.S. -- is shown. Producers are guaranteed a minimum price (TP in Figure 4) through direct deficiency payments. QF-S and GH-ES represent the subsidizing country's domestic and excess supply, respectively. With an unconstrained in-kind export subsidy the domestic supply is QCL-S' and the excess supply MN-ES'. If the amount of exports which can be subsidized is constrained not to exceed AI (which is equal to X^*), the domestic supply becomes QCIE-S'' and the excess supply MRST-ES''. Again, we assume that the constraint on the volume of subsidized exports is binding. The equilibrium price decreases in all countries (from P to P'). Country A's exports increase from X to X', domestic consumption increases from D to D', while production does not change (Q). The in-kind subsidies (QY) equal the increase in exports (XX') plus the increase in domestic consumption (DD'). The value of the bonuses equal area VZYQ. Area PWVP' represents the increase in the deficiency payments to domestic producers because of the lower domestic price in A due to the in-kind export subsidy.

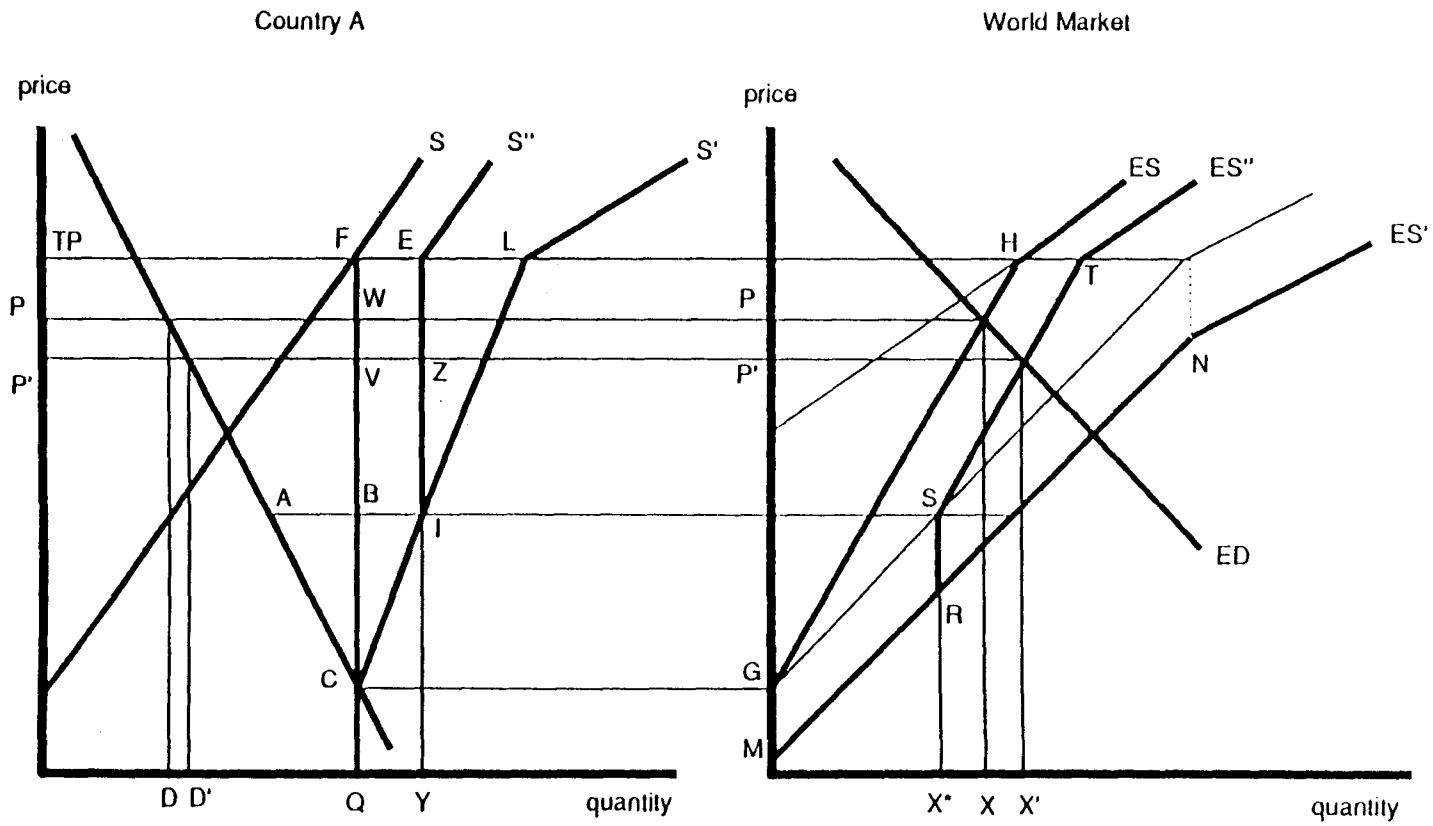


Fig. 4 A General Volume Constrained in-Kind Subsidy with a Guaranteed Producers Price Scheme in the Export Subsidizing Country.

The theoretical model demonstrates that **a priori** the subsidies could not achieve their stated goals. The qualitative results also hold for targeted subsidies. The following effects result for the EEP program:

(a) The increase in U.S. exports is smaller than the volume of EEP in-kind subsidies. Therefore, EEP effectiveness in inducing additional exports is questionable.

(b) A reduction in exports by all competing exporters except for the EC, which is insulated by its export restitutions policy[7]. The reduction in both export volume and price reduces the welfare of competing exporters. The cost to the EC is limited to the increase in export restitution payments.

(c) Domestic and international prices fall which results in an increase in U.S. domestic consumption and an increase in imports by both targeted and non-targeted markets.

(d) An increase in the federal budget expenditure due to higher deficiency payments because of lower domestic prices. Thus EEP is not budget neutral.

An Empirical Assessment of the Effects of the EEP on the World Wheat Market

An empirical analysis based on the above theoretical model is developed to assess the effects of EEP on the world wheat market. Our goal is to provide a reasonable laboratory setting for an experiment capable of producing valuable qualitative information on the direction and order of magnitude of the changes which occurred as a result of EEP and not a detailed representation of either the world wheat market or EEP. The reference time period is calendar

[7] Current EC policies provide export restitution payments for the difference between the domestic and international price for all exports, and thus result in a perfectly inelastic export supply curve.

year 1988, when EEP wheat sales approached 22 million tons and accounted for over 54 percent of total U.S. wheat exports.

A partial equilibrium spatial model is used to analyze the effects of EEP on the world wheat market. The composition of the 29 regions considered is provided in Table 2. To allow for a more detailed description of its domestic market, the U.S. is modeled both as a consuming country with no production, and as a producing country with no consumption. U.S. non-EEP wheat stock releases are modeled as a linear function of the domestic price, assuming an elasticity of .28 [Devadoss, Helmar and Meyers]. U.S. production is modeled to be perfectly inelastic with respect to the domestic price when it is below the target price. U.S. domestic price cannot be lower than the loan rate. When the domestic price reaches the loan rate domestic supply in excess of market clearance levels is assumed to end up in governmental stocks. Linear excess demand and supply functions are derived based on the prices, traded quantities and trade elasticities given in Table 2. Unless explicitly mentioned below, domestic policies as well as border ones are taken into account in the model by assuming that price transmission linkages are already incorporated in the trade elasticities. Transportation costs are based on International Wheat Council (IWC) information. Existing bilateral agreements as listed by the IWC have been included in the model as minimum constraints on the trade flows.[8]

EEP subsidized shipments to each targeted country have been constrained not to exceed the actual volume of the initiatives which occurred during the 1988 calendar year. For each targeted region, the monetary value of the bonuses used are given by the average bonuses over

[8] Transportation costs, minimum constraints on the trade flows as well as many details regarding the model's structure and results have been omitted due to space constraints. However, they can be obtained from the authors.

Table 2. Definitions of the Countries and Regions in the Model.
Base Prices, Quantities Traded, and Trade Elasticities.

Region		Price ($/mt)	Quantity Traded (mmt)	Trade Elast.
USS	U.S. production	155**	49.3	.6
USD	U.S. consumption	137	-26.5	-.3
CAN	Canada	138	20.1	.7
EC	European Community (12)	338**	9.9	0
FIN*	Finland	156	-0.1	-.2
OWEU	Other Western Europe	141	0.6	.8
POL*	Poland	158	-2.3	-.5
OEEU	Other Eastern Europe	141	1.4	.5
JAP	Japan	165	-5.7	0.0
AUS	Australia	137	12.3	.8
USSR*	Soviet Union	157	-19.8	-.4
CHI*	China	158	-15.5	-.25
MEX*	Mexico	154	-1.1	-.6
CAM	Central America	158	-2.8	-.4
BRA	Brazil	158	-1.0	-.4
ARG	Argentina	124	3.6	.3
COL*	Colombia	159	-.7	-.5
OLTAM	Other Latin America	160	-3.0	-.8
TWAF*	Targeted West Africa (Cameroon, Ghana, Ivory Coast, & Togo)	164	-0.4	-.5
ZAI*	Zaire	168	-0.2	-.5
OAFR	Other African Countries	168	-2.3	-.5
EGY*	Eqypt	162	-5.3	-.5
TME*	Targeted Middle East (Iraq, Jordan, N. Yemen)	166	-3.6	-.8
TNA*	Targeted N. Africa (Algeria, Morocco, & Tunisia)	162	-6.1	-.4
OME	Other Middle East	168	-1.5	-.8
TSA*	Targeted South Asia (Bangladesh, India, Sri Lanka)	168	-5.0	-.8
PHIL*	Philippines	170	-1.1	-.3
OAS	Other Asia	168	-8.6	-.7
ROW	Rest of the World	164	-0.4	-.7

* Denotes Targeted Country or Region.
** Target Price.

all actual subsidized shipments which occurred, totally or in part, during 1988. Both the constraints on the shipments eligible for the subsidies and the average monetary bonuses are provided in Table 3. Only forty percent[9] of the commodity certificates awarded as bonuses for EEP wheat sales are assumed to be instantaneously exchanged for the same commodity, wheat. Wheat stock release due to EEP wheat sales is defined as the face value of the certificates to be redeemed divided by the U.S. equilibrium price.

EC exports and domestic price are held fixed to represent the effects of the variable export restitutions policy. The export restitutions budget cost for the EC is computed as the difference between its target price (held fixed) and the border export price, times its exports (held fixed). Japanese import demand is assumed to be perfectly inelastic to represent its import quota. Countries are not allowed to import and export at the same time, i.e. arbitraging of subsidized exports is ruled out.

The model is based on the standard procedure [Samuelson; Takayama and Judge] of maximizing a non-linear "quasi welfare" function, given by the sum of the gains from trade over all regions. The solution is obtained using a recursive procedure in order to avoid the problems induced by the high degree of non-linearity in the model's constraints. This is due to the fact that actual EEP bonuses in-kind are defined as a non-linear function of the equilibrium price, which is endogenously determined. The model solutions for the base scenario with EEP and for the

[9] Because EEP certificates are generic they cannot be distinguished from other CCC certificates. Therefore, information on the % of EEP certificates exchanged for wheat does not exist. Based on aggregate redemption data we estimate the grain companies redeemed about 40% of the EEP certificates for wheat. However, we also run the model assuming a 100% redemption and this was done for two reasons. The first was to determine how sensitive the results are to our choice of 40%. The second reason was to provide some idea of the likely effects on the wheat market of the exchange of EEP wheat certificates for other commodities such as corn.

Table 3. EEP Bonuses ($/mt) and Maximum Constraints on Subsidized Shipments (mmt): 1988

Targeted Region	Bonus ($ per mt)	Maximum Constraint on Subsidized Shipments (mmt)
FIN	17.47	0.086
POL	40.12	0.485
USSR	32.03	8.082
CHI	29.72	6.375
MEX	23.23	0.800
COL	28.46	0.256
TWAF	37.40	0.165
ZAI	23.77	0.070
EGY	26.88	1.598
TME	22.12	1.015
TNA	30.52	3.270
TSA	21.42	2.449
PHIL	22.43	1.090

scenario without the EEP subsidies as well as the observed 1988 net trade positions are provided in Table 4.

Results

The model results show that no exporting country gains from EEP and that the intended loser, the EC, was only slightly harmed. These results can be used to evaluate the stated goals of EEP. The price and volume effects, the budgetary effects for the U.S., and damage inflicted on the EC are discussed.

Price and volume effects

EEP lowers prices in all countries whose net trade positions are left free to change. Under EEP, the U.S. domestic price, which equals the U.S. border price, is $137.90 per metric ton, $2.90 lower than in the no-EEP scenario. Border prices in all countries decrease by $2.90 to $4.80 per metric ton. Canada, Australia and USSR are among the countries experiencing the biggest drop in price. All exporters but the EC export less and all importers but Japan import more.

U.S. wheat exports increase by 1.889 million metric tons. U.S. exports experience a large increase in the targeted markets (an 8.1 mmt increase, from 29.7 to 37.8) and a decrease in the non-targeted ones (down 6.2 mmt, from 7.0 to 0.8) (see Table 5). The value of the in-kind bonuses is equal to $745 million. Consumers in the U.S. gain from the lower price by slightly increasing their consumption (up 165,000 tons).

One of the main goals of implementing EEP was to induce additional exports. While subsidized exports equal 25.741 million tons and subsidies in-kind equal 2.160 million tons, our

Table 4. Observed Net Trade Positions and Model Solutions, With and Without EEP (mmt)

Region	Observed Net Trade Position	Estimated Net Trade Positions With EEP	Estimated Net Trade Positions Without EEP	Change
USS**	65.1	65.091	63.037	2.054
USD	-26.5	-26.445	-26.280	-0.165
CAN	20.1	19.993	20.487	-0.494
EC	9.9	9.900	9.900	0.000
FIN*	-0.1	-0.100	-0.100	0.000
OWEU	0.6	0.596	0.613	-0.017
POL*	-2.3	-2.322	-2.287	-0.035
OEEU	1.4	1.395	1.419	-0.024
JAP	-5.7	-5.700	-5.700	0.000
AUS	12.3	12.512	12.860	-0.348
USSR*	-19.8	-19.853	-19.609	-0.244
CHI*	-15.5	-15.477	-15.407	-0.070
MEX*	-1.1	-1.096	-1.084	-0.012
CAM	-2.8	-2.800	-2.773	-0.027
BRA	-1.0	-1.003	-0.995	-0.008
ARG	3.6	3.739	3.764	-0.025
COL*	-0.7	-0.698	-0.692	-0.006
OLTAM	-3.0	-2.986	-2.943	-0.043
TWAF*	-0.4	-0.401	-0.395	-0.006
ZAI*	-0.2	-0.199	-0.198	-0.001
OAFR	-2.3	-2.294	-2.274	-0.020
EGY*	-5.3	-5.284	-5.238	-0.046
TME*	-3.6	-3.584	-3.534	-0.050
TNA*	-6.1	-6.176	-6.103	-0.073
OME	-1.5	-1.508	-1.473	-0.035
TSA*	-5.0	-5.073	-4.957	-0.116
PHIL*	-1.1	-1.120	-1.110	-0.010
OAS	-8.6	-8.709	-8.536	-0.173
ROW	-0.4	-0.400	-0.394	-0.006

* Denotes Targeted Country or Region.
** U.S. Production + EEP bonuses + non-EEP stock release.

Table 5. Exports to Targeted and Non-targeted Markets by Exporter, with EEP and without EEP (1988: mmt)

	with EEP			without EEP		
	Target Markets	Non Target Markets	Total	Target Markets	Non Target Markets	Total
USS	37.8	0.8	38.6	29.7	7.0	36.7
CAN	9.6	10.4	20.0	10.7	9.8	20.5
EC	6.6	3.3	9.9	9.9	0	9.9
OWEU	0.6	0	0.6	0.6	0	0.6
OEEU	1.4	0	1.4	1.4	0	1.4
AUS	5.3	7.2	12.5	8.4	4.5	12.9
ARG	0	3.7	3.7	1.0	2.8	3.8
Total	61.30	25.40	86.70	61.70	24.10	85.80

model estimates only a small increase in US wheat exports due to EEP - approximately 1.889 million tons.

Budgetary effects of EEP

Although EEP was explicitly designed to be budget neutral, it is not. EEP in-kind bonuses lower domestic price, and, by doing so, increase the budget cost of the government's deficiency payments. In our simulation, EEP increases the budgetary cost of deficiency payments by $140.3 million.

The budgetary cost of the increased deficiency payments equals $74.30 per metric ton of exports in excess to those which would have occurred without EEP. If we include in the cost the value of the stocks released as subsidies in-kind, the cost per metric ton of additional wheat exports reaches $469 !

We are assuming that only 40% of the generic certificates awarded as EEP wheat sales bonuses are redeemed for wheat. This implies that we are not taking into account the full impact of EEP wheat subsidies. In particular, the redemption for other commodities of three fifths of the certificates awarded as bonuses for EEP wheat sales will significantly lower prices and increase consumption and deficiency payments in other markets.[10] These effects are likely to be far from minor. To give a rough benchmark of what the overall impact of the EEP wheat program may be, we consider the extreme case where the redemption rate for wheat of the certificates awarded as bonuses for EEP wheat sales is equal to 100%. When this is the case, the qualitative effects

[10] As we mentioned above, when the constraint on the volume of exports eligible for a subsidy is binding, the effects of the program is solely due to its stock release effect. Therefore, the percentage of certificates redeemed for the specific commodity considered solely determines the magnitude of the impact of the program on that market. In this case it does not matter if this actually is the market in which the subsidies were originally awarded or not.

of the program do not change, but their magnitude does: U.S. wheat exports increase now by 4.7 mmt; EEP wheat in-kind bonuses equal 5.4 mmt; the U.S. domestic price decreases by $9.30 per metric ton; domestic consumption expands by more than 0.5 mmt; and U.S. deficiency payments for wheat increase by over $450 million ($98 per metric ton of additional exports).

EEP and other exporters

EEP was intended and designed to injure the European Community, in retaliation for its "unfair" policy of subsidizing the export of its domestic surplus onto a world market where prevailing prices are much lower than its domestic target price. In our model EC exports are assumed to be perfectly inelastic to reflect the insulation provided by the variable export restitutions. Therefore, the EEP cannot reduce total EC exports, rather it can only divert trade flows from one market to another. The EC reduces shipments to targeted countries and increases those to non-targeted countries by the same amount. From the EC standpoint the only effect of EEP is an increased cost of the export restitutions. Based on our simulation this increase appears to be very small. The EC border export price decreases by $4.80 due to the EEP, and, as a result, the cost of the variable subsidy increases by $48.0 million from $1.913 to $1.961 billion. The increase in the EC budget cost due to EEP obtained based on our simulation is even smaller than the increase in the U.S. budget costs for the deficiency payments for wheat due to the same program (i.e. without even considering the impact of the redemption of 60% of EEP wheat sales bonus certificates on deficiency payments for other commodities). Deficiency payments for wheat in the U.S. increased by an estimated 20.4%, while EC export restitution payments increased by only 2.5%.

Other major exporters, Canada, Australia and Argentina, are adversely affected by EEP,

although changes in their net trade positions appear to be small (Table 5). EEP creates problems for exporters different from the EC both in the targeted and the non-targeted markets. In the targeted markets they face increased competition by the U.S.. In the non-targeted markets they face stronger competition from the EC, due to its perfectly inelastic export supply, which makes its exports to targeted countries displaced by the increased U.S. competitiveness shift to non-targeted ones. Exports from Canada, Australia and Argentina to non-targeted markets increase, but their exports to targeted markets fall by a greater amount overall.

Conclusions

The United States government believes EEP has been successful and the administration has authorized additional EEP expenditures under the 1990 Farm Bill. This paper provided substantial evidence that EEP fails to meet any of its stated criteria. The increase in wheat exports due to EEP is less than the volume of the bonuses released from government stocks. Finally, EEP harms other exporters more than the EC.

The qualitative analysis of the evolution of EEP showed that the U.S. was unable to control the size of the program. Once other importers saw that export subsidies were available, they used their market power and the availability of alternative suppliers to convert the targeted subsidy program into a virtual global subsidy. The extension of the program to the Soviet Union and China indicates that the U.S. does not have the ability to implement a small targeted subsidy program that could be welfare improving.

As a weapon to get the EC to change its policies, EEP ends up being more costly to the U.S. and the other exporters. The U.S. and other countries have raised the cost of EC farm

policies by tying the outcome of the Uruguay Round to EC concessions in agriculture. So far, even this stronger threat has not changed EC policy. If this has failed, then why persist with EEP which does not have much "punishment" ability and does not make economic sense as a long-term strategic trade policy?

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