

THE IMPACT OF FOOD AID ON COMMERCIAL FOOD EXPORT

by

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Nations which rely heavily on commercial exports of agricultural com-

modities have sometimes objected to concessional food exports under aid programs. They contend that the food aid replaces commercial imports and reduces world market prices. To determine if policies are needed to reduce or eliminate any such adverse effects, it is necessary to know the extent to which food aid actually replaces commercial imports by food aid recipients and changes world market prices.

Knowledge of the relationship between food aid and commercial food imports is useful to the donor country to determine an optimum balance between commercial and concessional exports. To be able to manage wisely its balance of payments, the donor country should know how much foreign exchange is foregone by exporting food commodities through aid program rather than through commercial outlets.

Little quantitative information relating food aid and commercial imports of food commodities was available prior to this study. A recent study of the impact of PL 480 (the U.S. food aid) on the Indian economy concluded that, in the absence of PL 480, India would have increased commercial food imports. The additional imports "would have been far short of the actual imports under PL 480, "[7, p.36]. In a study of the impact of PL 480 on the Israeli economy, it was estimated that approximately 73 per cent of the wheat

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imported under PL 480 during 1955-60 would have been imported commercially in the absence of PL 480 [3, pp. 12,300 ff]. Other studies have discussed the impact of food aid on world market food prices [1, 4]. The general conclusion from those studies is that exports under aid programs have an adverse effect on prices, but few attempts have been made to quantify the relationship.

This study is an attempt to bridge some gaps in our knowledge of the impact of food aid on commercial exports. More specifically, the major objectives of the study are:

1. To develop a conceptual framework to estimate the impact of food aid on commercial exports and prices and to estimate the impact of the U.S. food aid by means of this framework for the three fiscal years 1964, 1965 and 1966.
2. To develop a conceptual framework to estimate the export revenue foregone by the donor country by maintaining food aid programs and to estimate the export revenue foregone by the U.S. during the 1964-66 period

To simplify the quantitative analysis which follows, it is assumed that a unique world market price exists for each commodity. Most food aid consists of stable commodities such as wheat, with small price differences and high rates of substitution among the various types of any one commodity. The market clearing price is defined in this study as the price that would occur in the world market if all food aid programs were discontinued and the food exported under these programs were added to the prevailing commercial world market supply. The procedure for estimating the market clearing price is illustrated in the Appendix.

To estimate the world market price, we need to determine the average

rate of substitution of commercial import for food aid, i. e. the amount of commercial food import replaced by food aid.

## COMMERCIAL IMPORTS REPLACED BY FOOD AID

### Data Sources

The basic data were obtained from a mail survey conducted among 441 persons representing 14 countries. All countries which received one per cent or more of the total U. S. food aid during the 3 fiscal years, 1964, 1965, and 1966, were included in the sample provided that they had diplomatic relations with the United States at the time when the research was initiated. The survey countries received 70 per cent of the total U. S. food aid during 1964-66. The participating persons were chosen after consultation with a large number of individuals and agencies, some American and some representing the sample countries. We attempted to contact only individuals with a considerable knowledge on economic development and external economic assistance programs and needs. Of the 441 persons contacted, a partly or fully completed questionnaire was received from 88. This yields an overall response rate of 20 per cent. If more than one individual at any one institution was contacted, a joint answer was usually obtained. Such an answer was recorded as one response only. Thus, the response rate was downward biased. The confidential nature of the survey precludes revealing names of the individuals who completed questionnaires. But as stated above, the individuals contacted were deemed to have competence in matters of economic development and external economic assistance programs. Of the 88 respondents, 72 were citizens of the countries surveyed and 16 were U. S. citizens. The U. S. citizens were foreign development experts with experience in the survey countries. Forty-six of the respondents were econo-

mists and/or political scientists, most affiliated with universities. Seven of the foreigner respondents were cabinet members and 8 were government officials.

There is some indication that the most knowledgeable individuals completed and returned the questionnaire -- several questionnaires were returned with the statement that the person did not possess sufficient data or competence to complete it. Thus, a higher response rate might not have yielded data with a higher degree of reliability.

While shortcomings of the data suggest caution in interpreting the results, we believe the estimates to be useful. Furthermore, we are unaware of other comprehensive estimates of the rate of substitution between commercial import and food aid. Finally we are unaware of any alternative methodology that would offer more reliable estimates at a manageable cost in research funds, time and personnel. While these estimates are neither final nor exact and further refinements are desirable, the estimates do reflect the very real views of presumably informed foreigners and some Americans of the relation food aid and commercial food import by developing countries. 1/

Each survey participant was informed of the average annual quantity of wheat imported by his country under PL 480 during the period 1964-66. He was then presented four hypothetical situations in which the quantity of wheat imported under PL 480 was reduced by 25, 50, 75 and 100 per cent respectively. For each of the four alternative situations, he was asked to indicate the increase in commercial imports, if any, that he believed would have taken place during the period in question.

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1/ For a more complete presentation of primary and secondary data sources and limitations, see Pinstrup-Andersen[6].

0.75 million tons, that would have accompanied this reduction in PL 480 imports, was not large. But commercial exports would have increased an estimated 3.90 million tons annually if all PL 480 exports of 9.61 million tons annually had been terminated.

The amount of commercial wheat export replaced by each unit of wheat aid is increasing for increasing aid reduction up to 75 per cent reduction. However, beyond a reduction of 75 per cent the amount is slightly decreasing. It is likely that a reduction in PL 480 imports of 75 per cent would severely strain the ability of countries with a short supply of foreign currency to finance commercial imports. An additional reduction in PL 480 would have little effect on the quantity commercially imported due to lack of additional purchasing power in the international market.

#### THE ESTIMATED MARKET CLEARING PRICE

The market clearing price for wheat was estimated for four different levels of reduction in the quantity of wheat presently included in food aid programs. The results are summarized in Table 3. 2/

The market clearing price was estimated on the basis of each of two alternative assumptions concerning the degree of substitution between wheat and feed grains in the world market. In one case, it was assumed that no

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2/ The analysis summarized in Tables 3 and 4 is based on the following values of elasticities: Elasticity of export demand for U.S. wheat = -2.8 obtained from: Tweeten [9, p.360]; elasticity of export supply of U. S. wheat = .28, obtained from: Tweeten [8]. Elasticity of export supply of U.S. feed grains is assumed equal to that of wheat. The above elasticities are based on an intermediate run of approximately three years. The elasticities would be of smaller absolute magnitude in a shorter period for adjustment.

substitution would take place between wheat and feed grains, whereas in the other case it was assumed that wheat and feed grains substituted one-to-one on a weight basis for price decreases below the prevailing feed grain prices. The latter assumption implies that wheat is a perfect substitute for feed grains, but that feed grains are not necessarily perfect substitutes for wheat. Under the latter assumption, the wheat price will never fall below the price of feed grains given sufficient time for adjustment. If the price of wheat dropped below the prevailing prices of feed grains, where the prices are determined on a weight basis, the quantities demanded of wheat and feed grains would adjust to a point where the price of wheat equals the price of feed grains.

The average export price of feed grains during 1964-66 was \$53.42 per metric ton [cf. 11]. The price of wheat, equivalent to the feed grain price on a weight basis, was estimated to be \$1.45 per bushel. Hence, for wheat prices above \$1.45 per bushel, it is assumed that the substitution of wheat for feed grains is zero. However, if the wheat price drops below \$1.45 per bushel, it was expected that the amount of wheat substituted for feed grains would be of a magnitude that would equate the wheat price and the price of feed grains.

As shown in Table 3 the reductions in the prevailing world market price of wheat necessary to reach the market clearing price if all the wheat exported under the provisions of the Public Law 480 during the period 1964-66 were transferred to the world market were estimated to be 40.6 per cent if no substitution between wheat and feed grains were assumed and 20.9 per cent if complete substitution of wheat for feed grains were assumed. The average export price of wheat and wheat flour in grain equivalent for the three year period 1964-66 was \$1.68 per bushel [cf. 11]. Hence, the market clearing price for wheat was estimated to be \$1.00 and \$1.33 per bushel under

each of the two assumptions respectively.

It appears unlikely that the export price of wheat would drop below that of feed grains under free market conditions. Wheat is considered superior of feed grains for human consumption in most countries and is a near perfect substitute for feed grains for many other purposes. Hence, the best estimates of the market clearing price of wheat are likely to be obtained under the assumption of perfect substitution.

The market clearing price is the expected world market price if the food aid programs were terminated and the aid commodities transferred to the commercial world market. However, what world market price might be expected if the aid commodities were kept of the world market? This price was estimated for the same four levels of reduction in wheat aid for the period 1964-66. The results are shown in Table 4.

It is estimated that if the quantity of wheat exported under PL 480 had been reduced by 25 per cent during 1964-66, world market prices for wheat would have increased by approximately 5 per cent given that the wheat diverted from aid programs was not placed on the world market. In the absence of U.S. wheat aid the world market price was estimated to be \$2.15 per bushel or an increase of 28 per cent above the actual price during the period.

#### THE REVENUE FOREGONE

A procedure for estimating the export revenue foregone by the donor country by maintaining food aid programs is shown in the Appendix. The revenue foregone is expressed by the estimated increase in export revenues if the food presently included in aid programs were exported commercially and the aid programs terminated.

The estimated increase in export revenue per dollar of wheat transferred from aid programs to commercial export is shown in Table 5 for the four levels of reduction in wheat aid. The estimated marginal values refer to a marginal unit of 25 per cent of the total wheat aid.

The revenue foregone by the U.S. during 1964-66 by exporting wheat under aid provisions was estimated to be 62 cents per dollar's worth of wheat if no substitution were assumed and 86 cents if substitution were assumed. The revenue foregone per unit of aid was found to be greatest at the margin and falling as more wheat were transferred from aid programs to commercial export. If 25 per cent of the 1964-66 wheat aid were transferred to commercial export and assuming no institutional restraints on export prices, the export revenue was estimated to increase by \$1.01 per dollar's worth of aid transferred, or 101 per cent of the face value of the aid. This means that the revenue foregone by maintaining the wheat aid beyond 75 per cent of the 1964-66 level was 101 per cent of the face value of the aid.

The revenue foregone by maintaining only 25 per cent of the wheat aid was estimated at \$0.09 per dollar's worth of wheat if no substitution between wheat and feed grains were assumed and, more realistically, \$0.66 if substitution were assumed.

If the commercial world market is the best alternative outlet for commodities exported under aid programs and if no payment is received from the aid recipients, the export revenue indicates the alternative cost of food aid. However, if the food aid is not given as outright grants, the cost of aid is given by the export revenue foregone less the present value of the payments received from aid recipients.

It was found that the present value of the payments obtained by the U.S.



under 20 and 40-year dollar credit terms exceeded the export revenue foregone. Hence there is no real cost to the U.S. of maintaining food aid under these programs. 3/

### CONCLUSIONS

The presence of U.S. food aid programs reduced commercial food imports by the aid recipient countries. The reduction in commercial food imports was less than the actual amount of food aid received. The amount of commercial food import replaced by each unit of food aid declines as the food aid is expanded. Using the 1964-66 level of food aid, it was found that, on the average, each ton of wheat exported under U.S. aid programs replaced 0.41 tons of commercial imports. The commercial import replaced by the last ton of wheat aid was estimated to be 0.27 tons.

The impact of food aid on world market prices depends on the allocation of the commodities presently exported under aid programs in the absence of these programs. If the U.S. had chosen to sell the surplus wheat in the commercial world market instead of exporting it through aid programs, the world market price for wheat was estimated to have decreased by 21 per cent of the actual price. On the other hand, if the U.S. had not maintained aid programs in wheat and had allocated the surplus wheat to some outlet other than commercial export, the world market price would have been 28 per cent above what it actually was.

The latter finding refers to what food exporting countries complain about as the price depressing effect of food aid. It is questionable, however, whether

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3/ See: Pinstrup-Andersen [6] for a complete discussion of the cost of U.S. food aid.

the U.S. could find a feasible alternative outlet for the surplus commodities that are presently exported under aid programs.

The PL 480 was introduced primarily as an outlet for mounting stocks of surplus foods in the U.S. It is likely that had this massive food aid not been initiated in 1954, a considerable portion of the surplus commodities would have found its way into the commercial world market. It was not politically feasible to reduce production to a point where no surplus would forthcome, let alone to a point where the surplus on hand could be sold through ordinary channels. Neither was destruction a political feasible solution to the problem of surplus productive capacity in U.S. agriculture. It is important to keep this internal U.S. problem of surplus productive capacity in mind when analyzing the impact of U.S. food aid on the commercial food exports.

If the U.S. wheat aid was terminated and 40 per cent of the wheat was offered in the world market through ordinary commercial channels, the world market price would stay at the same level as if the aid programs were continued. However, if the U.S. could not find an alternative outlet for the last 60 per cent of the wheat, hence increased the world market supply, the world market price would fall. In this case the net effect of the aid programs is a higher world market price than without these programs.

It was not attempted in this study to determine which exporting countries might benefit from a termination of the U.S. food aid under the assumption that the U.S. would not merely transfer the aid commodities to the commercial world market. This, of course, would be determined partly by political decisions on the part of the importing countries and partly by transportation costs and other comparative advantages among the exporting countries.

We have been using the words "aid" and "commercial exports" as if they

were describing two completely different matters. This is not at all the case. As more emphasis is placed on food aid through dollar credit programs, the difference between aid and commercial export is merely the credit terms. It was found in this study that the present value of the payments received by the U.S. from export under these credit programs exceeded the export revenues that could have been obtained if the food had been exported through ordinary commercial exports. Hence, it is questionable whether export under these programs should be termed "aid."

In conclusion we reiterate certain limitations of this study. We have attempted to estimate the impact of food aid on commercial export by projecting what would happen to commercial exports and prices if the food aid programs were reduced or terminated. However, the world trade pattern that would develop after the termination of the aid programs might be quite different from the pattern that would have existed if the aid programs had not been introduced in the first place. It is likely that the developing countries would have placed more emphasis on domestic food production, resulting in less need for food import.

The estimated rate of substitution between commercial import and food aid relies heavily on the judgment of the persons surveyed. Even though the persons were carefully selected on the basis of the expected knowledge in these matters, they can be in error. While clustering of individual estimates about the sample mean suggests considerable agreement, bias may be present. Nevertheless, we believe the estimates despite their shortcomings are useful, particularly in view of the absence of other comprehensive quantitative studies on the topic.

Table 1. The Marginal and Average Rate of Substitution of Commercial Wheat Import for PL 480 Imports.

Country	Average annual wheat imports under PL 480	ARS	MRS
	1964-66  (1,000 tons)		
India	5,839	0.217	0.073
Pakistan	1,396	0.715	0.426
Brazil	861	0.791	0.792
Korea	440	0.732	0.333
Turkey	283	0.389	0.175
China	228	0.482	0.527
Israel	186	0.774	0.713
Morocco	156	0.641	0.641
Chile	128	0.781	0.742
Colombia	82	0.744	0.571
Greece	3	0.000	0.000
Congo	3	1.000	1.000
Total	9,605		
Weighted average <sup>1/</sup>		0.406	0.269

Source: See text.

<sup>1/</sup>The average is weighted by the quantities imported by each individual country. The negative sign is omitted from all rates of substitution.

**Table 2. Increase in Commercial Export for Various Reductions in Wheat Aid 1964-66**

Reduction in export under PL 480		Increase in commercial export	Rate of Substitution
(%)	(1,000 tons)	(1,000 tons)	
25	2.401	749	0.312
50	4.802	1.705	0.355
75	7.203	3.011	0.418
100	9.605	3.898	0.406

Source: See text.

**Table 3. The Estimated Market Clearing Price for Wheat for Various Levels of Reduction in Wheat Aid Levels.**

Reduction in total wheat aid	Reduction in prevailing world market price		Market clearing price	
	No substitution	Perfect substitution <sup>1/</sup>	No substitution	Perfect substitution
(Per cent)	(Per cent)		(\$ per bushel)	
25	11.7	11.7	1.48	1.48
30	13.9	13.9	1.45	1.45
50	22.0	16.1	1.31	1.41
75	29.8	18.3	1.13	1.37
100	40.6	20.9	1.00	1.33

Source: Basic coefficients derived from survey [6]. Data for commercial export and export under aid provisions used in the calculations are from USDA [11, p.6].

<sup>1/</sup> The estimates under perfect substitution are obtained by using a weighted average of the elasticities for wheat and feed grains below the price of \$1.45 per bushel of wheat (see text) and by using the commercial export quantity of wheat and feed grains rather than wheat alone.



Table 4. Estimated Effect of U.S. Wheat Aid on World Market Prices. <sup>1/</sup>

Reduction in total wheat aid	Increase in prevailing world market price	Estimated world market price <sup>2/</sup>
(Per cent)	(Per cent)	(\$ per bushel)
25	4.8	1.76
50	11.4	1.88
75	20.9	2.03
100	28.0	2.15

Source: Survey data [6].

<sup>1/</sup> Assuming that the commodities removed from aid programs were not placed on the world market

<sup>2/</sup> Given that the prevailing world market price was \$1.68 per bushel.

**Table 5. Estimated Export Revenue Foregone in Per Cent of Face Value of Wheat Aid for Alternative Levels of Aid.**

Per cent reduction in total wheat aid	No Substitution		Perfect Substitution	
	Average	Marginal	Average	Marginal
25	100.7	100.7	100.7	100.7
50	88.1	75.5	98.3	95.9
75	80.0	63.8	93.0	82.4
100	62.2	8.8	86.2	65.8

Source: Survey data [6].



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## APPENDIX A

### Conceptual Framework for Estimating the Impact on the World Market Price

The market clearing price is defined in this study as the price that would occur in the world market if all food aid programs were discontinued and the food exported under these programs were added to the prevailing commercial world market supply.

$D_1$  and  $S_1$  indicate a hypothetical commercial world market demand and supply curve, respectively, given the current level of food aid. The prevailing world market price is indicated by  $P_1$ . Now assume that all U.S. food aid programs were discontinued and all food previously exported under these programs was added to the world market supply. The new supply curve is given by  $S_2$ . Since the food aid to some extent substitutes for commercial demand, the discontinuation of the food aid programs causes world market demand by the developing countries to increase. However, the shift in the demand curve is likely to be less than the shift in the supply curve. The new demand curve is shown by  $D_2$ , and the market clearing price is indicated by  $P_2$ . If, on the other hand, the past food aid commodities were not placed on the commercial world market, the new world market price would be  $P_3$ .

The two demand curves are shown in Figure 1 as being parallel. This will be the case only if the additional commercial import demand brought about by discontinuation of the food aid is perfectly inelastic. If, as in the empirical analysis presented in this study, it is assumed that the elasticity related to the commercial import replaced by aid is equal to the elasticity of the prevailing commercial import, the slope of  $D_1$  exceeds the slope

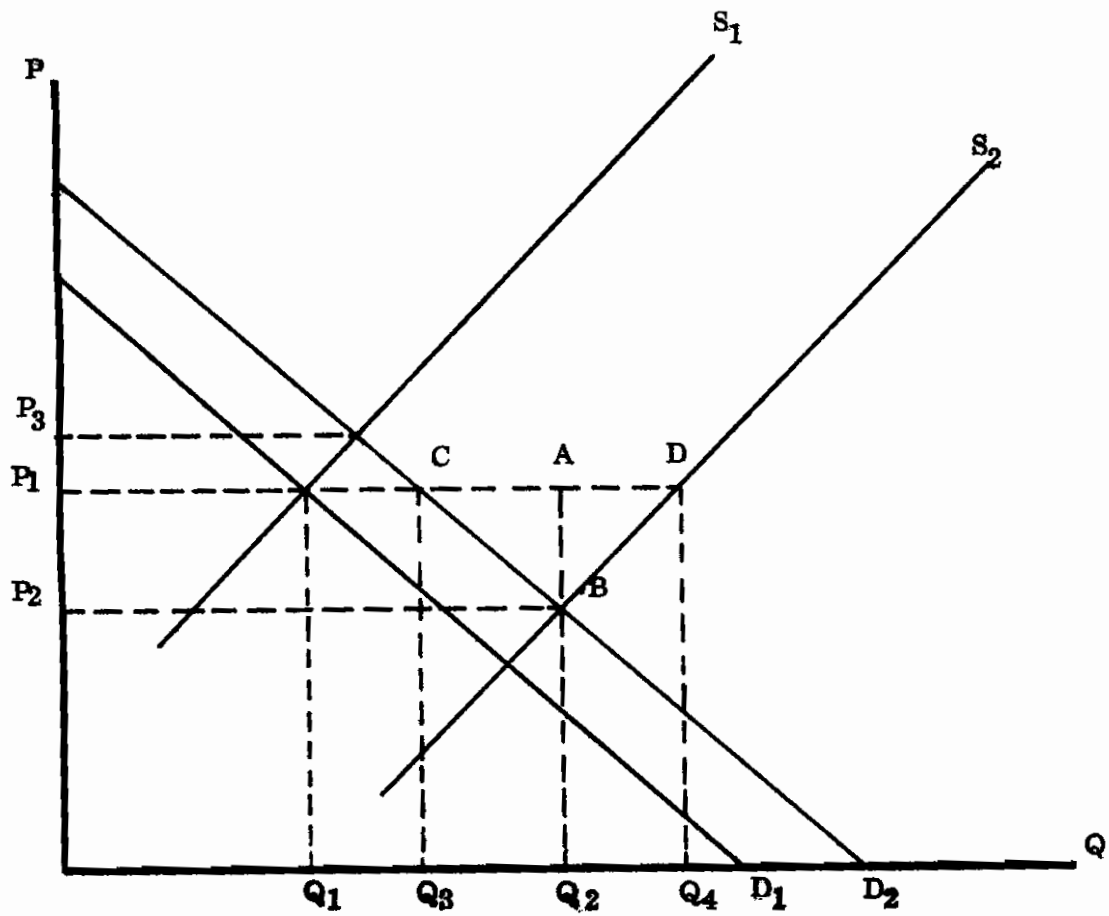


Figure 1. Illustration of Procedure to Estimate the Market Clearing Price

of  $D_2$ . However, this does not affect the validity of the mathematical procedure outlined in the following.

In order to find  $P_2$  and  $P_3$  in Figure 1, it is sufficient to estimate the demand and supply elasticities and the magnitudes of the horizontal shifts in the supply and demand curves caused by a discontinuation of the food aid programs. The mathematical framework for estimating  $P_2$  and  $P_3$  is shown below.

The reduction in the prevailing world market price necessary to reach the market clearing price is given in Figure 1 by the distance AB. The distance CD equals the total amount of food sold under food aid programs ( $Q_4 - Q_1$ ) less the amount of commercial demand replaced by present food aid programs ( $Q_3 - Q_1$ ). In other words, the distance CD measures the amount of present food aid that does not substitute for commercial imports.

Assuming straight line demand and supply curves, the elasticity of demand equals the inverse of the slope of the demand curve multiplied by the prevailing world market price divided by the quantity sold. Likewise, the elasticity of supply can be expressed as the inverse of the slope of the supply curve multiplied by the prevailing world market price divided by the quantity sold. Using the following notation:

$$\begin{aligned}
 E_D &= \text{price elasticity of export demand (expressed in absolute value)} \\
 E_S &= \text{price elasticity of export supply} \\
 \left( \frac{dp}{dq} \right)_D &= \text{slope of the demand curve (D}_2 \text{ in Figure 1)} \\
 \left( \frac{dp}{dq} \right)_S &= \text{slope of the supply curve (S}_2 \text{ in Figure 2)}
 \end{aligned}$$

- $P_1$  = prevailing world market price  
 $P_2$  = market clearing price  
 $Q_1$  = quantity initially exported commercially  
 $Q_2$  = quantity exported commercially after termination of aid programs  
 $\Delta S = Q_4 - Q_1$  = quantity exported under food aid provisions  
 $ARS$  = average rate of substitution of commercial import for food aid  
 $\Delta D = Q_3 - Q_1 = ARS \Delta S$  = increase in commercial import by aid recipients if U.S. aid programs are terminated  
 $CA = Q_2 - Q_3$   
 $AD = Q_4 - Q_2$   
 $AB = P_1 - P_2$

the relationships mentioned above may be expressed in the following three equations:

$$CD = (Q_4 - Q_1) - (Q_3 - Q_1) = Q_4 - Q_3 \quad (1)$$

$$E_D = \left( \frac{dq}{dp} \right)_D \frac{P_1}{Q_1} = \left( \frac{1}{\frac{dp}{dq}} \right)_D \frac{P_1}{Q_1} \quad (2)$$

$$E_S = \left( \frac{dq}{dp} \right)_S \frac{P_1}{Q_1} = \left( \frac{1}{\frac{dp}{dq}} \right)_S \frac{P_1}{Q_1} \quad (3)$$

$$\text{but } \left( \frac{dp}{dq} \right)_D = \frac{AB}{CA} ; \left( \frac{dp}{dq} \right)_S = \frac{AB}{AD} \quad (4)$$

and  $CD = CA + AD$ .

Solving (2), (3) and (4) for AB yields

$$AB = \frac{CA}{E_D} \frac{P_1}{Q_1} ; AB = \frac{AD}{E_S} \frac{P_1}{Q_1} \quad (5)$$

$$\text{hence } CA = \frac{E_D}{E_S} AD$$

$$\text{but } AD = CD - CA.$$

$$\text{So } CA = \frac{E_D}{E_S} (CD - CA)$$

$$= \frac{\frac{E_D}{E_S} CD}{1 + \frac{E_D}{E_S}} = \frac{CD}{\frac{E_S}{E_D} + 1}.$$

From (5) one obtains

$$\begin{aligned} AB &= CA \left( \frac{dp}{dq} \right)_D = \frac{1}{E_D} \frac{P_1}{Q_1} CA \\ &= \frac{CDP_1}{\left( \frac{E_S}{E_D} + 1 \right) E_D Q_1} = \frac{CDP_1}{(E_S + E_D) Q_1} \end{aligned}$$

$$\text{but } CD = \Delta S - \Delta D$$

$$\text{and } P_2 = P_1 - AB$$

$$\begin{aligned} \text{therefore, } P_2 &= P_1 - \frac{(\Delta S - \Delta D) P_1}{(E_S + E_D) Q_1} \\ &= P_1 \left( 1 - \frac{\Delta S - \Delta D}{(E_S + E_D) Q_1} \right) \end{aligned}$$

but  $\Delta D = ARS \cdot \Delta S$ , since  $ARS$  is defined as the change in commercial import demand per unit change in food aid.

$$\text{So } P_2 = P_1 \left( 1 - \frac{(1 - ARS) \Delta S}{(E_S + E_D) Q_1} \right).$$

Using a similar procedure, the world market price that would occur if all food aid programs were terminated and the aid commodities were not transferred to the commercial world market may be estimated as:

$$P_3 = P_1 \left( 1 + \frac{ARS}{(E_S - E_D) Q_1} \cdot \Delta S \right)$$

#### APPENDIX B

##### Conceptual Framework for Estimating the Export Revenue Foregone

Assuming that the world market is the best alternative outlet for surplus food, the estimated increase in total export revenue per dollar's worth of food aid transferred from aid programs to commercial export indicates the revenue foregone by the donor country per dollar's worth of food aid.

A procedure for estimating the increase in total export revenue per dollar's worth of food aid transferred into commercial export is suggested below. The procedure is based on the estimated market clearing price as previously defined. In addition to the previous notation, the following notation is used:

$TER_1 = Q_1 P_1$  = total export revenue obtained from initial commercial export

$TER_2 = Q_2 P_2$  = total export revenue obtained if all food, presently exported under food aid provisions were exported commercially

$\Delta TER = TER_2 - TER_1$  = the change in total export revenue

$\Delta ER = \Delta TER / \Delta S$  = the change in total export revenue per dollar's worth of food aid transferred

The revenue foregone per dollar's worth of food aid is given by:

$$\Delta ER = \Delta TER / \Delta S = (TER_2 - TER_1) / \Delta S = (Q_2 P_2 - Q_1 P_1) / \Delta S$$

$$\text{but } Q_2 = Q_1 + \Delta S - \Delta D$$

where  $AD = CD - AC$

$$= (\Delta S - \Delta D) - (\Delta S - \Delta D) / [(E_S/E_D) + 1]$$

$$= (\Delta S - \Delta D) (1 - [(E_S/E_D) + 1]^{-1}).$$

Hence,  $\Delta ER = \Delta S^{-1} (P_2 (Q_1 + \Delta S - (\Delta S - \Delta D) (1 - [(E_S/E_D) + 1]^{-1})) - Q_1 P_1)$

$$= Q_1 \Delta S^{-1} (P_2 - P_1) + P_2 (ARS + (1 - ARS) [(E_S/E_D) + 1]^{-1}).$$



## Abstract

### THE IMPACT OF FOOD AID ON COMMERCIAL FOOD EXPORT

by

P. Pinstrup-Andersen and Luther G. Tweeten

It has been argued that food aid replaces commercial food imports and reduces world market prices. However, little quantitative information relating food aid and commercial imports of food commodities is available.

In this study we develop a conceptual framework to estimate the impact of food aid on commercial food exports and prices and the export revenue foregone by the donor country by maintaining food aid programs. On the basis of this framework, the impact of the U.S. food aid during 1964-66 is estimated. The impact on commercial exports and prices was estimated for various levels of food aid. It was found that, on the average each ton of wheat exported under U. S. aid programs replaced .41 tons of commercial wheat imports. The commercial import replaced by the last ton of wheat aid was estimated to be .27 tons.

If the U. S. had chosen to sell the surplus wheat in the commercial world market instead of exporting it through aid programs, the world market price for wheat was estimated to have decreased by 21 per cent of the actual price. Alternatively, if the food aid were terminated and the surplus commodities were allocated to some use other than commercial export, the world market price would have increased to 28 per cent above the actual price.

The export revenue foregone by the U. S., by maintaining wheat aid

programs during 1964-66 was estimated for various levels of food aid. The revenue foregone was high at the margin and falling as more wheat was moved from aid programs to commercial export. On the average it was found that the U.S. sacrificed 86 cents for each dollar of wheat exported under aid programs. The net cost of wheat aid was smaller than the revenue foregone due to payments by aid recipients.

It was concluded that the most likely impact of U.S. food aid programs was a decrease in commercial exports and higher world market prices for the types of commodities exported under aid programs. //



