THE ROLE OF FOOD, FEED, AND FIBER IN FOREIGN ECONOMIC ASSISTANCE: VALUE, COST, AND EFFICIENCY

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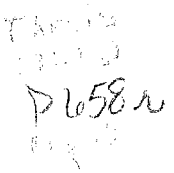
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VALUE, COST, AND EFFICIENCY

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PREFACE

This study is concerned with an analysis of the role of food, feed, and fiber in external economic assistance. A theoretical framework is developed to estimate the value to the aid recipient countries of food aid relative to untied cash aid as well as the cost to the donor countries of food aid. Using this framework, the value and cost of the U. S. food aid during 1964-66 are estimated for the various terms of aid.

The author wishes to express gratitude to Dr. Luther Tweeten for a very inspiring and stimulating guidance and assistance throughout this study. The assistance of the remaining of the advisory committee, Dr. Leo Blakley, Dr. Julian Bradsher, Dr. Vernon Eidman, and Dr. Carl Marshall, is acknowledged.

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CHAPTER I

INTRODUCTION

Agricultural surplus commodities have constituted a substantial part of U.S. foreign economic assistance during recent years. Serious attempts have been made by the U.S. Government to dispose of the surpluses. One of the major attempts of surplus disposal has been to offer commodities to developing nations through aid programs. The major legislative tool for this purpose has been the Agricultural Trade Development and Assistance Act (commonly known as Public Law 480) which was enacted in 1954.

Use of food, feed, and fiber surpluses as part of the total U.S. foreign economic assistance programs has generally met easy approval by the American public. The apparent double function of such programs, surplus disposal, and assistance to needy nations, appeals to the public on the grounds of national interests as well as humanitarianism.

The Problem

Certain misconceptions prevail in relation to food aid. One is that, dollar for dollar, food aid valued at prevailing export prices provides benefits to the recipient country equivalent to aid in any other form. If the developing nations were offered the dollar equivalent of assistance now received in food, feed, and fiber, the resulting combination of imports might be quite different in terms of food and nonfood items than under the present assistance programs, and the

impact on the economic development in the recipient nations might also be different.[1]

Another misconception is that food aid entails little or no resource cost to the U.S. because surplus capacity exists in U.S. agriculture. If such beliefs are held by the donor country, the result may be too much food aid relative to other types of aid.

Indiscriminate use of food aid can be costly to both the donor and the recipient nations. Developing nations may accept food aid because it is available in addition to other types of assistance even though food aid is not effective in promoting development. Donating countries, e.g. the United States, may pay more in resources offered through food aid to achieve a given level of economic progress than it would through other types of assistance such as a dollar loan.

Most research concerning the effect of U.S. food aid to developing countries has been based on what might be called an all-or-nothing approach that ignores the fundamental principle of opportunity cost. The major aims of such research have been to evaluate the total effect of the food assistance program to the country in question and to determine whether the country has benefited from the program. In other words, the question to which most past research has sought an answer was: Is a country, that has received U.S. food aid for a certain period of time, better off today than it would have been without this food aid, ceteris paribus.

The major attempt to determine the effect of food aid under PL 480 on the recipient nations is a series of studies sponsored by the U.S.

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[1]Lawrence Witt, A Program of Research on Food for Peace, Part II (East Lansing, Michigan, 1966), p. 6.

Department of Agriculture and carried out by research groups in a number of nations which have received large amounts of food, feed, and fiber under PL 480.[2] From these studies, it seems evident that recipient nations have in fact derived great benefit from past U.S. food aid. There is little indication, however, as to the benefit derived at the margin. There is also little indication whether other forms of foreign economic assistance would have entailed a more efficient use of U.S. resources.

If a high degree of efficiency is to be obtained in the foreign economic assistance programs, the relationship between the various types of assistance must be known. It is important to know to what extent U.S. agricultural surplus commodities can best fit into foreign assistance programs and development plans in order that the assistance may promote optimal economic progress in the recipient countries.

If, for any given cost outlay to the donor country, the maximum impact on economic progress in aid recipient countries is to be obtained, the relative value to the recipient countries as well as the relative cost to the donor for the various types of aid must be known. Likewise, the minimum donor cost required to obtain any given impact on the recipient countries can be estimated only if the above relationships are known.

Knowledge of the marginal benefits and opportunity costs is necessary to determine an optimum mix of food and nonfood items in economic assistance programs as well as an optimum allocation of U.S. surpluses.

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[2]Such studies have been carried out for Colombia, Greece, India, Israel, Spain, and Turkey.

A few studies have been aimed at these relationships. Tweeten has developed a theoretical framework that specifies the optimum allocation of resources between providing farm commodities versus other forms of aid to developing countries.[3] A second feature of the theoretical framework is specification of the optimum combination of production control and food aid disposal in foreign countries as a means to handle reserve capacity in U.S. agriculture. Pincus estimated the cost of the various types of U.S. foreign aid, and Hillman and Loveday suggested a theoretical framework to estimate the optimum combination of surplus disposal and supply control.[4, 5] Furthermore, Schultz estimated the value of U.S. farm surpluses to recipient countries.[6]

However, a rigorous and comprehensive empirical analysis of the value and cost of food aid relative to other types of aid was not attempted in any of the above mentioned studies.

Objectives

The over-all objective of this study is to provide additional knowledge concerning the role of food, feed, and fiber in external economic assistance programs. Within this broad objective, major aims

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[3]Luther G. Tweeten, A Proposed Allocative Mechanism for U.S. Food Aid. Journal of Farm Economics, Vol. 48 No. 4, Part I (November, 1966), pp. 803-810.

[4]John A. Pincus, The Cost of Foreign Aid. The Review of Economics and Statistics, Vol. XLV, No. 4 (November, 1963), pp. 360-367.

[5]Jimmye S. Hillman and Douglas Loveday, Surplus Disposal and Supply Control. Journal of Farm Economics, Vol. 46, No. 3 (August, 1964), pp. 593-602.

[6]Theodore W. Schultz, Value of U.S. Farm Surpluses to Underdeveloped Countries. Journal of Farm Economics, Vol. XLII, No. 5 (December, 1960), pp. 1019-1030.

of the study include estimation of the value of food aid to recipient countries, the cost to donor countries, and the efficiency of food aid relative to other types of aid.[7]

More specifically, the major objectives are:

1. To develop a theoretical framework to estimate the value to recipient countries of food aid relative to untied cash aid and to estimate the value of U.S. food aid by means of this framework.
2. To develop a theoretical framework to estimate the cost to the donor countries of food aid relative to the best alternative outlet for surplus commodities and to estimate the cost of U.S. food aid on the basis of this framework.
3. To estimate the social gain associated with food aid programs and its distribution between donor and recipient countries.[8]
4. To estimate the extent to which food aid substitutes for commercial food imports.
5. To develop policy guidelines for future external economic assistance to improve the efficiency of such assistance, with main emphasis on improving the combination of food and nonfood aid relative to alternative outlets for suplus food commodities.

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[7] Efficiency of foreign aid refers to the economic progress realized by the aid recipient per unit of aid.

[8] The social gain is the value of food aid to recipient countries less its value in best alternative use.

The remainder of this study is divided into five chapters. Chapter II includes a historical review of major U.S. foreign assistance programs during the years succeeding World War II with main emphasis on an explanation of Public Law 480.

Chapter III is devoted to a theoretical analysis of external economic assistance. The most important problems, fallacies, and misconceptions concerning foreign aid evaluation are discussed and a theoretical framework for evaluation is developed.

Chapters IV and V contain empirical analyses. The value of food aid relative to nonfood aid, the rate of substitution of commercial import for food aid and the market clearing price are estimated in Chapter IV. Chapter V is concerned with estimation of the real value to the recipient countries, the aid component, the net cost to the donor country, and the net social gains obtained from food aid.

Finally, Chapter VI contains a summary and conclusions from the study. The implications from the study are discussed and policy guidelines for future external economic assistance are suggested.

CHAPTER II

THE DEVELOPMENT OF U.S. FOREIGN ECONOMIC ASSISTANCE PROGRAMS

This chapter outlines the main trends in past legislative actions related to foreign aid. No attempt has been made to provide an exhaustive description of past foreign assistance programs. Only some of the most important programs are discussed and main emphasis is placed on a description of current programs and their most direct forerunners.

With World War II, foreign economic assistance became a key tool in American foreign policy and a major factor in world affairs. Prior to the war, U.S. foreign economic assistance was given on an irregular basis, usually to provide relief for victims of natural disasters, and the amount of assistance was small.

On March 11, 1941, Congress passed the Lend-Lease Act providing an economic weapon for the war effort of Great Britain and a few other nations. From 1941 through 1945 the United States provided $50.2 billion in aid under this Act.[1] Of this amount, $6.5 billion were spent on agricultural commodities.[2] The Lend-Lease assistance was

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[1]Murray R. Benedict and Elizabeth K. Bauer, Farm Surpluses, U.S. Burdens or World Asset? (Berkeley, 1960), p. 28.

[2]Ibid., p. 28.

entirely a wartime arrangement with no important carry-over of policy from it.[3,4]

Current economic assistance programs have their antecedents in the creation in 1942 of the Institute of Inter-American Affairs, a government agency responsible for providing U.S. technical assistance to Latin American countries.[5]

By the end of World War II, the United States had become involved in relief and rehabilitation in a large number of countries in Europe and Asia. Soon afterwards, the Truman Doctrine led to large scale military aid to Greece and Turkey. As the Cold War developed and the Marshall Plan was introduced to promote and accelerate war recovery in Western Europe, the volume of U.S. foreign assistance rose to unprecedented heights. The idea of aid for development of poor countries emerged as a logical extension of economic aid under the Marshall Plan for reconstruction of war-damaged economies. Programs from the late 1940's to the present have been more concerned with economic assistance, not for war-recovery, but for purposes of promoting or accelerating economic development and reducing human miseries such as starvation and malnutrition in less-developed nations. One of the underlying factors has been the communistic threat in poor countries.

United Nations Relief and Rehabilitation Administration

The United Nations Relief and Rehabilitation Administration

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[3]U.S. Department of State, The AID Story (Washington, D.C., 1966), p. 3.

[4]Benedict and Bauer, p. 28.

[5]U.S. Department of State, The AID Story, p. 3

program (UNRRA) was initiated in 1943. Its purpose was to provide food, clothing, shelter, and medical aid in the areas liberated from enemy occupation.[6] After the war, UNRRA became an important supplier of aid in some of the severely disorganized countries such as Poland, Yugoslavia, and Greece.

However, UNRRA was soon replaced as the primary channel for U.S. aid by more orderly procedures. These procedures provided for various forms of transitional aid to war-devastated countries. The most important of these aid programs was undoubtedly an emergency loan to Great Britain in 1946 of $3.8 billion or almost one-half of the total aid given under these procedures.

The European Recovery Program

Soon after World War II, it became clear that the war-damaged European countries needed external economic assistance if a quick recovery was to be obtained. This, along with recognition that a weak Europe might be an easy target for Communism, caused the United States to offer economic assistance to Europe on a scale never previously experienced in peacetime.

The main features of what was to become the European Recovery Program or Marshall Plan was outlined in 1947. The first appropriation under the program was made the same year and in 1948 a four-year program was established. The economic assistance provided under the Marshall Plan totaled $13.2 billion. The distribution of this amount among the various subprograms is shown in Table I.

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[6]Benedict and Bauer, p. 29.

TABLE I

FOREIGN ASSISTANCE COMMITMENTS OF AID AND PREDECESSOR AGENCIES FISCAL YEARS 1949-1966

Type of Assistance	The Marshall Plan 1949-51	Mutual Security Act 1952-61	Foreign Assistance Act 1962-66	Total 1949-66
		$ Million		
Development Loans[1]	0	1,987	5,821	7,808
Technical Assistance and Development Grants	86	1,276	1,487	2,849
Supporting Assistance	12,743[2]	11,462[3]	2,285[2]	26,490
Other Assistance including International Organization	331	1,834	1,916	4,081
Total	13,160	16,559	11,509	41,228

[1]This category covers loans both for projects and commodity programs, designed to stimulate economic development; also includes Alliance for Progress Loans for Latin America.

[2]These funds are used to provide economic aid directed primarily toward immediate political and security objectives; for example, economic assistance to a country engaged in a major defense effort. Direct military assistance is not included.

[3]During the period 1953-61 allocations made under supporting assistance programs were used jointly for economic and military assistance.

Sources: Agency for International Development, Operations Report. Data as of June 30, 1966, p. 60 and Harry Bayard Price, The Marshall Plan and Its Meaning. (Ithaca, 1955), p. 162.

The majority of the assistance was given as U.S. commodities, including large shipments of wheat and other foodstuffs. No direct payment was to be made to the United States for these commodities. When received by an European government, the commodities were sold through regular trade channels and the funds obtained were placed in a trust account, held in the name of the recipient country, from which they could be released only on U.S. approval. The funds were generally released for long-term development projects in the countries. The apparent success of the sales for non-convertible currencies, rather than outright grants or loans as a means of economic assistance in the European Recovery Program, undoubtedly was of great significance in structuring the later PL 480.

The Marshall Plan proved to be very successful in transforming the war damaged economies of the European countries into highly productive countries with great potential for sustained economic growth. The success of the program undoubtedly promoted appeals for economic assistance to other foreign countries. Hope for results in the poor countries of Asia, Africa, and Latin America similar to those obtained in Europe undoubtedly was a major force behind the sizeable foreign aid appropriations after 1952.

The Mutual Security Act

The European Recovery Program was successful, not only in building the economies of the western European nations, but also in restraining the spread of Communism. It may be argued that the latter success was caused primarily by the former. It was believed that the economic and defense assistance programs were mutually strengthening the free world

in its resistance to Communism. Therefore, major efforts were made in the U.S. Congress during 1950-51 to create a single legislative authorization under which the various U.S. foreign assistance programs could be gathered. The outcome was the Mutual Security Act of 1951.

The Mutual Security Act included all assistance programs existing at that time except the Export-Import Bank activities. The objectives of the Act was

> To maintain the security and promote the foreign policy of the United States by authorizing military, economic, and technical assistance to friendly countries to strengthen the mutual security and individual and collective defenses of the free world.[7]

It is apparent that the foreign assistance authorized under the Mutual Security Act of 1959 was aimed primarily at strengthening the position of the United States towards the Communistic Bloc, while economic development of the recipient countries per se was, at best, a secondary objective. The portion of the foreign aid funds allocated to direct military assistance was very large during the beginning of the 1950's. Military assistance accounted for 32 per cent of the total foreign aid allocation in 1951. It increased to 53 per cent in 1952 and about two-thirds in 1953, compared to 5 per cent in 1948-49 and about 16 per cent in fiscal year 1967.[8]

A small volume of surplus agricultural commodities moved under Mutual Security Acts of 1951 and 1952. Under the 1953 Act, however, a special section was added providing for use of surplus agricultural

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[7] William A. Brown, Jr., American Foreign Assistance (Washington, D.C., 1953), p. 509.

[8] Benedict and Bauer, p. 38 and U.S. Congress, Foreign Assistance Act of 1967, Hearings before the Committee on Foreign Relations, U.S. Senate, 90th Congress, 1st Session, p. 334.

commodities in foreign assistance. This section 550 provided for sales of surplus agricultural commodities for local currencies in a manner similar to that developed under the European Recovery Program except that the local currency funds obtained were to be deposited in the name of the U.S. Treasury rather than in the name of the recipient countries. The procedure used under section 550 is identical to that used in the later PL 480. In addition to sale for local currency, section 550 provided for a small amount of food aid as grants.

The provisions of section 550 were continued by section 402 of the Mutual Security Acts of 1954 to 1961. During this period, the amount of food aid under section 402 declined from $450 million in 1955 to $186 million in 1961. The decline of the amount of food aid carried out under the Mutual Security Act was due to the establishment of PL 480 in 1954.

Until the Mutual Security Acts were replaced by the Foreign Assistance Act in 1961, they had provided $16.6 billion in foreign assistance. However, some of that was for direct military assistance. The distribution among the various programs is given in Table I.

Agricultural Trade Development and Assistance Act

The Mutual Security Acts had opened the way for disposal of agricultural surpluses; and commodity stocks were mounting during 1953 and 1954. This situation, along with the real need for food and fiber in a large number of developing nations, pressed the U.S. Congress for a more extensive program of surplus food disposal to developing nations.

As an outcome of these pressures, the Agricultural Trade

Development and Assistance Act, popularly known as Public Law 480 or PL 480, was enacted in 1954. Enactment of this law laid the foundation for what came to be the most extensive international transfer of agricultural commodities, on an aid basis, that the world has experienced. During 14 years, 1955-68, $18.2 billion of U.S. farm products were exported under PL 480 (Table II). An additional $2.2 billion were shipped under Mutual Security programs, making a total shipment under government financed programs of $20.4 billion, or 29 per cent of total agricultural exports during this period.

PL 480 was originally scheduled to expire on June 30, 1957. However, the law has since continued to be extended by amendment. The various amendments to Public Law 480 have attempted to meet changing conditions, including changes in public attitudes that have occurred since 1954.

The primary objective of PL 480, as it was enacted in 1954, was to establish a politically acceptable outlet for the mounting surpluses of certain agricultural commodities. A secondary objective of the law was to aid in the promotion of economic development in friendly nations.[9]

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[9]Section 2 of PL 480, as initially enacted, reads as follows: "It is hereby declared to be the policy of Congress to expand international trade among the United States and friendly nations, to facilitate the convertibility of currency, to promote the economic stability of American agriculture and the national welfare, to make maximum efficient use of surplus agricultural commodities in furtherance of the foreign policy of the United States and to stimulate and facilitate the expansion of foreign trade in agricultural commodities produced in the United States by providing a means whereby surplus agricultural commodities in excess of the usual marketings of such commodities may be sold through private trade channels, and foreign currencies accepted in payment therefore. It is further the policy to use foreign currencies which accrue to the United States under this act to expand international trade, to encourage economic development, to purchase strategic materials, to pay United States' obligations abroad, to promote collective strength, and to foster in other ways the foreign policy of the United States." See: United States Code Congressional and Administrative News, 83rd Congress, Second Session 1954, Vol. 1, pp. 505-506.

TABLE II

U.S. AGRICULTURAL EXPORTS, FISCAL YEARS 1955-68

Type of export program	Market value	Portion of gov't prog.	Portion of total exports
	$ Million	Per cent	
PL 480:			
Sales for foreign currencies	11,347	55	16
Sales on long-term credit	925	5	1
Donations and disaster relief	3,204	16	5
Barter	2,674	13	4
Total PL 480	18,150	89	26
Mutual Security programs	2,223	11	3
Total export under government-financed programs	20,373	100	29
Total export outside government-financed programs	50,329	--	71
Total agricultural exports	70,702	--	100

Source of data: Foreign Agricultural Trade of the United States, November 1968, p. 21.

The objectives of PL 480, as amended by the Food for Peace Act of 1966, are stated somewhat differently.[10] The objectives of combating hunger and malnutrition and encouraging economic development in developing nations appear to be ranked ahead of the objective of surplus disposal. Furthermore, particular emphasis is placed on assistance to those nations that are determined to improve their own agricultural production.[11]

PL 480 originally contained three titles. Title I authorized the sale of U.S. surplus agricultural commodities to friendly nations with payment in the currency of the recipient nation. Title II authorized donations of agricultural commodities held in stock by the Commodity Credit Corporation (CCC) for famine and disaster relief in foreign nations, and Title III provided for the disposition of CCC owned surplus commodities to carry out two separate programs: (a) domestic donation programs administered by various government agencies or by recognized voluntary nonprofit charitable and relief organizations and foreign donations to needy peoples through American voluntary agencies and international organizations; and (b) barter to obtain certain

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[10] Public Law 89-808, 80 Stat. 1526, approved November 11, 1966, effective as of January 1, 1967.

[11] Section 2 of PL 480, as amended by the Food for Peace Act of 1966, reads as follows: "The Congress hereby declares it to be the policy of the United States to expand international trade; to develop and expand export markets for United States agricultural commodities; to use the abundant agricultural productivity of the United States to combat hunger and malnutrition and to encourage economic development in the developing countries, with particular emphasis on assistance to those countries that are determined to improve their own agricultural production; and to promote in other ways the foreign policy of the United States." See: United States Code Congressional and Administrative News, 89th Congress, Second Session 1966, Vol. 1, pp. 1761-1776.

strategic materials as well as off-shore procurement of goods and services. The 1959 amendment to PL 480 added a fourth title. This title, Title IV, provided for sale of commodities on long-term dollar credit. The 1961 amendment authorized, under Title II, donations of CCC-owned commodities for community development, school lunch programs, and other economic development purposes in foreign nations.

A more detailed analysis of the four Titles, as they exist January 1, 1968, is given in the following.

Title I

Title I authorizes the President of the United States to negotiate and carry out agreements with friendly nations to provide for the sale of agricultural commodities for non-convertible currencies or for dollars on credit terms.

Sales for Non-Convertible Currencies

Up to the present, sales for non-convertible currencies under Title I have been the major phase of the PL 480 program in terms of the quantities of commodities involved. This is apparent in Table II, which shows the total value of shipments under PL 480 through fiscal year 1968 and the distribution among the various programs.

Sales of commodities for non-convertible currencies is carried out through private trade channels within the framework of agreements between the United States government and the participating nations' governments. The first step in the procedure is an application from a foreign country. This application as well as the surrounding conditions are carefully analyzed by the U.S. government in order to determine

whether the application is a sound basis for an agreement.

A number of factors are taken into account in such an analysis, including (1) the participating country's efforts to help itself towards a greater degree of self-reliance, including efforts to meet its problems of food production and population growth;[12] (2) the participating country's needs, economic status, and foreign exchange position; (3) the possible impact on dollar sales and other export programs; (4) the effect on export markets of other supplying countries; and (5) the relationship of the program to the foreign aid program and the foreign policy of the United States.

If the analysis indicates that sale for a non-convertible currency is appropriate, negotiations concerning the content of an agreement take place. An agreement between the U.S. government and a foreign country usually covers the quantity and price of commodities involved, the exchange rate between the foreign currency and the U.S. dollar, and the terms for the deposit and use of the foreign currency funds involved in the agreement.

After the agreement is completed, the actual trade transactions are handled by U.S. commercial exporters and importers or buying missions designated by the purchasing country. The U.S. exporters acquire the commodities, either from stocks owned by the Commodity Credit Corporation or from the domestic market and transport them to the foreign country. The exporters are paid in dollars from the U.S. treasury.

As the shipments are received, the recipient country's government

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[12]This factor was introduced into PL 480 by the 1966 amendment.

deposits to the account of the United States government an amount of its own currency equivalent to the dollar amount due.

Use of Foreign Currencies. The terms for the deposit and use of the foreign currency funds obtained from sales under Title I are usually included in each individual agreement under which the particular sale is carried out.

Section 104 of PL 480, amended as of January 1, 1967, specifies a wide variety of purposes for which the foreign currency funds may be used. A summary of the various purposes is given in the following.[13]

Foreign currencies including principal and interest from loan repayments, which accrue in connection with sales for foreign currencies under Title I, may be used for one or more of the following purposes:

(a) For payment of United States obligations;

(b) For carrying out programs of U.S. government agencies to

(1) help develop new markets for United States agricultural commodities on a mutually benefiting basis;

(2) finance international educational and cultural exchange activities;

(3) collect, collate, translate, abstract, and disseminate scientific and technological information and conduct research and support scientific activities overseas;

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[13]For a complete statement of Section 104 see: United States Code Congressional and Administrative News, 89th Congress, Second Session 1966, Vol. 1, pp. 1761-1776.

(4) acquire sites and buildings and grounds abroad for U.S. government use;

(5) finance acquisition, indexing and evaluations of foreign books and periodicals;

(c) To procure equipment, materials, facilities, and services for the common defense including internal security;

(d) For assistance to meet emergency or extraordinary relief requirements other than requirements for food commodities;

(e) For loans to U.S. business firms for business development and trade expansion in foreign countries, and for loans to domestic or foreign firms for the establishment of facilities for increasing the consumption of, and market for, U.S. agricultural products;

(f) To promote multilateral trade and agricultural and other economic development, particularly to assist programs of recipient countries designed to promote food production in food-deficit countries friendly to the United States;

(g) For the purchase of goods or services for other friendly countries;

(h) For financing programs emphasizing maternal welfare, child health and nutrition, and activities related to the problems of population growth;

(i) For financing activities assisting friendly developing

countries to become self-sufficient in food production;[14]

(j) For sale for dollars to U.S. citizens and nonprofit organizations for travel or other purposes.

Status and Uses of Foreign Currency. By June 30, 1966, the United States had entered into agreements with recipients of Title I shipments calling for the deposit of approximately $11.4 billion in the foreign currencies of 53 nations.[15] Table III shows the use of the foreign currency funds provided by agreements signed from 1954 through 1965 and during the Fiscal Year 1966 for four major categories of uses. The largest outlet for these foreign currency funds has been as loans to foreign governments. Almost one-half of the total amount of funds were used for that purpose.

Sale on Long-Term Dollar Credit

PL 480 was expanded in 1959 to include a fourth title providing for the sale of U.S. surplus agricultural commodities on long-term dollar credit by agreement between the United States and recipient governments. Delivery periods of up to 10 years were authorized but were, in most cases, limited to three years. The credit terms vary according to the recipient country's ability to pay. Up to fiscal year 1968, most agreements carried out under this provision have

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[14] Such activities are authorized under PL 480, section 406. This section is described at a later stage.

[15] U.S. Congress, Food for Peace, 1965, Annual Report on Public Law 480 (Washington, D.C., 1966) p. 31 and U.S. Department of Agriculture, 12 Years of Achievement Under Public Law 480 (Washington, D.C., 1967), p. 5.

TABLE III

USES OF FOREIGN CURRENCY, AGREEMENTS SIGNED JULY 1, 1954 THROUGH DECEMBER 31, 1965 AND FISCAL YEAR 1966

	1954-65 $ million equivalent[1]	Per cent	FY 1966 $ million equivalent[1]	Per cent
Loans to foreign governments	4,714	44.9	640	61.6
Various uses by U.S. agencies	2,384	22.7	208	20.0
Grants for economic development	1,808	17.2	0	0
Common defense	1,003	9.5	141	13.6
Loans to private enterprises	595	5.7	50	4.8
Total	10,504	100.0	1,039	100.0

[1]Market value including ocean transportation.

Compiled from: U.S. Congress, Food for Peace, 1965, Annual Report on Public Law 480 (Washington, D.C., 1966), pp. 136 and 138 and Agency for International Development, Operations Report, Data as of June 30, 1966 (Washington, D.C., 1966), p. 86.

included a 20-year repayment period with a short grace period and relatively modest interest rates. A 40-year repayment period including a 10-year grace period was introduced in Fiscal Year 1968.

An amendment to Title IV enacted in 1962 authorized the sale of U.S. surplus agricultural commodities on a long-term dollar credit basis by agreement between the United States and private entities of the United States or friendly foreign countries.

In 1966, an amendment to PL 480 moved the provision for sale of surplus agricultural commodities for long-term dollar credit from Title IV to Title I of PL 480. The same amendment removed the term "surplus" from the provision, making all agricultural commodities eligible under the provision whether they are currently in surplus or not.

Increasing emphasis is being placed on sales on long-term dollar credit. The Food for Peace Act clearly specifies that wherever feasible, sales for foreign currencies should be replaced by sales on dollar credit. Section 103 (b) of PL 480, as amended, states that the President shall "... take steps to assure a progressive transition from sales for foreign currencies to sales for dollars at a rate whereby the transition can be completed by December 31, 1971 ..."[16] The Food for Peace Act also introduced a requirement of down payment. Section 103 (k) states that the President shall:

> ... whenever practicable require upon delivery that not less than 5 percentum of the purchase price of any agricultural commodities sold under Title I of this Act be payable in dollars or in the types of kinds of currencies which can be converted into dollars.[17]

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[16] The Food for Peace Act.

[17] Ibid.

Government-to-government agreements signed under this provision through Fiscal Year 1966 amounted to $684 million at export market value. Private trade agreements amounted to $42 million, yielding a total of $726 million since the first agreement was signed in 1961. Shipments totaled $925 million through Fiscal Year 1968 (Table II). The shipments during Fiscal Year 1968 alone accounted for $293 million or about 32 per cent of total shipments under this provision.

In addition to increasing dollar sales of U.S. agricultural commodities, this program is designed to develop future foreign markets for U.S. agricultural commodities and to assist in the economic and social development of the recipient nations. For this purpose, an agreement is made between the United States and each recipient country regarding the purposes for which the recipient government should use the local currency which is generated by the total sales of the commodities. This agreement provides assurance that the use of the credit by the purchasing country would be coordinated with other U.S. development and assistance programs in that country. The local currency proceeds are being used to finance such projects as marketing and processing facilities, land reforms, and community development.

Title II

Title II of PL 480 authorizes the donation of U.S. agricultural commodities to meet famine or other urgent or extraordinary relief requirements, to combat malnutrition, to promote economic and community development in friendly developing countries, and for needy persons and nonprofit school lunch programs outside the United States. Such donations may be provided through friendly governments or through agencies,

private and public, including international, multilateral organizations such as the World Food Program.

Prior to the 1966 amendment, donations provided through certain agencies were placed under Title III of PL 480. As of January 1, 1967, however, all donation programs under PL 480 are placed under Title II.

Provision for use of food donations as a direct self-help incentive was introduced by the 1966 amendment. This provision marked the beginning of a shift from straight relief to self-help programs utilizing food as part payment of wages for work on community development projects.

Estimated net export market value of donations carried out under programs presently under Title II during the 14 year period 1955-68 totaled $3.2 billion. About $2.2 billion of this amount was donated through various U.S. relief agencies and international organizations, leaving $1.0 billion for direct assistance from the U.S. government.

Title III

As mentioned under Title II, certain donation programs were removed from Title III and included under Title II by the 1966 amendment. Left in Title III are provisions for barter transactions only. Under this provision, the U.S. government is authorized to barter agricultural commodities for goods and services procured abroad for stockpiling.

Barter transactions have been used primarily to acquire foreign produced strategic materials for government stockpiles. The program allegedly contributed to improvement of the U.S. balance-of-payments position by using agricultural commodities as payments for purchases

which otherwise would have been paid in dollars.[18]

During the period 1955-68, agricultural commodities valued at $2.7 billion were exported under the barter program (Table II). Shipments under this program accounted for 13 per cent of government financed exports and 4 per cent of the total U.S. agricultural exports during the period.

Title IV

Title IV was completely revised by the 1966 Food for Peace Act. Prior to this amendment, Title IV provided for sale of agricultural commodities on long-term dollar credit. This provision was moved to Title I by the 1966 amendment and Title IV now contains mainly general provisions and definitions. An interesting part of this Title is Section 406, which provides for extensive development programs in the recipient countries' agricultural sector financed primarily by local currencies obtained through sale of Title I commodities. The section is an attempt to promote a greater degree of self-sufficiency in food production in the developing countries, a goal that is often expressed as one of the main objectives of U.S. foreign aid programs. Section 406 specifies a number of development programs for which the acquired foreign currencies may be spent such as agricultural extension service, research in tropical and subtropical agriculture, and youth exchange programs.

The significance of Section 406 is that it allocates foreign currencies held by the United States into programs that improve the

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[18] U. S. Department of Agriculture, 12 Years of Achievement Under Public Law 480 (Washington, D. C., 1967), p. 12.

recipient nations' agriculture. Furthermore, if the programs require resources that cannot be obtained by the non-convertible currency, the section provides for additional dollar aid to import such resources.

Foreign Assistance Act

The original Foreign Assistance Act was inacted in 1961 to aid foreign countries and international organizations. The Act was later amended. The Foreign Assistance Act of 1967 consists of two parts: (1) Act of International Development and (2) International Peace and Security Act. The latter is concerned with military assistance, and therefore, falls outside the scope of this study.

The Act for International Development is probably the most important piece of legislation providing for nonfood foreign economic assistance since the Marshall Plan. The over-all objective of the Act is to assist developing countries in achieving economic growth by means of loans, grants, and technical cooperation. The Act provides for investment guarantees to private entities by the U.S. government for investments in projects contributing to economic development in friendly countries.

The Foreign Assistance Act of 1961 introduced a new way of thinking concerning U.S. foreign economic assistance. Prior to 1961, most U.S. nonfood aid was allocated according to short-term goals of U.S. foreign policy and little attention was paid to the effect of the aid on the recipient nations' economic development. The Foreign Assistance Act, however, emphasized the goal of economic progress and development in the poor countries. This new spirit may best be illustrated by a statement of the late President John F. Kennedy in the draft proposal

to the Foreign Assistance Act of 1961:

> Economic development assistance can no longer be subordinated to, or viewed simply as a convenient tool for meeting short-run political objectives. This is a situation we can ill afford when long-range, self-sustained economic growth of less-developed nations is our goal.[19]

A further extension of this new line of thinking, the self-help criteria, was introduced by the 1966 amendment. The self-help criteria stresses that U.S. assistance be allocated among countries according to their own individual efforts towards development. It was stressed that U.S. assistance should be used to support, rather than to substitute for, "the self-help efforts that are essential to successful development programs, and should be concentrated in those countries that take positive steps to help themselves".[20]

The Agency for International Development (AID) was established in 1961 to carry out the functions of the Foreign Assistance Act. The AID has responsibility for carrying out non-military U.S. foreign assistance programs and for continuous supervision and general direction of all assistance programs under the Foreign Assistance Act. It also carries out certain functions under PL 480, primarily allocation of some of the local currency funds made available under this program.

Economic assistance under the International Development Act through Fiscal Year 1966 totaled $11.5 billion (Table I). The majority of the assistance was nonfood, although a small volume of food assistance has

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[19] U. S. Congress, Executive Communication, Transmitting Draft Legislation to Provide for Aid to Social and Economic Development Under an Act for International Development. 87th Congress 1st Session (Committee Print).

[20] U. S. Code Congressional and Administrative News, 90th Congress 1st Session, p. 2958.

been provided under AID programs, primarily as exports under the development loan program.

A Summary of Recent Changes in Political Attitudes Towards Economic Assistance

Food Aid

The Food for Peace Act of 1966 introduced a number of changes in the legislation concerning foreign food aid programs. Some of these changes merely emphasized past trends in political attitudes towards the role of food in foreign economic assistance. Other changes, however, seem to introduce new ideas and attitudes on how the food aid programs should be administered and how food aid should relate to other forms of economic assistance.

Introduced by the 1959 amendment to PL 480, the trend from sale for foreign currencies to sale on long-term dollar credit was further emphasized and encouraged by the Food for Peace Act. Transition from sale for foreign currencies to sale on dollar credit to the greatest extent possible is emphasized in the Act. Furthermore, the Act specifies that at least five per cent of the price on all sales must be paid in cash (dollars) whenever practicable.

The Food for Peace Act of 1966 indicates a very important change in the attitude of the Congress towards the objectives of U.S. food aid programs. An initially inacted, PL 480 was mainly to be considered a measure of surplus disposal. However, during recent years, as the stocks of surplus commodities have been diminishing, the political attitude has changed towards considering food aid as a means to promote

economic development in the recipient countries by supplementing other types of foreign aid. This trend culminated in the Food for Peace Act. The objectives of combating hunger and malnutrition and encouraging economic development in the recipient countries play a dominant role in this Act. Prior to the amendment of PL 480 made by the Food for Peace Act, only surplus commodities were included in the food aid programs carried out under PL 480. However, under the Food for Peace Act, the PL 480 programs are not limited to surplus commodities. Conversely, the programs ostensibly are limited to commodities which the recipient countries cannot obtain through its own resources. In other words, the needs of the developing countries presumably are considered before the need for surplus disposal.

Another change in recent legislation that points towards more emphasis on the economic development aspect of U.S. food aid programs is the introduction of the "self-help" clause into PL 480. The Food for Peace Act emphasizes that before an agreement is carried out concerning sale for foreign currency or sale on long-term dollar credit, the efforts of the participating country to help itself toward a greater degree of self-reliance should be considered. Particular attention is paid to the country's efforts to meet its problems of food production and population growth. By making U.S. food aid available to a country only if it shows willingness to make an effort to narrow the gap between domestic food production and demand, one of the dangers of foreign food aid, negligence of the domestic agriculture resulting in a extended reliance on the donating country for food, may be avoided.

Introduction of the above mentioned clauses into the U.S. legislation clearly indicates a growing commitment, in the U.S., for use of

food aid to promote long-run improvements in the economic conditions of the recipient nations. There are indications, however, that the United States is not willing to include food aid in the total foreign assistance program on a basis equal to other forms of aid. One such indication comes from the draft for the Food for Peace Act, U.S. Senate report No. 1527. The report states that:

> There have been some ideas expressed that under this new program (Food for Peace Act) food aid is going to become just a part of the foreign assistance program, and that it will then be treated just like dollar aid. We want to make it clear that this is not the case.

The report continues:

> Food aid cannot be treated as dollar aid simply because this would present too great a risk to American farmers and American consumers. Domestic needs and supplies, together with price support and acreage allotments that affect agricultural production, must be integral factors in our food aid programs. This is why food aid must be handled separately.[21]

Non-Food Aid

The most important recent trends in economic assistance programs is undoubtedly the increasing emphasis on use of aid to obtain real economic progress in the recipient countries rather than to further short-run goals in U.S. foreign policy. The previously mentioned self-help criteria is one indication of this trend.

However, it is quite clear that the amount and distribution of U.S. assistance, to a very large extent has been, is, and most likely will continue to be directed by political decisions determined by domestic surpluses, by budget limitations, balance of payments, the

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[21] U.S. Code Congressional and Administrative News, 89th Congress, 2nd Session 1966, pp. 4410-4445.

development of the Cold War and the political directions in which the various developing countries choose to move.

U.S. foreign aid authorizations have been reduced significantly during recent years. The authorizations made in 1968 totaled $1.6 billion. That is the smallest annual amount allocated to foreign aid since the initiation of the Marshall Plan. The largest amount ever authorized was approximately $8.0 billion in 1951. Since then, the foreign aid appropriations have trended downward.

It is difficult to predict whether this trend will continue in the future. The attitude of the U.S. Congress towards foreign aid allocations in the years to come will be determined by a number of domestic and international factors. It appears that the impact of past U.S. foreign aid on the rate of growth in the recipient countries has been somewhat less than expected by the U.S. Congress. This, along with the increasing threat of social change in the recipient countries in a direction disfavored by the U.S., may cause some discontent in the U.S. Congress and influence future foreign aid appropriations.

CHAPTER III

A THEORETICAL ANALYSIS

Little and Clifford define aid as the value of the subsidy implicit in the total flow of resources from donor to recipient country.[1] Evaluation of the foreign economic assistance within this definition is a complex process. Foreign economic assistance consists of a conglomeration of loans, grants, and sales for non-convertible currencies. The assistance may be more or less tied to certain commodities or projects. Furthermore, the length of the repayment period and the rate of interest on loans as well as the use of non-convertible currency vary among programs and among recipient countries.

Because estimation of the aid component present in these programs is not easy, most past evaluations have been based either on the cost to the donor country or, in the case of surplus commodities, on prevailing world market prices. Few attempts have been made to estimate the aid component involved.

Such evaluations may be very misleading. In certain cases, as explained later in this chapter, such evaluations can discriminate against the recipient countries, resulting in a smaller real aid to a certain country than would have been the case if correct information had been available.

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[1] I. M. D. Little and J. M. Clifford, International Aid (London, 1965), p. 13.

In the following pages, important problems, fallacies, and misconceptions concerning foreign aid evaluation will be discussed and a theoretical framework for evaluation will be suggested. The theoretical framework consists of procedures to estimate (1) the expected world market price if all food aid programs were discontinued and the food presently exported under these programs were added to the prevailing supply on the world market; (2) the value of food aid relative to cash aid; (3) the aid component present in food aid under the various aid programs; (4) the net cost to the donor country; and (5) the social gain associated with food aid programs.

Evaluation of Foreign Economic Assistance -- Problems and Misconceptions

Capital Assistance

In a competitive market the benefit of any commodity involved in a trade transaction tends to be the same for buyer and seller.[2] This need not be the case in transactions where the price system is replaced by some other allocator. In foreign aid programs, it is often found that the cost to the donor country varies significantly from the benefit to the recipient country. In fact, only a small amount of the total capital assistance flowing into developing countries has a real value to the recipient countries as high as its face value.[3]

Some instances in which the benefit to the recipient country equals

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[2]The marginal utility of any commodity is assumed equal to its price.

[3]The "face value" of capital assistance is defined as the cost to the donor country.

the cost to the donor country are (1) grants of convertible currencies, and (2) grants tied to commodities or projects for which the recipient country would have used the grants anyway. The volume of the former type of assistance has been negligible in recent U.S. programs. The extent to which the latter type of assistance has been utilized cannot be determined with great certainty. It appears, however, that the interests of the donor concerning investments of the capital assistance in many cases differ from the interests of the recipient country. Where the donor has some influence over use of assistance, the benefit to the recipient country may differ from the face value of the assistance.

This brings up problems of evaluating capital assistance which may be tied in a number of ways. U.S. capital assistance is often tied to an agreement that the assistance be used for U.S. products to be shipped on U.S. vessels. The primary purpose of this type of typing is to protect the donor country's balance of payments or merchant marine. Where capital assistance is tied to products produced by the donor country, aid "can bring about cumbersome limitations on the freedom of the recipient to choose freely the most suitable sources of supply on the international market".[4] To the extent that the U.S. cannot provide the products demanded at competitive prices or cannot provide transportation at competitive rates, this type of tying reduces the benefit of the assistance to the recipient country.

The U.S. sometimes ties foreign capital assistance to certain projects. If such tying arrangements cause an allocation of resources

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[4] Development Assistance Efforts and Policies, 1966 Review (Paris, 1967), p. 87.

that deviate from the allocation of resources wanted by the recipient country to maximize economic progress, the value of the assistance is less than its face value.[5]

Experience indicates that capital assistance has in fact been misallocated in a large number of past programs due to tying arrangements.[6] A large portion of the capital assistance has been tied exclusively to import of capital goods for new projects. This may cause unfavorable economic consequences for the recipient countries in the long run. If a country accepted all the capital goods offered for new projects, then it might not be able to meet both the domestic cost of the projects for which these capital goods are intended, and carry out, without growth reducing inflation, all the other desirable investments and current government expenditures for which no foreign assistance is available.[7] Furthermore, if too much capital assistance is allocated to new projects, the recipient countries may be unable to import the goods necessary to maintain the projects. The impact of such economic assistance on the recipient countries' economic growth is reduced by the tying arrangements because of less than full utilization of the productive capacity created by the capital inflow and because of inflation. A classical example of underutilization of the productive capacity is technical equipment originally provided as foreign assistance which stands idle for lack of spare parts. Neither the domestic

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[5]It is assumed that the over-all goal of the recipient governments is to maximize economic progress and that these governments have the ability to select the best means to reach this goal.

[6]Development Assistance Efforts and Policies, 1966 Review, p. 87.

[7]Little and Clifford, p. 161.

economy nor the balance of payments allow for maintenance of the project provided by foreign assistance.

A procedure for allocating foreign capital assistance whereby the advanatages of tying are maintained and the adverse effects are reduced would be to incorporate the capital assistance into the development plan for each recipient country. This procedure is being followed in some countries but only a small proportion of the total U.S. assistance is included in such plans. One suggestion is that, with the exception of assistance for emergency relief, all countries should be required to develop a workable long-run economic plan in order to qualify for U.S. economic assistance.[8] By including all economic assistance programs not for emergency relief into the recipient countries' economic plans and by close supervision by the donor as well as the recipient country to assure that the assistance is actually used for the purposes for which it was designed, a higher degree of coordination could be obtained. Hence, the efficiency of the assistance would increase.

Tying reduces the value to the recipient countries whether the assistance is provided on a grant or a loan basis. However, accurate estimation of the aid component in assistance provided by loan introduces additional complications. Loans contain only an element of aid. It is clearly misleading to lump loans, grants, and other kinds of assistance together when assessing either the cost to donors and lenders or the benefit to recipients. Nevertheless, such practices have been followed in the past.

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[8]The judgment as to whether the plan is to be considered workable could be made by a group of economists from, say, the country in question, the donor country, the United Nations and the International Bank for Reconstruction and Development.

A correct evaluation of capital loans should be based on the opportunity cost of capital.[9] The aid component involved originates from the difference between the rate of interest charged on the loan and the opportunity cost of capital under equal risk. Loans are usually not evaluated on this basis. In most cases the total outlay, whether it is for loans or grants, is considered as the magnitude of assistance. The Organization for Economic Co-operation and Development emphasizes this point in a recent publication:

> There is little doubt but that the gross amount (of loans) represents the amount of contributed "assistance" in the minds of Finance Ministers and the legislators. Even if an equal amount were being paid back as the result of previous loans, the gross out-payments would still be regarded as indicating the size of the national effort, measured as a budgetary burden.[10]

Commodity Assistance[11]

The majority of the U.S. commodity assistance consists of food products. Evaluation of food assistance poses certain unique problems due to the existence of excess capacity in U.S. agriculture. The following analysis of procedures to evaluate commodity assistance is based primarily on food commodities. Problems of evaluating non-food

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[9]The opportunity cost of capital may be based on the interest foregone by the donor country or it may be based on the rate of interest the recipient country would have to pay to obtain capital from alternative sources. If a perfrect international capital market exists, the two rates would be equal.

[10]Development Assistance Efforts and Policies, 1966 Review, p. 35.

[11]The term "commodity assistance" is defined in this discussion as referring to assistance in the form of goods for direct consumption. Other commodity assistance is treated as tied capital assistance as previously discussed.

consumption goods are largely similar to those discussed under capital assistance.

U.S. food aid is principally provided under three different programs: (1) sales for non-convertible currencies, (2) long-term dollar credit, and (3) grants. Common to all three programs is the problem of pricing of the commodities in question. In a free market, price determination is based on the interaction of demand and supply. Such an automatic price determinant is not present in commodity assistance programs. Hence, pricing must be done either by bargaining or by following certain guidelines.

The guidelines most often used in the past have been the world market prices prevailing at the time of the transactions. Whether pricing at the prevailing world market price overvalues food aid may be determined by estimating the expected world market price under the assumption that all food aid programs are discontinued and the food presently exported under these programs is added to the prevailing supply on the world market.[12] Assuming also that the world market is the best alternative outlet for the food commodities presently included in food aid programs, a market clearing price represents the best alternative price of a commodity.[13] Hence, the market clearing price should be the basis for pricing of a commodity exported under aid programs. Pricing above the market clearing price introduces an element of gain to the donor country and the transaction is not purely an aid transaction.

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[12]For simplicity purposes, the expected price as defined above will be termed "the market clearing price" in the following.

[13]Domestic supply control may not be feasible either for economical or political reasons.

There are essentially three cases for which a pricing procedure based on prevailing world market prices is appropriate: (1) If the quantity sold through the world market is very large relative to the quantity not sold through the world market but for which the world market prices are applied. This condition is not present for most commodities available under U.S. food aid programs. For example, U.S. wheat export under food aid programs in fiscal year 1965 amounted to approximately 79 per cent of the total U.S. wheat export and 31 per cent of the world export in wheat.[14] (2) If the demand in the world market is perfectly elastic. It is very unlikely that this condition will be present. Tweeten estimated the elasticity of demand for U.S. food and feed in the world market to be -1.91 in the intermediate run and -6.42 in the long run.[15] Tweeten further suggests that the U.S. may be faced with a kinked demand curve in the export market, hence the above elasticities may be biased upward when one considers the effect of a price decrease.[16, 17] In any case, the demand seems far from being perfectly elastic. (3) If a shift of the total quantity presently exported under food aid programs into the world market is associated with a shift in world market demand of the same magnitude as the shift in supply. In other words, if all food presently exported under food aid programs were

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[14]Estimated on the basis of data from U.S. Department of Agriculture, Agricultural Statistics (Washington, D.C., 1966).

[15]Luther G. Tweeten, "The Demand for United States Farm Output," Food Research Institute Studies, Vol. VII, No. 3 (Stanford, 1967), p. 306.

[16]Ibid, p. 363.

[17]If competing exporters do not react to a price increase of U.S. food but follow the U.S. in a price decrease, a kinked demand curve is obtained. Hence, the elasticity of demand is higher for a price increase than for a price decrease.

shifted from food aid to commercial sale in the world market, the previous recipients of food aid would increase their commercial demand on the world market by an amount equal to the previous food aid. There are no indications that this would in fact be the case. Conversely, the provisions for PL 480 specify that the food imported under food aid programs should not replace any ordinary commercial import. If this were so, it would mean that a discontinuation of the food aid programs would have no effect on world market demands. This, too, is not very realistic. It is likely that the present food aid programs substitute for some commercial demand. Hence, a discontinuation of the present food aid programs would cause the developing countries to expand their demand in the world market by some amount, however less than the amount of food aid they previously received. The proportion of the food aid demand that will be converted into commercial demand will vary from country-to-country and will be determined by a large number of factors such as the balance of payments, the production potential of the domestic agriculture, and the extent to which the past food aid exceeded actual needs of the recipient country.

Since none of the three possible cases mentioned above are likely to be present, it seems safe to conclude that pricing of food aid based on prevailing world market prices is inappropriate and incorrect. The procedure overvalues the commodities exported under food aid programs.

Suggested Pricing Under the Various Aid Programs

The importance of realistic pricing of commodities exported under food aid programs differs for the various aid programs. Each of the three programs: grants, sale for non-convertible currencies, and sale

on long-term dollar credit will be considered separately.

In the case of grants, realistic pricing is important only in the sense that it is the basis for evaluation of the aid under consideration. If prices are biased upward, the real value of the aid is less than the estimated value. Miscalculated values may cause misallocations of other types of aid. The amount of nonfood aid may be lower to countries receiving a large quantity of food than if the food were correctly evaluated. Furthermore, inflated valuation of the aid may reduce the total flow of real aid to developing countries. A number of economists in developing countries have expressed concern over this problem. Sen puts it this way:

> At first sight, it may seem that the present accounting procedure which exhibits a higher dollar figure for the food aid is not of much consequence. But it may have an unfortunate effect if in any way it creates a feeling of complacency in the donor country which may have the effect of slowing down the direct foreign exchange assistance which the underdeveloped countries badly require.[18]

In the case of sales for non-convertible currencies, the dollar value of a certain shipment often has been determined by the prevailing world market price. After the dollar value has been established, an exchange rate between U.S. dollars and the non-convertible currency is determined and the amount of the local currency is calculated. If the pricing procedures are upward biased, the amount of local currency is too high, hence the recipient country paid too much for the shipment.

Correct pricing would be of no greater importance in this case than in the case of grants if the majority of the local currencies not

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[18] S. R. Sen, "Impact and Implications of Foreign Surplus Disposal on Underdeveloped Economies -- The Indian Perspective," Journal of Farm Economics, Vol. 42, No. 5 (December, 1960), p. 1037.

used by the U.S. was returned to the recipient country as grants. Until recently, a large portion of the local currencies was in fact given back as grants. However, the main emphasis today is on loans; i.e., the amount of the local currencies not used by the U.S. is primarily used for development loans to the recipient countries. In this case, it is clear that a pricing procedure that causes too high prices will have an adverse effect on the economy of the recipient country. If the commodities were priced correctly, the same amount of food could be obtained for a smaller outlay. Hence, the savings by the consumers could be made available for private investment or to the state for development purposes. Therefore, unduly high pricing of commodities sold for non-convertible currencies has a net effect of making the U.S. own more of the currency than if pricing were more realistic. Overpricing in turn places an undue burden on the recipient country of repaying loans to the U.S. local currency accounts.

Another factor in favor of realistic pricing is the current efforts to replace sales for local currencies by sales on long-term dollar credit. In the countries where this is accomplished, repayments on local currency loans will be the only local currency receipts for the U.S. These funds may be used to cover U.S. costs of embassy maintenance, market development, etc., as they are repaid. This means that the local currency funds may substitute for U.S. dollars long after the termination of the sales for local currencies. If a large portion of the local currencies is used for this purpose, it is obvious that an upward bias in prices of the commodities may have an adverse effect on economic growth in the recipient countries.

In the case of export under long-term dollar credit, the importance

of correct pricing is very great. Incorrect pricing leads to incorrect credit obligations which in turn lead to incorrect payments by the recipient countries. Pricing at prevailing world market prices commits recipient countries to a larger dollar credit than if correct pricing were used.

As mentioned under capital assistance, the aid component of foreign assistance loans consists of the opportunity cost of capital less the interest payments required. However, the portion of the credit commitments that is due to upward biased commodity prices should be considered a negative aid component. Hence, the real aid involved is determined by the relative magnitudes of the two components. If the risk is low or the pricing procedure used causes a considerable upward bias in prices, the real aid involved may be negligible.

In spite of the serious deficiencies of a pricing procedure based on prevailing world market prices, past food aid has been priced and evaluated almost exclusively on this basis. Pricing based on the prevailing world market prices is convenient and easy to apply. However, as more food aid is shifted from sale for local currencies to sale on long-term dollar credit, the adverse effects on the recipient countries of incorrect pricing are increasing in importance. Therefore, it seems appropriate to base pricing of food aid commodities on the expected world market price in the absence of U.S. food aid programs, the market clearing price, rather than on the prevailing world market price. A procedure to estimate the market clearing price will be suggested in a later section of this chapter.

Other Aspects of Pricing and Evaluation

Another factor that enters into the evaluation of food aid is the cost of transportation and handling of the commodities. If the recipient countries pay these costs, the actual value of the aid is reduced correspondingly.

Instead of the prevailing world market price, another procedure used to value food aid has been the total U.S. outlay for the commodities in question. This procedure has been applied primarily for food aid allocated on a grant basis.

The total cost to the U.S. of surplus products reflects costs of farm programs, storage costs, and various other costs that have no bearing on the value of the product to the recipient country. Therefore, an evaluation of food aid based on this principle does not in any way indicate the value of the food aid to the recipient country; it merely reflects the cost of U.S. excess production. Nevertheless, this procedure has been used extensively in the past and is still used for food aid given on a grant basis. Even though the recipient countries make no repayment, a misevaluation misinforms the public and may cause malallocation of aid under this program as well as of aid under other programs. The total cost to the Commodity Credit Corporation of surplus products distributed as grants during recent past has been about twice the prevailing world market price.[19] Hence, overvaluation of food aid is larger when valued at the total costs to the donor country that when valued at prevailing world market prices.

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[19]Estimated on the basis of: U.S. Congress, Food for Peace, Annual Reports 1964 and 1965 (Washington, D.C., 1965 and 1966).

Some suggested principles for realistic pricing and evaluation of the various foreign assistance programs may be summarized as follows:

1. The unadjusted aid component of grants of convertible currency equals the face value of the grant.
2. The unadjusted aid component of untied loans and long-run dollar credit consists of the opportunity cost of capital less the interest payments by the recipient country.
3. The unadjusted aid component of sales for non-convertible currencies consists of the reported value of the commodities less the proportion of the non-convertible currency replacing dollar spending in the country.
4. Tying of capital aid to certain products or projects may reduce the aid component. If the aid is incorporated in the recipient countries economic plans this reduction may be negligible.
5. If pricing of surplus agricultural commodities is based on a set of prices higher than the market clearing prices, the aid component is reduced accordingly.
6. If the cost of transportation and handling of food aid commodities is paid by recipient countries, the aid component is reduced accordingly.
7. To estimate the net aid component involved, it is necessary to subtract the reductions as mentioned under points 4, 5, and 6 from the unadjusted aid components defined under points 1, 2, and 3.

Suggested Procedure for Estimation of the Market Clearing Price

The usefulness of the market clearing price as a value indicator for commodities exported under food aid programs was discussed in the previous section. As previously defined, the market clearing price is the expected export price if all food aid programs were discontinued and the food presently exported under these programs were added to the prevailing commercial export supply. It is based on a free market price determination. Estimation of the market clearing price is not an attempt to predict the export price that would actually occur. Due to institutional trade arrangements, it is very doubtful that the export prices would be permitted to fall as necessary to restore a free market equilibrium. As a value indicator, however, the market clearing price appears to be appropriate.

A suggested procedure for estimating the market clearing price is illustrated in Figure 1. 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 extend substitutes for commercial demand, the discontinuation of the food aid programs causes world market demand by the developing countries to increase. However, as discussed earlier, the shift in the demand curve will be less than the shift in the supply curve. The new demand curve is shown by D_2, and the new world market price is indicated by P_2. The two demand curves are shown in Figure 1

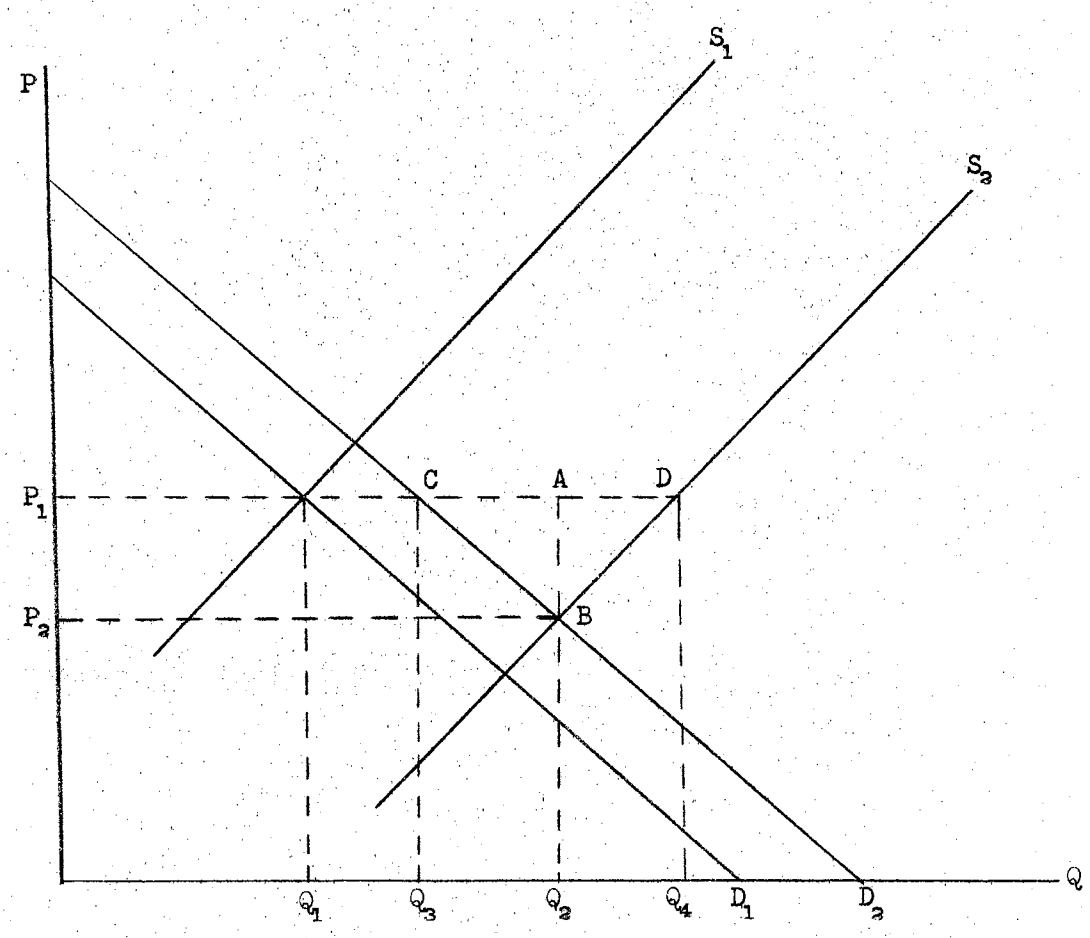

Figure 1. Illustration of Procedure to Estimate the Market Clearing Price

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 a succeeding chapter, 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 of D_2. However, this does not affect the validity of the procedure outlined below.

Assuming that the world market is the best alternative outlet for U.S. food presently exported under food aid programs, P_2 is the best alternative price. If commodities sold on long-term dollar credit were priced at P_2, the aid component would be determined by the opportunity cost of capital less the interest payments on the credit. However, a price higher than P_2 charged the recipient countries reduces the aid component. It is possible that the prices charged for commodities may deviate so much from P_2 that the aid component may be completely offset, leaving the donor rather than the recipient country as the real beneficiary.

The three primary reasons why developing countries may participate in such transactions are (1) that the available alternatives may be unacceptable to the country, e.g., mass starvation, (2) lack of knowledge, and (3) that the recipient countries may be concerned primarily about the short-run situation. Repayment of the dollar credit may not be taken into consideration and food aid on long-term dollar credit may be accepted as if it were grants, hence the price level is viewed to be of little significance. In all three cases, acceptance of overpriced commodities is due either to the recipient countries' weak bargaining

position or lack of information. However, from a political point of view, it will probably be advantageous for the donor country to avoid exploitation of its bargaining position. Relatively unstable developing countries may well solve the problem of repayment of credit by turning to other world powers to the detriment of relations with the donor country. The larger the debt, the greater is the chance that this will occur.

In order to find P_2, the market clearing price, 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 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 mutliplied 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:

E_D = price elasticity of export demand

E_S = price elasticity of export supply

$\left(\frac{dp}{dq}\right)_D$ = slope of the demand curve (D_2 in Figure 1)

$\left(\frac{dp}{dq}\right)_S$ = slope of the supply curve (S_2 in Figure 2)

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 food 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 $\cdot$ ΔS = increase in commercial import by aid-recipients if U.S. aid programs are terminated

$AC = Q_3 - Q_3$

$AD = Q_4 - Q_2$

$AB = P_1 - P_2$.

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

$$CD = (Q_4 - Q_1) - (Q_3 - Q_1) = Q_4 - Q_3 \tag{1}$$

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

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

But $\left(\frac{dp}{dq}\right)_D = \frac{AB}{AC}$; $\left(\frac{dp}{dq}\right)_S = \frac{AB}{AD}$;

and $CD = CA + AD$.

Solving (2) and (3) for AB yields

$$AB = \frac{AC}{E_D}\frac{P_1}{Q_1}; \quad AB = \frac{AD}{E_S}\frac{P_1}{Q_1}$$

hence $AC = \frac{E_D}{E_S} AD$

but $AD = CD - AC$.

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

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

From (2) one obtains

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

$$= \frac{CDP_1}{\left(\frac{E_S}{E_D} + 1\right) E_D Q_1} = \frac{CDP_1}{\left(E_S + E_D\right) Q_1}$$

but $CD = \Delta S - \Delta D$

and $P_2 = P_1 - AB$

therefore, $P_2 = P_1 - \frac{(\Delta S - \Delta D)P_1}{(E_S + E_D)Q_1}$

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

but $\Delta D = ARS \cdot \Delta S$, since ARS is defined as the change in

commercial import demand per unit change in food aid.

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

The procedure for estimating the market clearing price is used in Chapter IV in an empirical analysis based on survey data. Furthermore, the market clearing price, as estimated by this procedure, is used in the development of a procedure to estimate the net cost to the donor country of food aid and a procedure to estimate the aid component involved in food aid programs.

Suggested Procedure to Estimate the Value of Food Aid Relative to Untied Cash Aid

Several attempts have been made in the past to estimate the value to the recipient countries of food aid relative to other types of aid. Using a deductive procedure, Schultz estimated the value of PL 480 products to the recipient countries to be about 37 cents for each dollar of CCC-costs.[20] Valued at prevailing world market prices, Schultz found the export market value of the PL 480 commodities to be 70 per cent of the CCC-costs. He further "guessed" that the value of the aid using world market prices would be about one-half of CCC-costs if all farm surpluses were sold on the world market.[21] Hence, the value of food aid was estimated to be 37 per cent of CCC-costs, 53 per cent

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[20] Theodore W. Schultz, "Value of the U.S. Farm Surpluses to Underdeveloped Countries," Journal of Farm Economics, Vol. XLII, No. 5, December, 1960, pp. 1019-1030.

[21] Ibid., p. 1022.

of export market value if valued at prevailing world market prices, and 70 per cent of export market value if valued at expected market clearing prices.

Fitzgerald estimated that "one-half to two-thirds of the net increase in long term assistance resulting from food aid went into investment, or released equivalent funds for investment," with the remaining going into increased levels of consumption.[22, 23]

However, increasing levels of consumption may be looked upon as investment in human resources. Hence, the value of food aid to the recipient countries would consist of the direct effect on conventional investment as well as the effect on long-term investment in human resources. While the proportion of food going into conventional investment may be valued at full world market value, the value of the proportion going into increased levels of consumption is more difficult to estimate.[24] Fitzgerald made no attempt to estimate this latter value.

Other studies have estimated the value of food aid relative to other types of aid. Common to all of them, however, is a strictly deductive methodology, with little or no support from actual data. An attempt is made in this study to estimate the value to the recipient countries of food aid relative to untied cash aid on the basis of actual data.

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[22] D. A. Fitzgerald, Operational and Administrative Problems of Food Aid, Food and Agriculture Organization of the United Nations. World Food Program Study No. 4 (Rome, Italy, 1965), p. 4.

[23] Ibid., p. 4.

[24] Only part of the aid going into increased levels of consumption can be attributed to productive investment while the remaining contributes to the immediate welfare of the consumers only, and may have little or no impact on economic development.

The problem setting may be expressed in terms of indifference curves. Given a certain indifference curve, the average value of food relative to untied cash aid may be found for each quantity of food simply by the ratio of food to untied cash aid at this particular point. In Figure 2, the average value of x_1 dollars' worth of food, valued at prevailing world market prices, in terms of untied cash aid is given by y_1/x_1, i.e., each dollars' worth of food aid valued at prevailing world market prices is of the same value to the recipient country as y_1/x_1 dollars in untied cash aid.

The relative value at the margin is simply the marginal rate of substitution of food for untied cash aid, i.e., the slope of the indifference curve at the point corresponding to the current magnitude of food aid.

The choice of indifference curve is determined by the total outlay by the donor country while the shape of the indifference curve is determined by the relative values to the recipient countries of food aid versus untied cash aid. The estimates of the relative values on the average and at the margin are applied in various analyses to follow.

Suggested Procedure to Estimate the Aid Component

To perform realistic evaluations and comparisons of various types of foreign assistance programs, it is necessary that a common denominator be established for the various programs. One method to establish such a common denominator is to estimate the real aid involved, or the aid component. Generally, the aid component present in foreign economic assistance may be defined as the actual value of the flow of money, goods, and services to a recipient country less the discounted

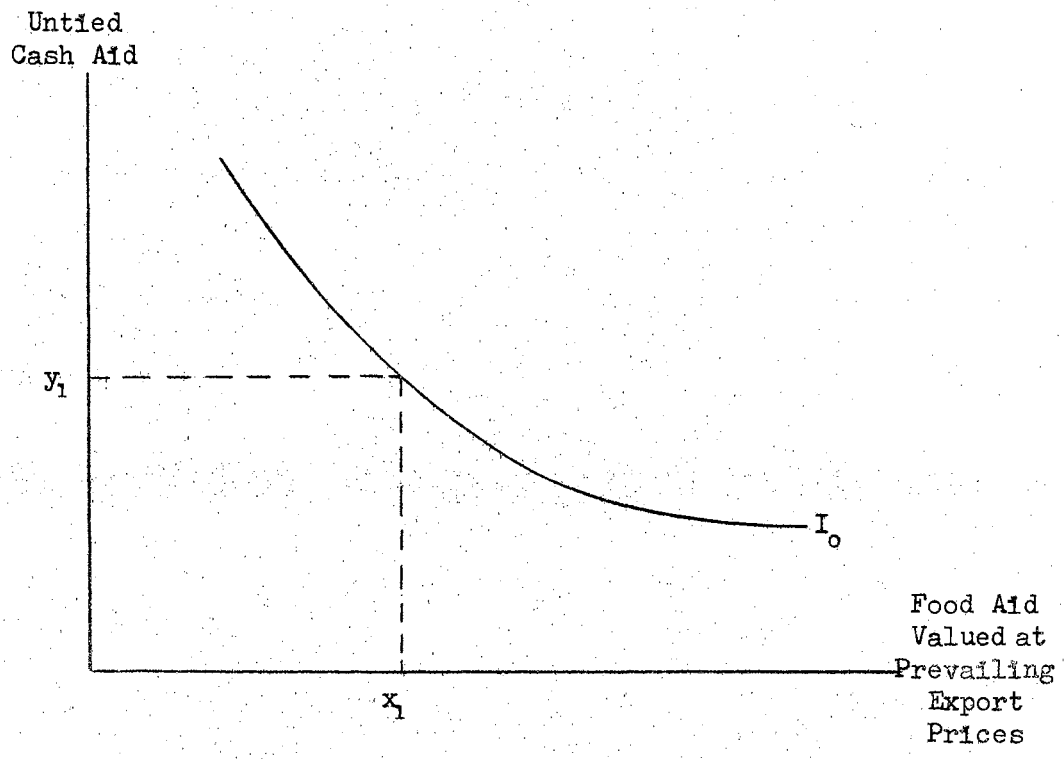

Figure 2. Illustration of Procedure to Estimate the Value of Food Aid Relative to Untied Cash Aid

present value of the disbursements required.[25]

In the following formulation, a theoretical framework is derived for estimating the aid component present in each of the three food aid programs: sales on long-term dollar credit, sales for non-convertible currencies, and grants.

Sales on Long-Term Dollar Credit

The aid component present in sales on long-term dollar credit may be expressed as the actual value of the goods received less transportation costs payable by the aid recipient and the discounted present value of down payment, principal repayments, and interest payments.

The aid component is due to a difference between the rate of interest charged on the credit and the rate of interest available from the best alternative employment of the capital involved under equal risk, i.e., the difference between interest actually obtained and the opportunity cost of capital. Therefore, an aid component is involved only if the rate of interest is concessionary. If the interest rate charged on the credit equals or exceeds the opportunity cost of capital, no real aid is involved and the transaction should not be classified as aid.

A perfect international capital market was implicitly assumed above. If the international capital market is less than perfect, the opportunity cost of capital to the donor country may differ from the opportunity cost to the recipient country. In case of such

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[25]Disbursements, as applied here and in later analyses refers to the total payment required from aid recipients including transportation costs if paid by aid recipients.

imperfections in the capital market, the question arises as to which interest rate should be used for discounting purposes. This question will be further discussed later in this section.

The notation used in the theoretical framework is as follows:

Q = quantity of food involved in a trade transaction

P_w = world market price prevailing at the time of trading

QP_w = face value of the commodities traded

P' = reduction in world market prices if all U.S. food, presently exported under assistance programs, were sold in the world market

$P_e = P_w - P'$ = expected market clearing price under above assumptions

QP_e = estimated value of the commodities traded

AV = estimated average value of food aid expressed in terms of untied cash aid for the period 1964-66

MV = estimated marginal value of food aid expressed in terms of untied cash aid for the period 1964-66

PV = discounted present value of down payments, repayments and interest payments

$A_1 = QP_e - PV$ = aid component, given an optimum combination of food and cash aid

$A_2 = QP_w \cdot AV - PV$ = aid component present in the 1964-66 combination of food and cash aid

$A_3 = QP_w \cdot MV - PV$ = aid component at the margin, 1964-66 combination of food and cash aid

$a_J = (A_J/QP_w) \cdot 100$ = aid as a percentage of the face value of the credit (J may take on the values of 1, 2, and 3)

i_1 = rate of interest during grace period

i_2 = rate of interest during repayment period

r = rate of discount

D = expected rate of default

n = maturity (No. of years)

n′ = grace period (No. of years)

I = initial or down payment

T_1 = transportation cost payable by aid recipient countries.

A few remarks concerning the above notation may be appropriate. It is assumed that the world market prices prevailing at the time of trading are used to determine the amount of credit to be repaid (QP_w). For transactions under PL 480, this is usually the case.

The determination of P′ is based on the procedure previously outlined. Note that P_e indicates the price that is estimated to clear the world market given that all U.S. food presently exported under government programs is sold on the world market and given a period of adjustment in supply and demand. This implies that QP_e represents the estimated value of the commodities sold on long-term credit provided that the world market is the best alternative outlet for the food presently exported under food aid programs.

Given estimates of the expected market clearing price P_e and the average value of food expressed in untied cash aid it is possible to establish two alternative procedures for estimating the average aid component. The major difference between the two procedures is that the former (A_1) yields an estimate of the aid component given that the aid recipient countries obtain the desired combination of food aid and cash aid, whereas the latter procedure (A_2) yields an estimate of the aid

component present in the food aid received during 1964-66. Hence, in the former procedure, estimation of the aid component is based on correct evaluation as well as a correct combination of food aid and cash aid. In the latter, the estimation is based on correct evaluation and the 1964-66 combination of food and cash aid.

A_3 gives an estimate of the aid component present in the last unit of food aid. Since the estimated marginal values of food in terms of untied cash aid are based on the 1964-66 combination of aid, the aid component at the margin is referring to this combination, which may or may not be the desired combination. Each of the aid components may be expressed as a proportion of the face value of the credit (a_J).

The rate of interest charged on the credit is i.

The opportunity cost of capital is r. While i determines the amount of interest to be paid on the credit, r is used as a discount rate for computing present value of repayments.

The appropriate choice of discount rate depends on the purpose of the analysis. The marginal return on long-term public investment in the donor country is appropriate if the opportunity cost of capital in the donor country is of interest. On the other hand, if the opportunity cost to the recipient country is the factor under consideration, the international lending rate may be used as a discount factor.

The international lending rate may be represented by the World Bank lending rate or by the rate of return required by private investors to invest in developing countries. Another indicator of the opportunity cost to the recipient countries might be the Export-Import Bank lending rate although Eximbank loans are primarily short term. In Chapter V, where the present theoretical framework will be applied to empirical

data, it will be seen that except for the private lenders' rate of interest, the above mentioned rates are almost equal in magnitude. Hence, the problem of which rate to select may not be of major significance.

Since there may be some doubt as to the ability of the recipient countries to repay the credit obtained on commodities for direct consumption, it may be appropriate to include in the computations a coefficient indicating the expected rate of default (D). The coefficient indicates the expected percentage of the credit not being repaid. As the default rate increases, the aid component included in the credit will increase, ceteris paribus.

The primary reason for including a separate default rate is that the probability of complete repayment of long-term credit on commodities for direct consumption is assumed to be smaller than the probability of complete repayment of loans for investment purposes. By introducing the default rate to cover only the difference in risk between investment loans and consumption credit, the discount rate r is directly comparable to the opportunity cost of capital for investment purposes.

The way in which an expected default rate should be included in the mathematical framework is determined by the assumption made about the distribution of defaults over the repayment period. It may be argued that most defaults may be expected in the beginning of the repayment period since the aid has not yet contributed significantly to an improvement of the recipient countries' ability to pay additional foreign debt. On the other hand, it is possible that the occurrence of defaults will be more frequent during the latter part of the repayment period, when other more immediate problems may have developed. The

credit may be "forgotten" by the aid recipient countries.

It is not possible to draw any significant inferences from past experiences on this particular subject, partly because of the short duration of the program of sales on dollar credit and partly because of the relatively small amount of food involved in the program. Therefore, neither logic nor past experience seem to justify a distribution of defaults over the repayment period other than a rectangular distribution. Hence, it is assumed in the theoretical framework that the probability of default is the same for any one year during the repayment period.

It appears from past experience from PL 480 that defaults usually are limited to the repayments. Defaults in interest payments are rare. Therefore, rather than apply the default rate to repayments and interest payments alike, it seems more appropriate to limit the default rate to the repayments and assume that all interest payments will be paid on time. Furthermore, it seems appropriate to exclude any down payment from expected default.

The maturity, n, indicates the total number of years covered by the credit and the grace period, n', is the number of years that no repayments need to be made. Where a grace period is included, it is assumed that only interest is paid during that period. I indicates the required down payment in connections with the transaction. T_1 refers to the cost of ocean transportation payable by aid recipient countries. The extent to which transportation costs are paid by recipient countries is discussed in Chapter V.

Assuming that the principal is repaid in equal annual installments with no grace period, the discounted present value of the repayments of

principal is given by:

$$PV_1 = \sum_{t=1}^{n} [[QP_w(1 - D)]n^{-1} (1 + r)^{-t}]$$

$$= [QP_w(1 - D]n^{-1} [(1 + r)^n - 1] [r (1 + r)^n]^{-1};$$

$[QP_w(1 - D)]n^{-1}$ being the annual installment after adjustment for expected default and $(1 + r)$ being the discount factor.

The present value of the interest payment is:

$$PV_2 = \sum_{t=1}^{n} i_2[QP_w - QP_w (t - 1)n^{-1}] (1 + r)^{-t}$$

$$= i_2 QP_w \sum_{t=1}^{n} [(1 - (t - 1)n^{-1}) (1 + r)^{-t}];$$

where $QP_w - QP_w(t - 1)n^{-1}$ is the unpaid balance at the beginning of year t. The discounted present value of repayment of principal and interest then becomes $PV_1 + PV_2$ or:

$$PV = [QP_w(1 - D)][(1 + r)^n - 1][nr (1 + r)^n]^{-1}$$

$$+ i_2 QP_w \sum_{t=1}^{n} [(1 - (t - 1)n^{-1}) (1 + r)^{-t}].$$

Using the expected market clearing price, the aid component involved in the credit is found as the actual value less transportation costs payable by recipient country and present value of repayment and interest:

$$A_1 = QP_e - T_1 - PV = QP_e - T_1 - [[QP_w(1 - D)] [(1 + r)^n - 1] [nr (1 + r)^n]^{-1}$$

$$+ i_2 QP_w \sum_{t=1}^{n} [(1 - (t - 1)n^{-1}) (1 + r)^{-t}]]$$

and the aid component as a percentage of the face value of the credit is:

$$a_1 = \frac{A_1}{QP_w} 100.$$

Now, introduce a grace period during which only interest is paid. Assume that the principal is repaid in equal annual installments after the end of the grace period.

The present value of the interest payments during the grace period is:

$$PV_1 = \sum_{t=1}^{n'} (i_1 QP_w)(1+r)^{-t} = i_1 QP_w [(1+r)^{n'} - 1][r(1+r)^{n'}]^{-1}.$$

The present value of the repayments of principal and payments of interest made after the grace period is:

$$PV_2 = \sum_{t=n'+1}^{n} [[QP_w(1-D)](n-n')^{-1}(1+r)^{-t} + i_2[QP_w - QP_w(t-n'-1)(n-n')^{-1}](1+r)^{-t}]$$

$$= \sum_{t=n'+1}^{n} [[QP_w(1-D)](n-n')^{-1} + i_2[QP_w - QP_w(t-n'-1)(n-n')^{-1}]](1+r)^{-t}.$$

The total present value of repayments and interest payments are $PV_1 + PV_2$ or

$$PV = i_1 QP_w[(1+r)^{n'} - 1][r(1+r)^{n'}]^{-1} + \sum_{t=n'+1}^{n} [[QP_w(1-D)](n-n')^{-1} +$$

$$i_2 QP_w[1-(t-n'-1)(n-n')^{-1}]](1+r)^{-t}.$$

The aid component is given as:

$$A_1 = QP_e - T_1 - PV$$

and the aid component as a percentage of the face value of the credit is:

$$a_1 = \frac{A_1}{QP_w} 100.$$

If a down payment (I) is required upon delivery, the present value becomes:

$$PV = i_1 (QP_w - I)[(1+r)^{n'} - 1][r(1+r)^{n'}]^{-1} + I + \sum_{t=n'+1}^{n} [[(QP_w - I)(1-D)]$$

$$(n-n')^{-1} + i_2 (QP_w - I)[1-(t-n'-1)(n-n')^{-1}]](1+r)^{-t}.$$

Similarly, an estimate of the aid component based on an estimate of the average value of food relative to untied cash during 1964-66 may be calculated as

$$A_2 = QP_w \, AV - T_1 - PV$$

where PV is expressed above.

The aid component as a percentage of the face value of the credit is given by

$$a_2 = \frac{A_2}{QP_w} 100 = \left(AV - \frac{T_1 + PV}{QP_w}\right) 100.$$

Likewise, the aid component present in the last unit of food sold on

long-term dollar credit during 1964-66 is given by:

$$A_3 = QP_w \quad MV - T_1 - PV.$$

Sales for Non-Convertible Currencies

As defined earlier, the aid component present in sales of U.S. food for non-convertible currencies consists of the actual value of the food less transportation costs payable by aid recipients and the amount of dollar spending in the recipient country displaced by the local currency obtained.

An estimation of the actual value of the food may be based on either the predicted market clearing price, as earlier defined, or on the average value of food expressed in terms of untied cash aid, 1964-66. Hence, an estimate of the aid component included in sales for non-convertible currencies is given by

$$A_1 = QP_e - B - T_1$$

$$\text{or} \quad A_2 = QP_w \; AV - B - T_1$$

where Q, P_e, P_w, T_1, and AV are as previously defined and B is the amount of dollar spending substituted by local currency in the recipient country.

The aid component at the margin is given by

$$A_3 = QP_w \; MV - T_1 - MB$$

where MB is the amount of dollar spending substituted by the local currency obtained at the margin.

Grants

The aid component included in food grants consists of the actual value of the grant less transportation costs payable by recipient countries. Under the present grant program the total cost of transportation is paid by the U.S. Hence, T_1 in the equations to follow is zero. As previously, the actual value may be estimated either on the basis of expected market clearing price or on the basis of the average value of food relative to untied cash aid. Hence, the aid component present in food grants may be estimated by

$$A_1 = QP_e - T_1$$

$$\text{or} \quad A_2 = QP_w \, AV - T_1$$

The aid component at the margin is given by

$$A_3 = QP_w \, MV - T_1 .$$

The theoretical framework developed above will be applied on survey data in Chapter V.

Suggested Procedure for Estimating the Net Cost to the Donor Country of Food Aid

The market clearing price indicates the price that the present aid receiving countries would have to pay for the commodities included in the aid programs if all food aid programs were terminated and the total quantity of food involved in these programs was offered on the world market at free market prices. Therefore, the market clearing price may be used as an indicator of the value to the recipient countries of the

food aid received.

However, the value to the recipient countries is not necessarily equivalent to the cost to the donor country. The net cost to the donor country of maintaining food aid programs may be estimated as the revenue foregone by not allocating the food to its best alternative use plus transportation cost payable by the donor country less the present value of the disbursements provided by aid recipients. Two alternative outlets for surplus commodities presently exported under aid programs, commercial export and production control, will be considered.

Alternative I: Commercial Export

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

NC = net cost per dollar's worth of aid

T_2 = transportation costs payable by the donor country

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

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

but $Q_2 = Q_1 + \Delta S - AD$

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

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

The net cost is then given by the revenue foregone and the transportation costs of food and payable by the donor country less the present value of disbursements per dollar's worth:

$$NC = \Delta ER + T_2 - PV/\Delta S.$$

If the food aid is given on a grant basis, no disbursement is required; hence, the revenue foregone plus transportation costs express the net cost.

Alternative II: Domestic Production Control

In the previous analysis, the net cost of food aid was estimated under the assumption that commercial export was the best alternative outlet for commodities presently included in food aid programs. An

alternative outlet, production control, should be considered.

The net cost of food aid, if production control is the best alternative outlet for the food included in the aid programs, may be estimated as the savings that the donor country could have realized by reducing production by the amount of food exported under aid programs plus transportation costs related to food aid payable by the donor country less the present value of the disbursements made by the aid recipients. The potential savings, or revenue foregone, is given by the treasury cost of obtaining the food less the cost necessary to reduce production by a similar amount. Ignoring government storage costs, the revenue foregone per dollar's worth of food aid may be estimated as the treasury cost required to purchase one dollar's worth of suplus commodities less the treasury payment necessary to reduce the quantity produced by an equal amount.[26]

The net cost may be estimated as

$$NC_{PC} = \frac{P_R}{P_W}(1 - C_{PC}) + T_2 - PV/\Delta S$$

where

NC_{PC} = net cost per dollar's worth of food if production control is the best alternative outlet for surplus commodities

P_R = prices received by farmers, weighted average for the commodities involved

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[26] As previously, "worth" refers to the prevailing world market price whereas the treasury costs are determined by the government support prices.

P_w = prevailing world market price

C_{PC} = treasury cost required to reduce the quantity produced by an amount that, valued at prices received by farmers, is worth one dollar

PV = present value of disbursements

ΔS = quantity of food exported under food aid programs valued at prevailing world market prices

T_2 = transportation costs payable by the donor country.

The net cost associated with each of the three aid programs, sales for non-convertible currency, dollar credit and grants is estimated in Chapter V.

Suggested Procedure for Estimation of the Net Social Gain From Food Aid Programs

The net social gain obtained from food aid programs may be defined as the value to the recipient country of the aid in excess of the value of the food in its best alternative use less the cost of transporting the food from donor to recipient country. Hence, the average net social gain is given by

$$ASG = AV - RF - (T_1 + T_2)$$

where

ASG = average social gain in per cent of face value of aid

AV = average value of food aid in per cent of face value

RF = revenue foregone in per cent of face value

$T_1 + T_2$ = transportation cost of food aid.

If the present value of disbursements is subtracted from the right-hand side of the above equation, one gets

$$ASG = A_a - NC$$

where

A_a = average aid component

NC = average net cost in per cent of face value.

If the present value of disbursements is not equal for donor and recipient countries, the latter equation yields an estimate of ASG that is different from the former. This may be the case for export on long-term dollar credit. The opportunity cost of capital in the recipient countries may differ from the opportunity cost in the donor country under equal risk due to imperfections in the international money market.

The adjustments in the social gain due to differences in the opportunity cost of capital is taken into account in the latter formula but not in the former. Hence, the latter formula is most appropriate for estimating the net social gain.

The marginal social gain may be estimated as

$$MSG = A_m - MNC$$

where

MSG = marginal net social gain

A_m = marginal aid component

MNC = marginal net cost.

The distribution of social gain between donor and recipient countries is shown by the aid component and the net cost. The aid component indicates the net gain obtained by the recipient country. Hence, the net social gain less the aid component indicates the net gain obtained by the donor country. If the net gain to the donor

country is negative, a net transfer of resources from the donor country to the recipient country has taken place.

CHAPTER IV

EMPIRICAL ANALYSIS I - ESTIMATION OF THE VALUE OF FOOD AID TO RECIPIENT COUNTRIES, THE RATE OF SUBSTITUTION OF COMMERCIAL IMPORT FOR FOOD AID AND THE MARKET CLEARING PRICE

Introductory Remarks

This chapter contains estimates of the value of food aid to the recipient countries on the average and at the margin. Furthermore, the extent to which food aid substitutes for commercial food imports by aid recipients is estimated for wheat and for food, feed, and fiber in aggregate. Based on these estimates, the market clearing price is calculated. Besides being of direct informative value, the estimates obtained in this chapter are the basis for various analyses in the following chapter. The theoretical framework underlying the analysis was presented in the previous chapter.

The empirical analyses in this and the following chapter are based primarily on data obtained from a mail survey conducted from December 1, 1967 to August 1, 1968. The kinds of data obtained from the survey are explained in the following sections. The questionnaire is shown in Appendix A. Before making the various analyses, the sampling procedure applied in the mail survey is described.

Sampling Procedure

A mail survey was conducted among a number of persons knowledgeable on economic development and external economic assistance programs and needs. The sample consisted of 441 individuals representing 14 countries.

The sample countries were selected from the population of countries which received food, feed, and fiber from the United States under food aid provisions during the 3-year period 1964-66. All countries which received one per cent or more of the total U.S. food aid during this period were included in the sample provided that they had diplomatic relations with the United States at the time when the research was initiated.[1] Furthermore, one country, Colombia, was included which received large amounts of food aid in the past but received only .8 per cent of total U.S. food aid during the above period. The countries included in the survey and their percentages of total U.S. food aid for the period 1964-66 are shown in Appendix B.

Since the population of persons knowledgeable on the subject in the various countries was unknown, a simple random sampling procedure could not be applied. The participating persons were chosen after consultation with a large number of individuals and agencies, some American and some representing the sample countries. The only criteria for selection was that the person was actively involved in economic

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[1]The relative magnitude of food aid for each individual country is based on the quantity of food shipped during the period 1964-66 valued at prevailing world market prices. By valuing all food at prevailing world market prices, the problem of application of different value indicators for different programs as discussed in Chapter III is avoided.

development or external assistance programs in some way. This criteria was felt necessary since the questions asked in the survey called for considerable knowledge of these topics. Positive correlation between the number of people contacted in any individual country and the proportion of the total U.S. food aid flowing into the country during the period 1964-66 was attempted. However, a complete proportional allocation of sampling units among countries according to the amount of food aid obtained was not possible because of difficulty in obtaining an adequate number of names and addresses of knowledgeable persons in some countries and because of differential rates of response from those to whom the questionnaire was sent.

Some individuals contacted were natives of the individual countries who were considered knowledgeable on the problems involved and some were foreign economic development experts located in the countries surveyed. Appendix C gives an occupational breakdown of the participating persons.

Of the 441 persons contacted, a partly or fully completed questionnaire was received from 88. This yields an over-all response of 20.0 per cent. The number of persons contacted in each individual country and the response obtained is shown in Appendix B. Since there is some indication that the most knowledgeable individuals completed and returned the questionnaire, the response rate does not necessarily suggest biased results.[2] Furthermore, if more than one individual at any one institution were contacted, a joint answer was usually obtained. Such an answer was recorded as one response only. Hence, the response rate

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[2] A large number of the persons contacted who did not complete the questionnaire indicated by letter that they did not possess the necessary knowledge of the factors involved.

was downward biased.

The Marginal Value of Food Aid

In this section, the value of food aid relative to untied cash aid at the margin is estimated. The marginal value is estimated for each of the survey countries excluding those countries from which the necessary information was unavailable. The marginal value is estimated for each of several levels of increase in the amount of food aid received by the survey countries during 1964-66.

The basic data were obtained by means of two approaches. First, the value to the recipient countries of a uniform increase of $1 million worth of food aid to each of the survey countries was estimated.[3] Secondly, the value to the recipient countries of a 25 per cent increase in the 1964-66 level of food aid was estimated. The two approaches differ in two major aspects: (1) the marginal unit applied in the former is relatively small, $1 million worth of food. The size of the marginal unit in the latter approach (25 per cent of the food aid received during 1964-66) largely exceeds $1 million for all the countries involved. (2) In the former approach an equal size marginal unit is used for each country while the marginal unit in the latter approach varies among countries according to the quantity of food aid received by each individual country.

The results obtained by the two approaches are summarized and the sample data are described in the following sub-sections. Then, based

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[3] In order to aggregate the various food commodities the prevailing world market price was used as a common denomination. Hence, the term "worth" as used here and in the following refers to a certain quantity valued at prevailing world market prices.

on these results, the marginal value of food aid for various levels of increase in the quantity of such aid received during 1964-66 is estimated for each of the individual survey countries for which the necessary information was available. Finally, a weighted average of the marginal values for the survey countries was estimated.

The Value of an Additional $1 Million Worth of Food

Each survey participant was asked to indicate the amount of untied cash aid that he believed would yield the same benefit to the country he represented as an additional $1 million worth of food donations, where food was valued according to world market prices. The participants were given five alternative choices ranging from $.2 million to $1.0 million in cash. The replies obtained were used to estimate the marginal value of food expressed in terms of untied cash aid.

The results obtained are shown in Table IV. The marginal value of food aid was estimated for each of the survey countries using the arithmetic mean (MV_a) and the mode (MV_b). The number of respondents is indicated by n. The standard error $\hat{\sigma}_{\bar{x}}$ was estimated for each country and a t-test was used to test whether MV_a could be considered less than the face value of the aid for a certain level of significance. Since MV_a is expressed in per cent of face value, the hypothesis tested was:

$$H_0 : MV_a < 100$$

given the alternative hypothesis

$$H_1 : MV_a \geq 100.$$

TABLE IV

MARGINAL VALUE OF FOOD AID IN PER CENT OF FACE VALUE OF AID

Country	MV_a [1]	MV_b [2]	n	$\hat{\sigma}_{\bar{x}}$	$\lvert t \rvert = \frac{MV_a - 100}{\hat{\sigma}_{\bar{x}}}$
India	73.3	100.0	12	8.198	3.2568*** [3]
Pakistan	100.0	100.0	2	0	---
Yugoslavia	100.0	100.0	1	---	---
Brazil	66.7	60.0	9	5.774	5.7672***
Korea	80.0	100.0	11	8.090	2.4722**
Turkey	69.2	100.0	13	7.718	4.1202***
China	68.0	80.0	5	7.682	4.1656***
Israel	80.0	80.0	6	5.165	3.8722***
Greece	75.0	80.0	4	12.570	1.9889*
Chile	77.5	80.0	8	8.813	2.5530**
Morocco	80.0	80.0	1	---	---
Congo	80.0	80.0	1	---	---
Indonesia	60.0	---	2	40.000	1.000
Colombia	68.9	60.0	9	6.759	4.6013***
Sample Average	77.0	80.0	6	.7029	32.7216***

[1] Estimations based on arithmetic average of sample values.

[2] Estimations based on the modes of the sample values.

[3] The asterisks indicate the level of significance.

*significant at the 90 per cent level

**significant at the 95 per cent level

***significant at the 99 per cent level

The significance level is indicated by asterisks. One asterisk indicates that the t was significant at the 90 per cent level; i.e., there was no basis for rejection of H_o at the 90 per cent level, two asterisks indicate a 95 per cent level, and three asterisks indicate that the t was significant at the 99 per cent level.

Four of the country means could not be tested since the standard error was zero or undefined. Of the remaining 10 country averages, seven were significantly less than 100 at the 99 per cent level, and only one was not significantly less than 100 at the 90 per cent level. The over-all mean of the country means was found to be significantly different from 100 at the 99 per cent level.

It may be concluded from the above results that the value of a small additional amount of food aid to the recipient countries included in the survey is significantly less than the face value of the aid; i.e., the aid evaluated on the basis of prevailing export prices. In other words, the marginal value of an additional dollar's worth of food aid, where "worth" is determined by the prevailing export prices, is less than the value of an additional dollar in untied cash aid.

The Value of an Additional 25 Per Cent of Food Aid

The preceding analysis was an attempt to estimate the marginal value of food aid for small increases. The results are not necessarily valid for larger increases in the amount of food aid received by an individual country. Therefore, as a supplement to the previous analysis, it was attempted to estimate the value to the recipient countries of an additional annual amount of food aid equal to 25 per cent of the average

annual food aid received during the period 1964-66.

Each survey participant was asked to indicate, for various levels of food aid for the period 1964-66, the amount of untied cash aid that he believed would have been of equal benefit to the country he represented. The marginal values were estimated based on the answers obtained.

The estimated marginal values (MV_c) are shown in Table V. Data were available from 11 countries only. The number of respondents from each country is indicated by n in Table V. The standard error $\hat{\sigma}_{\bar{x}}$, was estimated for each country mean, and a t-test was used to determine whether the estimate of MV_c was significantly less than 100. All the estimates but two were significantly less than 100 at the 99 per cent level, and the remaining two were significant at the 90 per cent level. Hence, it may be concluded that if survey countries had received 25 per cent more food aid than they actually received, the value of the additional food aid would have been less than its face value. The weighted mean of the survey countries was estimated to be 61.2. Hence the analysis indicates that if the quantity of food aid to each of the survey countries during 1964-66 had been 25 per cent larger than it actually was, the value to the recipient countries of the additional 25 per cent would have averaged 61 cents in untied cash aid per dollar's worth of food aid.

The Marginal Value of Food Aid for Various Levels of Increase

The estimates of the marginal value, MV_c, in Table V may be interpreted as the marginal value per dollar's worth of food aid where the

TABLE V

THE MARGINAL VALUE IN PER CENT OF FACE VALUE FOR A 25 PER CENT INCREASE IN FOOD AID

Country	MV_c	n	$\hat{\sigma}_{\bar{x}}$	$\lvert t \rvert = \frac{MV_c - 100}{\hat{\sigma}_{\bar{x}}}$
India	65.1	9	11.27	3.0967***
Pakistan	64.9	1	-	-
Brazil	62.7	7	7.140	5.2241***
Korea	51.7	10	10.82	4.4640***
Turkey	51.3	9	10.20	4.7745***
China	64.4	3	17.35	2.0519*
Israel	76.4	6	6.240	3.7821***
Greece	59.4	4	22.48	1.8060*
Chile	72.1	6	6.090	3.4319***
Morocco	50.0	1	-	-
Colombia	59.6	9	10.05	5.0149***
Simple Mean	64.8			
Weighted Mean[1]	61.2			

[1]Each country mean is weighted by the relative proportion of total U.S. food aid received, 1964-66.

marginal unit is expressed as 25 per cent of the 1964-66 level of food aid. Hence, MV_c is a measure of the average value of the additional food aid. Alternatively, if the marginal value per dollar's worth of food aid is assumed to be a linear function of the quantity of food aid received beyond the 1964-66 level, the estimates shown in Table V may be interpreted as the value of the last dollar's worth of food aid at a 12.5 per cent increase, the midpoint of the 25 per cent increase. Likewise, the estimates of the marginal values corresponding to an increase of $1 million worth of food aid to each of the survey countries, MV_a, may be interpreted as the value of the $500,000 worth of food aid. Based on this information and assuming a linear relationship between the marginal value and the level of increase in the amount of food aid received it is possible to estimate the marginal value of food aid corresponding to any level of increase. The estimating procedure is shown in Appendix D. The linear relationship between the marginal value and the level of increase in food aid may be expressed as $y = a + bx$, where y is the marginal value and x is the percentage increase in the 1964-66 level of food aid. The estimated values of the coefficients a and b for each individual country are shown in Table VI.

Based on these coefficients, the marginal values corresponding to various levels of increase were calculated and shown in Table VII. The marginal value of food aid decreases as the quantity of food aid is increased. As indicated by the weighted average, the value of the last dollar's worth of food aid in 1964-66 was 77 cents. If each of the survey countries increased the food aid received by one per cent of the 1964-66 level, the value to the recipient countries of the last dollar's worth of food aid is estimated to be 73 cents. The marginal value falls

TABLE VI

ESTIMATED VALUE OF THE A AND B COEFFICIENTS

Country	a	b
India	.7307	-.0065
Pakistan	1.0116	-.0289
Brazil	.6717	-.0033
Korea	.8141	-.0235
Turkey	.7064	-.0149
China	.6839	-.0035
Israel	.8054	-.0036
Greece	.7787	-.0151
Chile	.7838	-.0051
Morocco	.8826	-.0306
Colombia	.7310	-.0105

TABLE VII

ESTIMATED MARGINAL VALUE OF FOOD AID FOR VARIOUS LEVELS OF INCREASE ABOVE THE 1964-66 LEVEL OF FOOD AID, PER CENT OF FACE VALUE OF AID

Country	MV of the Last Unit if the Level of Increase were: 0%	1%	10%	20%	30%	40%	50%
India	73.1	72.4	66.6	60.1	53.6	47.1	40.6
Pakistan	100.0	98.3	72.6	43.3	14.4	1/	1/
Brazil	67.2	66.7	63.9	60.6	57.3	54.0	50.7
Korea	81.4	79.1	57.9	34.4	10.9	1/	1/
Turkey	70.6	69.2	55.7	40.8	25.9	11.0	1/
China	68.4	68.0	64.9	61.4	57.9	54.4	50.9
Israel	80.5	80.2	76.9	73.3	69.7	66.1	62.5
Greece	77.9	76.4	62.8	47.7	32.6	17.5	02.4
Chile	78.4	77.9	73.3	68.2	63.1	58.0	52.9
Morocco	88.3	85.2	57.7	27.1	1/	1/	1/
Colombia	73.1	72.1	62.6	52.1	41.6	31.1	20.6
Weighted Average	76.9	72.6	63.0	52.3	40.9	34.2	29.5

[1](-) indicates an estimated negative value.

to 30 cents if the increase is 50 per cent.

It should be emphasized that the above results refer to the countries included in the survey only. Conclusions as to the whole population of countries receiving U.S. food aid can be made only if some assumption is made concerning the remaining countries. Since only the major food aid recipients were included in the survey, the survey results would be valid for the entire U.S. food aid only if no correlation exists between the factor under observation and the quantity of food aid received by each country. Such correlation was not found for the countries under survey. The factor determining the marginal value of food aid is the excess of food aid above the minimum food requirements. In other words, the extent to which the recipient country is willing to forego current food consumption for the purpose of accelerating economic development is a major determinant of the value of food aid relative to untied cash aid at the margin. Hence, the absolute quantity of food aid received by any individual country does not in itself indicate the marginal value of food aid to that country relative to other countries. Furthermore, the countries under survey accounted for about 70 per cent of all U.S. food aid during the period 1964-66. Hence, it may not be too unrealistic to consider the survey results to be a reasonably adequate measure of the value of all U.S. food aid.

The Average Value

The average value of food aid is defined as the amount of untied cash aid that would yield the same benefit to the recipient country as each dollar's worth of food aid on the average for the total amount of food aid.

Each survey participant was asked to indicate the amount of untied cash aid that he believed would be of the same benefit to the country he represented as certain given amounts of food aid. Based on this information, the average value of the food aid received during 1964-66 was estimated. The estimates are shown as AV in Table VIII. The number of respondents for each of the survey countries is shown by n. The standard error is estimated for each of the countries to further describe the data, and a t-test was performed to determine whether the estimated average values were significantly less than 100. Five country averages were significantly less than 100 at the 99 per cent level and only two were not significantly less than 100 at the 90 per cent level. In both of these cases, the standard error was relatively large. The average value estimated for India, the recipient of 30 per cent of all U.S. food aid during 1964-66, was 90.6 per cent of the face value of the aid. However, since the variation of the survey answers from this country was relatively small, the estimate was significantly less than 100 at the 95 per cent level.

The weighted mean of the estimated country averages was calculated to be 80 cents in untied cash aid per dollar's worth of food aid. One sample value for each of three countries (India, Turkey, and Colombia) deviated markedly from the remaining sample values for each of the individual countries. A test for outliers was applied to the sample observations for all the survey countries.[4] By means of the test, the

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[4] The following statistic was used to test for outliers:
$r_{10} = \frac{x_2 - x_1}{x_n - x_1}$ where the observations, x_i, were ranked in ascending order. A table of critical values for r was used to determine the probability that the outlier, x_1, belonged to the same population as the remaining

TABLE VIII

ESTIMATED AVERAGE VALUE OF THE FOOD AID RECEIVED 1964-66, PER CENT OF FACE VALUE OF AID

Country	AV	n	$\hat{\sigma}_{\bar{x}}$	$\lvert t \rvert = \frac{AV - 100}{\hat{\sigma}_{\bar{x}}}$
India	90.6	8[1]	3.870	2.4289**
Brazil	69.0	7	8.540	3.6300***
Korea	68.6	10	33.04	.9504
Turkey	65.4	8[1]	6.810	6.5492***
China	70.3	3	19.02	1.5615
Israel	85.9	6	5.781	2.4394**
Greece	84.3	4	1.728	9.1279***
Chile	80.9	6	3.030	6.3036***
Morocco	100.0	1	-	-
Congo	100.0	1	-	-
Colombia	70.9	8[1]	5.915	4.9069***
Simple Mean	80.5			
Weighted Mean[2]	79.6			

[1]The original sample included nine observations. However, one observation was rejected by means of a test for outliers as discussed in the text.

[2]Each country mean is weighted by the relative proportion of total U.S. food aid received, 1964-66.

deviation of the extreme sample values for each of the countries could be compared. Furthermore, the probability that any extreme sample value could be expected to belong to the same population as the remaining sample values could be determined. The test indicated that the probability that the extreme sample value in each of the samples representing India, Turkey, and Colombia could be expected to belong to the same population as the remaining sample values were .005, .10, and .10, respectively. No other extreme sample values were found to exceed the 90 per cent significance level. Hence, the three sample values were excluded from the samples.

To estimate the average values of food aid with a reasonable degree of reliability, the survey participants needed a considerable degree of knowledge and understanding of the present state of economic development and external assistance concerning the country he represented. Therefore, it seems reasonable to expect that a few sample values might deviate considerably from the remaining ones, due to the lack of knowledge or lack of understanding on the part of a few respondents. The fact that only three out of 65 sample values had to be rejected and that the standard error of most country means was low suggests that the respondents were generally well informed on the issues involved. A low standard error might be the result of exchange of information among the respondents from any one country. This does not seem to have been the case. On the contrary, in most cases where questionnaires were sent to more than one individual at any one

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observations. For a further discussion of this and other tests for outliers, see: S. J. Dixon, "Rejection of Observations" in Ahmed E. Sarhan and B. G. Greenberg, Contributions to Order Statistics (New York, 1962), pp. 299-342.

institution, a joint answer was usually obtained. Such an answer was treated as one observation only.

The Extent to Which Food Aid Substitutes for Commercial Import

Estimation of the extent to which food aid substitutes for commercial imports was included in this study for two major reasons: (1) Knowledge of the degree of substitution was felt to be important for decision making and further research in matters concerning food aid and international trade policies; (2) the estimates were needed in this study to calculate the market clearing price which in turn is used to estimate the aid components and the net cost to the donor country.

According to the text of PL 480, all imports under this provision should be in excess of normal commercial imports. It is generally agreed, however, that PL 480 shipments do cause the quantity of food imported commercially to be less than if no PL 480 shipments were made. However, the degree to which commercial imports were reduced due to PL 480 imports was not known prior to this study.

A recent study concerning the impact of PL 480 on the Indian economy concluded that in the absence of PL 480, India would have increased commercial food imports. However, the additional imports "would have been far short of the actual import under PL 480".[5] In a study concerning the impact of PL 480 on the Israeli economy, it was estimated that approximately 73 per cent of the wheat imported under PL 480

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[5] Milakanth Rath and V. S. Patvardhan, Impact of Assistance Under PL 480 on Indian Economy. Gokhale Institute of Politics and Economics (Poona, India, 1967), p. 36.

during 1955-60 would have been imported commerically in the absence of PL 480.[6]

With the exception of the latter study, little quantitative information concerning the relationship between food aid and commercial imports of food commodities was available prior to this study. A few attempts have been made to establish quantitative relationships by means of time series data but the reliability of the results is somewhat less than satisfactory. This is so because all time series data available on the subject are so heavily influenced by other factors related to the individual importing countries' economic growth that the causal relationship sought is difficult or impossible to isolate. Hence, it was attempted in the survey to obtain information that would yield a basis for estimating the extent to which food aid substitutes for commercial food imports.

Each survey participant was informed of the average annual quantity of wheat imported by the country he represented under PL 480 during the period 1964-66. He was then faced with 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 commerical imports, if any, that he believed would have taken place during the period in question.

It was felt that more realistic answers could be obtained by using physical quantities of one commodity, wheat, rather than food in general. Since wheat constituted 58 per cent of all food aid in terms of

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[6]Fanny Ginor, Uses of Agricultural Surpluses. Bank of Israel, Research Department (Jerusalem, Israel, 1963), pp. 12 and 300-301.

value during the period 1964-66, it appears that estimates for wheat might be fairly representative of food in general.

The average annual wheat import under PL 480 during the period 1964-66 is shown for each of the survey countries in Appendix E. Furthermore, Appendix E shows the estimated increases in commercial wheat import that would have taken place if the import under PL 480 had been reduced. The estimates are given by country for each of the four hypothetical levels of reduction in PL 480 import. Only 12 of the 14 survey countries are included. One of the countries left out did not import any wheat under PL 480 during 1964-66 and no data could be obtained from the other country.

Based on the information summarized in Appendix E, the marginal and average rates of substitution of commercial wheat import for import under PL 480 were estimated for each of the four levels of reduction in PL 480 imports. The marginal rate of substitution for each of the four levels is to be interpreted as the increase in commercial imports for a one unit reduction in PL 480 imports given that the PL 480 imports are reduced by the percentage indicated. Hence, the marginal rate of substitution is estimated on a discrete rather than a continuous basis. The estimated values are valid only if the PL 480 imports are reduced by multiples of 25 per cent of the total PL 480 imports or if a constant marginal rate of substitution is assumed within each 25 per cent interval.

The estimated marginal and average rates of substitution for wheat are shown in Table IX. It appears that the marginal rate of substitution is relatively low for small reductions in wheat aid imports, and becomes higher for larger reductions in wheat aid imports. This

TABLE IX

THE MARGINAL AND AVERAGE RATE OF SUBSTITUTION OF COMMERCIAL WHEAT IMPORT FOR IMPORT UNDER PL 480 FOR VARIOUS LEVELS OF REDUCTION IN PL 480 IMPORTS

Country	Increase in Commercial Imports Per Unit Reduction in PL 480 Imports if the Reduction were:							
	0 - 25%		25 - 50%		50 - 75%		75 - 100%	
	MRS	ARS	MRS	ARS	MRS	ARS	MRS	ARS
India	.126	.126	.231	.178	.408	.255	.105	.217
Pakistan	.499	.499	.645	.572	.785	.643	.931	.715
Brazil	.870	.870	.749	.808	.819	.811	.730	.791
Korea	.464	.464	.727	.595	.864	.685	.873	.732
Turkey	.211	.211	.282	.246	.479	.349	.507	.389
China	.667	.667	.509	.588	.404	.526	.526	.482
Israel	.745	.745	.809	.785	.809	.793	.702	.774
Greece	.000	.000	.000	.000	.000	.000	.000	.000
Chile	.813	.813	.781	.797	.625	.792	.750	.781
Morocco	.641	.641	.641	.641	.641	.641	.641	.641
Congo	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Colombia	.619	.619	.714	.683	.762	.710	.810	.744
Average[1]	.312	.312	.398	.355	.543	.418	.369	.406

[1]The average is weighted by the quantities imported by each individual country.

indicates that as the quantity of wheat made available under food aid programs increases, an additional quantity of wheat replaces a smaller amount of commercial import.

The average rate of substitution indicates the increases in commercial imports per unit reduction in PL 480 import on the average. Since the marginal rate of substitution generally rises for increasing reductions in PL 480 imports, it is not surprising that the average rate of substitution also rises. The amount of commercial import replaced per unit of food aid is decreasing as more food aid is made available.

It is interesting to note, that, except for Greece, imports under PL 480 reduced the commercial imports by all the survey countries. This exception is of no major significance since the quantity of wheat imported by Greece under PL 480 was very low, only some 3,000 tons per year during the period 1964-66. The quantity of commercial wheat imports replaced by PL 480 imports is relatively small in the case of India. This is understandable since India would have been unable to provide foreign exchange for a very large proportion of the large wheat import under PL 480 during 1964-66. A reduction of the quantity of wheat made available to India through PL 480 during 1964-66 would probably have promoted an increasing emphasis on domestic wheat production. At the same time, the extent of hunger or starvation would have increased.

As mentioned earlier, the marginal rate of substitution generally increases for increasing reductions in the PL 480 imports. There is one important exception to this general trend. Estimates of a few countries, particularly India and Brazil, exhibit an increasing

marginal rate of substitution up to a 75 per cent reduction in PL 480 imports and a decreasing marginal rate of substitution beyond the 75 per cent level. This phenomenon is so powerful that the over-all average shows the same trend. It is possible that this exception is explained by experimental error. A more reasonable explanation is 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 impact of reductions in PL 480 imports beyond 75 per cent of the actual PL 480 import would be apparent primarily in the level of domestic production and consumption in countries such as India and Brazil.

The weighted average of the marginal and the average rates of substitution is estimated for each level of reduction in PL 480 imports and shown in Table IX. The weights used were the average annual wheat imports under PL 480 by each individual country during the period 1964-66. The over-all average rate of substitution for the survey countries was estimated to be .406. This means that during the period 1964-66, each bushel of wheat exported under PL 480 reduced the quantity of wheat imported commercially by the aid recipient countries by about two-fifths of a bushel.

The weighted marginal rate of substitution of commercial import for wheat aid of the last 25 per cent of the 1964-66 wheat aid was estimated to be .312. This means that each bushel of wheat exported under food aid provisions during 1964-66 in excess of 75 per cent of the actual amount reduced commercial demand by less than one-third of a

bushel. The data suggest a linear relationship between the marginal rate of substitution and the quantity of wheat exported under food aid programs in excess of 25 per cent of the 1964-66 level of food aid. If such a linear relationship is assumed, the last bushel exported under PL 480 during 1964-66 was found to have replaced about one-fourth of a bushel in the commercial market.

Although the estimated results are based on one commodity, wheat, the results may be the best single estimate of rates of substitution for food in general. However, it may be of interest to estimate an upper and lower limit for food in general. As earlier mentioned, wheat accounted for about 58 per cent of all food exported under food aid programs during 1964-66. Assuming that nothing is known about the marginal and average rate of substitution of commercial import for import under PL 480 for the remaining 42 per cent of the food commodities, an interval may be established within which the marginal or average rate of substitution of commercial import of food for import under PL 480 will lie. The upper limit is established by assuming that the commodities other than wheat have a marginal or average rate of substitution of 1.0, and the lower limit is established by assuming the rate of substitution for those commodities is zero. Table X shows the intervals for the rates of substitution for each level of reduction in PL 480 import. Similar intervals may be established for each country. Such estimates should be based on the individual country's combination of wheat versus nonwheat commodities comprising the imports under PL 480.

As shown in Table X, the over-all average rate of substitution for food in general is estimated to lie between .235 and .655 assuming that nothing is known about the marginal and average rate of substitution

TABLE X

MARGINAL AND AVERAGE SUBSTITUTION OF COMMERCIAL IMPORT FOR FOOD AID, UPPER AND LOWER LIMITS OF THE WEIGHTED AVERAGES OF THE SURVEY COUNTRIES

Limit	If the Reduction in PL 480 Imports were:							
	0 - 25%		25 - 50%		50 - 75%		75 - 100%	
	MRS	ARS	MRS	ARS	MRS	ARS	MRS	ARS
Lower	.181	.181	.231	.206	.315	.242	.214	.235
Upper	.601	.601	.651	.606	.735	.662	.634	.655

for commodities other than wheat. The average rate of substitution related to the last 25 per cent of food aid was estimated to be between .181 and .601.

Hence, for each dollar's worth of food aid, where "worth" is based on the prevailing world market prices, the commercial demand for food was reduced by 24 to 66 cents' worth, while the commercial demand replaced by the last 25 per cent was between 18 and 60 cents per dollar's worth of food aid.

If, as previously, a linear relationship were assumed between the marginal rate of substitution and the quantity of food aid, excluding the first 25 per cent of the 1964-66 aid, the last dollar's worth of food aid during 1964-66 replaced between 15 and 57 cents' worth of commercial demand.

It is very unlikely, however, that the average rate of substitution between food aid and commercial import of commodities other than wheat will be close to either one or zero. If the assumption that wheat is representative for all food commodities cannot be accepted, the midpoint between the upper and lower estimates may be an appropriate point estimate. Using the midpoint, each dollar's worth of food aid was estimated to replace 45 cents' worth of commercial import on the average and 36 cents at the margin, as compared to 41 and 31 cents on the average and at the margin, respectively, if the estimates for wheat were used.

The Market Clearing Price

In Chapter III, a procedure was suggested to estimate the market clearing prices of food on the world market if all food presently

included in U.S. food aid programs were sold on the world market. Assuming that no better alternative outlet exists, the market clearing price may be said to indicate the value of the food presently included in food aid programs. The market clearing price is established solely by the interaction of demand and supply. The concept is not used to predict the price that would actually occur, it is used merely as a value indicator. It indicates a theoretical alternative price of the food presently exported under food aid programs. Although institutional arrangements may be likely to prohibit the world market prices from adjusting to a demand-supply situation if all present food aid were shifted to the world market, the market clearing price as defined above would be the price at which all the food could be sold.

In Chapter III, the following equation was developed to estimate the market clearing price:

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

where

P_2 = estimated market clearing price

P_1 = prevailing world market price

E_S = price elasticity of export supply

E_D = price elasticity of export demand

ARS = average rate of substitution of commercial import for food aid

ΔS = quantity initially exported under food aid provisions

Q_1 = quantity initially exported commercially.

In the following analysis, the above equation will be used to

estimate the market clearing price for wheat and for food, feed, and fiber.

Wheat

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 XI.[7]

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 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 grains 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

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[7]The analysis summarized in Table XI is based on the following values of elasticities: Elasticity of export demand for U.S. wheat = -2.8, obtained from: Luther G. Tweeten, The Demand for United States Farm Output, p. 360; elasticity of export demand for U.S. feed grains = 1.3, obtained from: Ibid., p. 360; elasticity of export supply of U.S. wheat = .28, obtained from: Luther G. Tweeten, Commodity Programs for Wheat, Oklahoma State University, Experiment Station, Technical Bulletin T-118 (Stillwater, 1965); 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.

TABLE XI

THE ESTIMATED MARKET CLEARING PRICE FOR WHEAT FOR VARIOUS LEVELS OF REDUCTION IN WHEAT AID LEVELS

Per cent reduction in total wheat aid	Per cent reduction in prevailing world market price[1]		Market clearing price ($ per bushel)	
	No Substitution	Perfect Substitution[2]	No Substitution	Perfect Substitution
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	1.18	1.37
100	40.6	20.9	1.00	1.33

[1]Data for commercial export and export under aid provisions used in the calculations are from: 12 Years of Achievement Under Public Law 480, p. 6.

[2]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.

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.[8] 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 XI 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 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.[9] 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 to feed grains for human consumption in most countries and is a near perfect substitute for feed grains for many other purposes.

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[8] Calculations based on: 12 Years of Achievement Under Public Law 480.

[9] Calculations based on: Ibid.

Hence, the best estimates of the market clearing price of wheat are likely to be obtained under the assumption of perfect substitution.

Food, Feed, and Fiber

The market clearing price for food, feed, and fiber was estimated by an analysis similar to that for wheat. The results are shown in Table XII.[10]

The reduction in the prevailing world market prices of food, feed, and fiber necessary to reach the market clearing price if all commodities shipped under food aid programs during 1964-66 were transferred to the world market was estimated to be 6.1 per cent if the average rate of substitution of commercial wheat import for wheat and were assumed to be valid for food, feed, and fiber. Based on the previously estimated upper and lower limits of the average rate of substitution related to food, feed, and fiber, the reduction in the prevailing world market price was estimated to be between 3.6 and 7.9 per cent.

Since a common price of all food, feed, and fiber is an abstraction, the analysis was carried out on the basis of values rather than quantities, with a "price" of $1 per unit of value. Such a procedure does not change the results obtained from the analysis. The market clearing price was estimated to be 98.2 per cent of the prevailing world market price if the quantity of food exported under aid programs during 1964-66 had been only 75 per cent of the actual quantity and the

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[10]The analysis summarized in Table XII is based on the following price elasticities: elasticity of export demand for food, feed, and fiber = -1.90 weighted average calculated from The Demand for United States Farm Output, p. 360; elasticity of export supply for food, feed, and fiber = 1.60, estimation shown in Appendix D.

TABLE XII

THE ESTIMATED MARKET CLEARING PRICE FOR FOOD, FEED, AND FIBER FOR VARIOUS LEVELS OF REDUCTION IN FOOD AID

Per cent reduction in Total Food Aid	Per cent reduction in prevailing world market prices[1]			Market clearing price in per cent of prevailing world market price		
	ARS (wheat)	Lower ARS	Upper ARS	ARS (wheat)	Lower ARS	Upper ARS
25	1.8	2.1	1.0	98.2	97.9	99.0
50	3.3	4.1	2.0	96.7	95.9	98.0
75	4.5	5.9	2.6	95.5	94.1	97.4
100	6.1	7.9	3.6	93.9	92.1	96.4

[1]Underlying data for commercial food export and food aid are taken from: 12 Years of Achievement Under Public Law 480, p. 18.

remaining 25 per cent had been added to the commercial export. If all food aid programs had been discontinued and the food exported under these programs had been added to the commercial export, the market clearing price would have been 93.9 per cent of the prevailing price. If the reported values of commodities included in food aid programs are based on a value indicator different from the prevailing world market prices such as the CCC costs, the reductions needed to reach the value reflected by the market clearing prices will differ correspondingly.

The estimates obtained in this chapter are used in the following chapter to estimate the aid components, the net costs and the net social gains related to food aid programs. Summary and conclusions regarding the results obtained in this chapter are given in Chapter VI.

CHAPTER V

EMPIRICAL ANALYSIS II - ESTIMATION OF THE AID COMPONENTS, THE NET COSTS AND THE SOCIAL GAINS OF FOOD AID

The analyses performed in this chapter are based on the theoretical framework developed in Chapter III and the data developed in Chapter IV. The cost of transportation enters into the estimation of the aid component as well as the estimation of net cost and social gain. Therefore, the cost of transporting food aid commodities from donor to recipient countries is considered first. Afterwards, the aid components and the net costs associated with the various food aid programs are estimated. Finally the net social gain obtained from the various food aid programs and its distribution between donor and aid recipients are estimated.

Transportation Cost

The impact of transportation cost on the aid component, net cost, and social gain differ. Under PL 480, Title I (sales on long-term dollar credit and sales for non-convertible currencies) the aid recipient countries pay, in dollars, the cost of ocean transportation on foreign vessels. If the aid commodities are shipped on U.S. vessels, the U.S. pays the transportation cost in excess of the cost on foreign vessel. Under PL 480, at least 50 per cent of all food aid exported under Title I must be shipped on U.S. vessels.

Under Title II (grants), the U.S. pays the total cost of ocean

transportation. Commodities exported under Title II are usually shipped on U.S. vessels.

No widely accepted set of ocean shipping rates exists. The rates are usually determined by bidding for each individual shipment, and since a number of varying factors such as the possibility of back-haul, etc., may play a role in determining the bids, the rates may vary considerably from one shipment to another. Hence, the cost figures obtained for this study are based on a set of representative shipping rates rather than a universally accepted set of rates.

The cost of ocean transportation of food aid from U.S. Gulf Port to each of the various survey countries and a weighted average for all the countries are shown in Table XIII. The estimates are based on reported shipping rates for grain during the latter part of 1964 and the beginning of 1965. Both U.S. and foreign rates are indicated. The transportation costs are estimated as a percentage of the face value of the aid, i.e., the cost in cents per dollar's worth of aid. The conversion of the shipping rates to a percentage of the face value of the shipments is based on the average prices of wheat during 1964-66.

As shown in Table XIII the cost of ocean transportation on foreign vessels during 1964-65 was approximately 57 per cent of the cost of transportation on U.S. vessels. The gap between foreign and U.S. rates has widened considerably since then. In 1968 the cost of ocean transportation on U.S. vessels often was three times the cost of transportation on foreign vessels. The increasing difference is due to slightly decreasing foreign rates along with rapidly increasing U.S. rates. This development should be taken into consideration when comparing the aid components and the net costs associated with the various programs

TABLE XIII

COST OF OCEAN TRANSPORTATION OF FOOD AID FROM U.S. GULF PORT 1964-66 IN PER CENT OF FACE VALUE OF AID[1]

Destination	Foreign Vessel	U.S. Vessel
India	22.5	41.8
Pakistan	16.9	25.7
Yugoslavia	14.5	25.5
Brazil	17.2	31.0
Korea	20.9	39.5
Turkey	12.7	24.9
China	21.3	24.3
Israel	13.4	25.7
Greece	12.9	19.2
Chile	12.9	25.4
Morocco	13.7	20.9
Congo	24.1	34.5
Indonesia	22.5	31.1
Colombia	13.7	12.6
Weighted Average[2]	19.3	33.8

[1]Estimations based on shipping rates for grain to each of the various countries for the latter part of 1964 and the beginning of 1965.

[2]Each country estimate is weighted by the amount of food aid received during 1964-66.

Sources: Personal Correspondence with Dr. Willard Sparks, Comco, Memphis, Tennessee, and U.S. Congress, Food for Peace, Annual Report on Public Law 480, 1965 and 1966 (Washington, D.C., 1966 and 1968).

for a period more recent than 1964-66.

If the cost of transportation for each of the survey countries is weighted by the amount of food aid received by each individual country during 1964-66, the average cost of transportation of food aid during 1964-66 was found to be 19.3 per cent of the face value of the aid if shipped on foreign vessels and 33.8 if U.S. vessels were used.

The cost of transportation on U.S. vessels in excess of the cost of transportation on foreign vessels may be considered a subsidy to the U.S. merchant marine independent of food aid consideration. Hence, it appears that only the cost of transportation on foreign vessels should be considered when determining the net cost to the donor country of food aid.

The cost of handling and transportation prior to departure from the donor country is not dealt with separately in this study. Since the face value of the commodities is based on the export price, the costs prior to departure are included in the face value.

Estimation of the Aid Component

The aid component was defined earlier as the actual value of the flow of money, goods, and services to a recipient country less the discounted present value of the disbursements required. A theoretical framework for estimating the aid component present in the various food aid programs was developed in Chapter III.

In the following analysis, the aid component present in each of the three food aid programs, sales on long-term dollar credit, sales for non-convertible currencies and grants is estimated. Several alternative estimates are obtained for each program. Primary emphasis is

placed on the estimation of the aid component present in sales for long-term dollar credit. The other two programs are analyzed mainly for the purpose of comparisons.

Sales on Long-Term Dollar Credit

A general description of this program is given in Chapter II. Hence, only the credit terms related to the program will be described here. The credit terms vary with the hardest terms being repayment over three years with interest rates equal to the cost of money to the Treasury. However, most agreements are based on one of the two credit arrangements described below.

The most common credit arrangement is based on a 20-year repayment period. A down payment of five per cent of the total value of the commodities is required upon delivery of the commodities. The repayment of principal is divided into 19 equal annual payments with the first payment due at the end of the second year. The interest rate during the grace period; i.e., the first year, currently is 2.0 per cent. The interest rate during the remaining 19 years is 2.5 per cent of the unpaid balance. The interest payments and repayments of principal are due at the end of each year.

A second credit arrangement is based on a 40-year repayment period. This arrangement was introduced in Fiscal Year 1968. Repayment of principal is divided into 31 equal annual payments with the first payment due at the end of the tenth year. The interest rate during the grace period, i.e., the first nine years, is 2.0 per cent and is due at the end of each year. The interest rate during the remaining 31 years is 2.5 per cent of the outstanding balance. Similar to the 20-year

credit arrangement, a five per cent down payment is stipulated. However, up to this time, this payment has not been charged under the 40-year credit arrangement.

Estimation of the Present Value

The present values of down payment, repayments, and interest payments under each of the two credit arrangements are shown in Appendix G, Tables XXXIII and XXXIV for 11 alternative discount rates and 20 alternative default rates. For any given rate of default, the present value of the disbursements is inversely correlated with the rate of discount. Similarly, for any given discount rate, the present value is inversely correlated with the rate of default. Therefore, the highest present value is obtained where the discount rate and the risk of default are smallest. Within the choice of discount rates shown in Appendix G, the highest present value was estimated to be 80.8 per cent of the face value of the credit. This estimate was found in the 20-year credit arrangement under the assumption of no risk of default and a discount rate of 5.0 per cent. The present value may be increased over the above mentioned value if a lower discount rate is introduced into the model.

The lowest estimated present value was 18.8 per cent of the face value of the credit. This estimate was found in the 20-year credit arrangement under the assumption of complete default of the principal and a discount rate of 10.0 per cent on interest payments. As mentioned in Chapter III, the rate of default refers to the principal only, hence the above estimate indicates the present value of the interest payments only.

The estimated present value of disbursements under the 40-year

credit arrangement was lower than the corresponding present value under the 20-year arrangement for low rates of default and higher for high rates of default. This phenomenon is primarily due to the exclusion of interest payments from default. As the rate of default on the principal is increased, the interest payments occupy a greater proportion of the present value. But since the 40-year arrangement includes a 9-year grace period during which interest is paid on the total amount of credit, the interest payments play a greater role in the 40-year arrangement than in the 20-year arrangement. Hence, the rate of decrease in the present value of disbursements as the rate of default increases is lower for the 40-year arrangement than for the 20-year arrangement.

Calculation of the present value may be simplified by expressing present value as a function of the discount rate (r) and the default rate (D) while treating the remaining variables as a constant. It should be noted that such a procedure is an approximation only. It was found that a linear regression equation with an interaction term was a fairly good approximation. The following two equations were estimated for the 20 and 40-year terms respectively:

20-year terms:

$$PV_{20} = \underset{}{104.4794} - \underset{(0.0424)}{4.9155}r - \underset{(0.0071)}{0.7694}D + \underset{(0.0010)}{0.0403}rD$$

$$R^2 = 0.9985$$

40-year terms:

$$PV_{40} = \underset{}{92.2196} - \underset{(0.0935)}{4.5410}r - \underset{(0.0156)}{0.4796}D + \underset{(0.0021)}{0.0380}rD$$

$$R^2 = 0.9729$$

where the variables PV, r and D were defined earlier. The standard errors are in parentheses below the coefficients.

As indicated by the coefficient of determination (R^2), both equations yield a good approximation of the present value.[1] The estimated present values are used in a latter section to estimate the aid component.

Choice of Discount Rate and Default Rate

The problems in connection with the choice of an appropriate discount rate were discussed in Chapter III. Due to imperfections in the international money market, there is no unique rate that expresses the alternative cost of capital. The alternative cost of capital to the donor countries may differ from the alternative cost of capital to the aid recipient countries.

The aid component is an expression of the real value to the recipient country of the aid. Hence, when estimating the aid component, it seems most appropriate to use a discount rate that reflects the opportunity cost of capital to the recipient country.

The alternative cost of capital to the aid recipient countries may be indicated by the international lending rate. The current World Bank lending rate is 6.5 per cent and the current Export-Import Bank lending rate is 6.0 per cent.[2,3] However, it is possible that the returns on investments in the aid recipient countries far exceed the

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[1] It should be noted that, due to the procedure by which the data were obtained, the error term is not normally distributed, hence ordinary statistical tests are not valid for the estimated coefficients.

[2] International Bank for Reconstruction and Development, Washington, D. C. personal correspondence.

[3] Export-Import Bank of the United States, Washington, D.C. personal correspondence.

lending rates expressed above. The lending rate on World Bank and Eximbank loans is not determined by the demand and supply for investment funds. The demand far exceeds the supply at the current lending rates. Hence, it seems safe to conclude that the returns on investments in aid recipient countries generally exceeds the international lending rates set by institutional arrangements.

A more appropriate indicator of the alternative cost of capital to aid recipient countries may be the private lending rate in the international money market. However, such an estimate is not readily available. Investments in aid recipient countries are often exposed to a considerable risk. Hence, the lending rate will vary considerably from one loan to another depending upon the expected degree of risk involved.

The choice of an appropriate discount rate becomes easier if a separate coefficient expressing the expected rate of default is included in the estimating procedure. A more detailed discussion of the default rate was given in Chapter III.

By including a separate coefficient expressing the risk of default, it is possible to use a lending rate with no excess risk premium included as the discount rate. Hence, it seems appropriate to use the World Bank lending rate of 6.5 per cent.

The proportion of the credit that may be expected to default is very difficult to estimate. The proportion of past credit that has not been repaid on time has been very small. At the end of Fiscal Year 1967, there were $610 million receivables from long-term dollar credit sales with $1.4 million in current payments past due.[4] By the end of

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[4] U.S. Department of Agriculture, Washington, D.C. personal correspondence.

July, 1967, $.4 million had been paid. The remaining $1.0 million continued to be overdue at the end of Fiscal Year 1968.

However, the increasing emphasis on an expansion of sales on long-term dollar credit, both in terms of the quantities of food involved and in terms of the number of countries included, is likely to cause an increase in the rate of default. The actual default rate will depend on economic as well as political factors such as the extent to which the U.S. food aid will be sold for dollar credit, the determination of the U.S. to obtain the repayments, the economic success of the aid recipients and the extent to which diplomatic relations between the U.S. and aid recipient countries will remain stable. In estimating the aid component and the net cost to the donor country, a number of alternative risk coefficients will be applied.

Estimation of the Aid Component

The aid component present in U.S. food aid sold on long-term dollar credit may be calculated as the estimated value of the aid less transportation cost payable by recipient countries and the present value of down payment, interest payments, and repayment of the credit. Three alternative sets of estimates for the value of food aid were established in Chapter IV: estimates based on the average value of food aid relative to cash aid, estimates based on the market clearing price, and estimates based on the marginal value of food aid relative to cash aid.

The first mentioned estimates refer to the average value of food aid relative to cash aid, given that the 1964-66 mixture of food aid and cash aid prevails. The estimates based on the market clearing price refer to the average value of food aid relative to cash aid,

given that the recipient countries have adjusted the mixture of food aid and cash aid to a desired level.

The estimated aid components are shown in Table XIV for a 20-year credit arrangement and in Table XV for a 40-year credit arrangement. The aid component is estimated on the basis of each of the three value estimators and for six arbitrarily selected alternative default rates.

A discount rate of 6.5 per cent was used. A five per cent down payment is included and the interest rates and other credit terms are those presently employed in each of the two credit arrangements. These terms were discussed previously.

The transportation costs payable by recipient countries under this program is the cost of ocean transportation related to foreign vessels.

Assuming no default of the credit, the average aid component present in food aid sold under the 20-year credit arrangement during 1964-66 was -11.8 per cent of the face value of the credit or a negative aid component of 11.8 cents per dollar's worth of aid received. This implies that if the aid recipient countries pay back the credit as agreed and if the countries have access to loans carrying a rate of interest equal to the discount rate used in the computations (6.5 per cent) these countries would have been better off rejecting food aid on long-term dollar credit. For each dollar's worth of food received the recipient countries had a total outlay of 11.8 cents more than the actual value of the food. The aid component present in the last unit of food aid under similar conditions was -14.5 per cent of the face value. The average aid component increases to 38.6 per cent of the face value under the 20-year arrangement if complete default of the credit is assumed but interests are paid as agreed. The marginal aid

TABLE XIV

ESTIMATED AID COMPONENT PRESENT IN FOOD AID EXPORTED UNDER THE 20-YEAR CREDIT ARRANGEMENT IN PER CENT OF FACE VALUE FOR ALTERNATIVE VALUE ESTIMATORS AND DEFAULT RATES

Default Rate in Per Cent	Value Estimator				
	Average Value	Marginal Value	Market Clearing Price		
			ARS (wheat)	Lower ARS	Upper ARS
0	-11.8	-14.5	2.5	0.7	5.0
1	-11.3	-14.0	3.0	1.2	5.5
5	- 9.3	-12.0	5.0	3.2	7.5
10	- 6.8	- 9.5	7.5	5.7	10.0
50	13.4	10.7	27.7	25.9	30.2
100	38.6	35.9	52.9	51.1	55.4

TABLE XV

ESTIMATED AID COMPONENT PRESENT IN FOOD AID EXPORTED UNDER THE 40-YEAR CREDIT ARRANGEMENT IN PER CENT OF FACE VALUE FOR ALTERNATIVE VALUE ESTIMATORS AND DEFAULT RATES

Default Rate in Per Cent	Value Estimator				
	Average Value	Marginal Value	Market Clearing Price		
			ARS (wheat)	Lower ARS	Upper ARS
0	- 1.8	- 4.5	12.5	10.7	15.0
1	- 1.6	- 4.3	12.7	10.9	15.2
5	- 0.7	- 3.4	13.6	11.8	16.1
10	0.4	- 2.3	14.7	12.9	17.2
50	9.6	6.9	23.9	22.1	26.4
100	21.1	18.4	35.4	33.6	37.9

component under similar conditions increases to 35.9 per cent of the face value.

If the aid recipient countries were allowed to adjust the combination of food aid and cash aid, the average aid component was found to be considerably higher. Under the 20-year arrangement, the average aid component was estimated to be 2.5 per cent of the face value if no default were assumed and 52.9 per cent if complete default were assumed. The lower and upper limits were estimated at 0.7 and 5.0 per cent, respectively, under no default, and 51.1 and 55.4 per cent if complete default were assumed.

The estimated aid components present in food aid sold under the 40-year credit arrangement were higher than the corresponding aid components under the 20-year arrangement for low rates of default and lower for high rates of default. This phenomenon is due to the behavior of the estimated present values for the two credit arrangements as previously discussed.

As previously indicated, the actual rate of default depends on a number of economic and political factors. The future impact of these factors is difficult or impossible to predict, hence the actual default rate cannot be determined. In most of the analyses to follow, a default rate of 10 per cent is arbitrarily chosen. Estimates based on other default rates may be easily obtained. The rate of change in the aid component corresponding to a change in the default rate is approximately .5 percentage points for each one percentage point change in the default rate for the 20-year arrangement and .2 percentage points for the 40-year arrangement.

The aid component present in the food aid received on long-term

dollar credit during 1964-66 was estimated for each of the survey countries for which data were available. The results are shown in Table XVI.

The aid component varies considerably among countries. This is due to differences in the need for food relative to other types of aid, the aid terms and the transportation cost. The average aid component was large for Morocco and Congo, while it was negative for Korea, China, Brazil, Turkey, and Colombia. The marginal aid component was large for Pakistan and Morocco while it was small for Brazil, India, and China.

With a few exceptions, for each individual country, the aid component present in the last unit of food aid was found to be lower than the average aid component.

Table XVII shows the estimated aid components present in export of wheat on long-term dollar credit. If no substitution between wheat and feed grains is assumed the aid component is negative for rates of default up to and even beyond 50 per cent. The meaning of a negative aid component was explained previously. If it is assumed that wheat is a perfect substitute for feed grains on a weight basis, the aid component is zero at a default rate of 24 per cent.

As previously mentioned, it is probably quite reasonable to assume that wheat is a near perfect substitute for feed grains. Hence, the latter set of estimates is more realistic than the former.

Sales for Non-Convertible Currencies

A theoretical framework to estimate the aid component present in sales for non-convertible currencies was developed in Chapter III.

The total amount of non-convertible currency included in agreements

TABLE XVI

ESTIMATED AID COMPONENTS IN PER CENT OF FACE VALUE OF CREDIT, FOR INDIVIDUAL SURVEY COUNTRIES[1]

Country	Average		Marginal	
	20-year terms	40-year terms	20-year terms	40-year terms
India	1.0	8.2	-16.5	- 9.3
Pakistan	n.a.	n.a.	16.0	23.2
Brazil	-15.3	-8.1	-17.1	- 9.9
Korea	-19.6	-12.2	-6.6	0.6
Turkey	-14.4	-7.2	-9.2	-2.0
China	-18.1	-10.9	-20.0	-12.8
Israel	5.4	12.6	0.0	7.2
Greece	4.3	11.5	-2.1	5.1
Chile	0.9	8.1	-1.6	5.6
Morocco	19.2	26.4	7.3	14.7
Congo	8.8	16.0	n.a.	n.a.
Colombia	-9.9	-2.7	-7.7	-0.5

[1]A default rate of 10 per cent is assumed for all the countries. Approximate figures based on a different rate of default may be obtained by subtracting or adding .5 percentage points per one per cent change in the default rate under 20-year terms and .2 under 40-year terms.

n.a. indicates that the estimate was not available.

TABLE XVII

ESTIMATED AID COMPONENTS PRESENT IN EXPORT OF WHEAT ON LONG-TERM DOLLAR CREDIT IN PER CENT OF FACE VALUE OF THE CREDIT[1]

Default Rate	20-year terms		40-year terms	
	No Substitution	Perfect Substitution	No Substitution	Perfect Substitution
0	-32.0	-12.3	-22.0	- 2.3
1	-31.5	-11.8	-21.8	- 2.1
5	-29.5	- 9.8	-20.9	- 1.2
10	-27.0	- 7.3	-19.8	- 0.1
50	- 6.8	12.3	-10.6	9.1
100	18.4	38.1	0.9	20.6

[1]Estimations based on the market clearing prices as previously estimated.

signed from 1954 through 1966 and the proportion used to replace U.S. dollar spending in the various countries are shown in Appendix H. The cost of transportation related to foreign vessels is to be paid in dollars by the recipient countries under this program. Based on the figures in Table XIII and Appendix H, the aid component is estimated for each of the survey countries and for the total quantity of food sold under the program. Three alternative procedures are used to estimate the aid component. One procedure is based on the previously estimated market clearing price. The estimated average and marginal values are the bases for the other two procedures. The results are shown in Table XVIII.

The average aid component present in U.S. food aid sold for non-convertible currencies during 1964-66 was estimated to be 36.7 per cent of the face value of the aid. The aid component present in the last unit of aid was estimated to be 57.6 per cent of the face value if it is assumed that the U.S. requirements for non-convertible currencies are satisfied prior to the receipt of the last unit of currency. If, on the other hand, it is assumed that the same proportion of the last unit of currency is used in place of dollar spending as for all previous units the aid component present in the last unit was estimated at 34.0 per cent of the face value.

It is likely that the amount of non-convertible currency replacing dollar spending for any individual country is somewhat fixed and affected little by additional currency. Hence, the former assumption appears to be valid.

The average aid component was estimated to be 51.0 per cent of face value if an optimum adjustment of the aid mixture were permitted,

TABLE XVIII

ESTIMATED AID COMPONENTS IN PER CENT OF FACE VALUE OF FOOD, FEED, AND FIBER SALES FOR NON-CONVERTIBLE CURRENCIES

Country	Estimation based on:					
	Market Clearing Price			Average Value	Marginal Value[1]	
	ARS (wheat)	Lower ARS	Upper ARS		If MB=0	If MB=B
India	56.4	54.6	58.9	53.1	50.6	35.6
Pakistan	68.2	66.4	70.9	--	83.1	74.3
Yugoslavia	71.9	70.1	74.4	--	--	--
Brazil	58.6	56.8	61.1	33.7	50.0	31.9
Korea	57.8	56.0	60.3	32.5	60.5	45.3
Turkey	51.3	49.5	53.8	22.8	57.9	28.0
China	48.6	46.8	51.1	25.0	47.1	23.1
Israel	65.5	63.7	68.0	57.5	67.1	52.1
Greece	46.7	44.9	49.2	37.1	65.0	30.7
Chile	55.0	53.2	57.5	42.0	65.5	39.5
Morocco	56.2	54.4	58.7	62.3	74.6	50.6
Congo	56.8	55.0	59.3	62.9	--	--
Indonesia	40.5	38.7	43.0	--	--	--
Colombia	52.8	51.0	55.3	29.8	59.4	32.0
Average	51.0	49.2	53.5	36.7	57.6	34.0

[1]MB and B indicate the percentage of the non-convertible currency that is used to replace dollar spending at the margin and on the average respectively (see Chapter III).

with the lower and upper limits estimated at 49.2 and 53.5 per cent, respectively.

The average aid component present in aid sold for non-convertible currencies during 1964-66 was relatively small for Turkey and large for Congo, Morrocco, and India. The aid component at the margin was low for Turkey and high for Pakistan.

The aid component present in wheat aid was estimated for each of the survey countries. The results are summarized in Table XIX. If no substitution between wheat and feed grains were assumed, the average aid component was estimated at 16.5 per cent of face value. If wheat was considered a perfect substitute for feed grains, the aid component was estimated at 36.2 per cent.

The lowest aid components were found for Greece and Indonesia while Yugoslavia and Pakistan each showed a high aid component.

Grants

The theoretical framework to estimate the aid component present in food grants was shown in Chapter III.

Table XX shows the estimated aid components present in the 1964-66 food aid on the average and at the margin for each of the survey countries for which information was available. Since no disbursements are required from aid recipients under grant programs, the aid components are equal to the average and marginal values shown in Tables VIII and VII, respectively.

As shown in Table XX, the aid component present in the 1964-66 food aid was estimated at 79.6 per cent of the face value on the average and 76.9 per cent at the margin. If adjustment in the aid composition were

TABLE XIX

ESTIMATED AID COMPONENTS IN PER CENT OF FACE VALUE OF WHEAT, SALES FOR NON-CONVERTIBLE CURRENCIES

Country	No Substitution	Perfect Substitution
India	21.9	41.6
Pakistan	33.7	53.4
Yugoslavia	37.4	57.1
Brazil	24.1	43.8
Korea	23.3	43.0
Turkey	16.8	36.5
China	14.1	33.8
Israel	31.0	50.7
Greece	12.2	31.9
Chile	20.5	40.2
Morocco	21.7	41.4
Congo	22.3	42.0
Indonesia	6.0	25.7
Colombia	18.3	38.0
Average	16.5	36.2

TABLE XX

ESTIMATED AID COMPONENTS IN PER CENT OF FACE VALUE OF FOOD, FEED, AND FIBER GRANTS

Country	Average	Marginal
India	90.6	73.1
Pakistan	--	100.0
Yugoslavia	--	--
Brazil	69.0	67.2
Korea	68.6	81.4
Turkey	65.4	70.6
China	70.3	68.4
Israel	85.9	80.5
Greece	84.3	77.9
Chile	80.9	78.4
Morocco	100.0	88.3
Congo	100.0	--
Indonesia	--	--
Colombia	70.9	73.1
Weighted Average	79.6	76.9

allowed, the aid component increased to 93.9 per cent of the face value of the aid. The lower and upper limits were estimated to be 92.1 and 96.4 per cent, respectively.

The aid components present in wheat grants are given by the estimated market clearing price for wheat. If no substitution between wheat and feed grains were assumed, the aid component was estimated at 59.4 per cent of the face value. If wheat was considered a perfect substitute for feed grains, the aid component was estimated at 79.1 per cent of the face value of the aid (Table XI).

Summary

Table XXI gives a summary of the aid components estimated for the various assistance programs. The estimates related to long-term credit programs are based on a default rate of 10 per cent.

The aid component of food aid exported under credit arrangements is negative, some 7 cents per dollar's worth on the average and 10 cents at the margin under 20-year terms. It is approximately zero on the average and negative at the margin under 40-year terms. If the food aid is sold for non-convertible currencies, the aid component is estimated to be 37 cents per dollar's worth on the average and 34 cents at the margin. Finally, if no disbursements are required from the aid recipients, the aid component was found to be 80 cents per dollar's worth of aid on the average and 77 cents at the margin.

If the amount of food aid received were adjusted to a point of optimum combination of food and cash aid, the aid component was found to be higher for each of the aid programs.

TABLE XXI

ESTIMATED AID COMPONENTS IN PER CENT OF FACE VALUE OF AID FOR THE VARIOUS AID PROGRAMS, FOOD, FEED, AND FIBER

Aid Program	Estimation based on:				
	AV	MV	Market Clearing Price		
			ARS (wheat)	Lower ARS	Upper ARS
Long-Term Credit					
20-year terms	-6.8	-9.5	7.5	5.7	10.0
40-year terms	0.4	-2.3	14.3	12.9	17.2
Non-Convertible Currency	36.7	34.0[1]	51.0	49.2	53.5
Grants	79.6	76.9	93.9	92.1	96.4

[1]Assuming that the same proportion of the last unit of currency is used in place of dollar spending as for all previous units. If U.S. requirements for non-convertible currency are satisfied prior to the receipt of the last unit of currency the marginal aid component is equal to that for grants.

Estimation of the Net Cost

In Chapter III, a procedure was developed to estimate the net cost to the donor country of food aid. The net cost is measured as the revenue foregone by allocating the commodities to aid programs rather than to the best alternative use plus transportation costs related to food aid and payable by the donor country less the present value of the disbursements made by the aid recipients.

Two alternative outlets, commercial export and production control, are considered.

Alternative I: Commercial Export

The revenue foregone under this alternative 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's worth of food transferred from aid programs to commercial export was estimated for food, feed, and fiber and for wheat alone. The results are summarized in Tables XXII and XXIII. The revenue foregone was estimated for four different levels of reduction in food aid. The estimated values refer to the amount of reduction, e.g., the estimates for 25 per cent reduction refer only to the marginal 25 per cent while the estimates for a 100 per cent reduction refer to the total quantity of food aid.

The export revenue foregone by maintaining food aid programs during 1964-66 was estimated to be 52 cents per dollar's worth of food, feed, and fiber. The upper and lower limits were estimated to be 71 and 38 cents, respectively. The level of aid was found to have little or no influence on the size of the revenue foregone per dollar's worth

TABLE XXII

ESTIMATED AVERAGE EXPORT REVENUE FOREGONE IN PER CENT OF FACE VALUE OF AID FOR ALTERNATIVE LEVELS OF AID, FOOD, FEED, AND FIBER

Per Cent Reduction in Total Food Aid	Estimation based on:[1]		
	ARS (wheat)	Lower ARS	Upper ARS
25	47.3	37.9	69.8
50	49.3	37.3	69.3
75	53.5	39.7	72.7
100	51.6	37.8	71.2

[1]The three different bases for estimation refer to the, in Chapter IV, estimated average rate of substitution for wheat with a lower and upper limit for food, feed, and fiber.

TABLE XXIII

ESTIMATED EXPORT REVENUE FOREGONE IN PER CENT OF FACE VALUE OF AID FOR ALTERNATIVE LEVELS OF AID, WHEAT

Per Cent Reduction in Total Food 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

of aid. The most likely explanation for this phenomenon seems to be that since food aid is a relative small proportion of the total agricultural export, the over-all export prices are affected very little by the quantity of food aid transferred to the commercial market.

The estimated values of export revenue foregone are results of two opposing forces, (1) increase in the quantity traded and (2) decrease in price. The effect on export revenue of a price decrease may be counterbalanced or offset by the increase in quantity traded.

Since the revenue foregone per dollar's worth was approximately equal for the various levels of food aid, the average and marginal values are the same. Hence, only the average values are shown in Table XXII.

The revenue foregone during 1964-66 by exporting wheat under aid provisions was estimated to be 62 cents per dollar's worth of wheat if no substitution was assumed and 86 cents if substitution was assumed (Table XXIII). 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 restrains 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 $.09 per dollar's worth of wheat if no substitution between wheat and feed grains were assumed and, more

realistically, $.66 if substitution were assumed.

The net cost is given as the revenue foregone plus transportation costs payable by the donor country less the present value of disbursements. The choice of discount rate to determine the present value was based on the alternative cost of capital to the donor country. The alternative cost of capital to the U.S. may be indicated by the average returns from public investment. Krutilla and Eckstein estimated the average returns from public investment in the U.S. to be 5.5 per cent.[5] Harberger estimated the returns to be 6.0 per cent.[6] Other estimates indicate a return on public investment in the U.S. of around 5.5 per cent. Hence, this rate is used as the discount rate when estimating the net cost to the U.S.

The estimated net cost associated with food, feed, and fiber for each of the aid programs is shown in Table XXIV. Since the revenue foregone per dollar's worth was approximately equal for the various levels of food aid, the net cost is estimated for the total aid only. A default rate of 10 per cent was arbitrarily assumed.

The net cost associated with food, feed, and fiber sold on long-term dollar credit was estimated to be negative except in the case of sale under 40-year credit terms assuming the upper limit of the average rate of substitution of commercial export for food aid. This implies that the United States realizes a net gain from aid transactions carried out under long-term dollar credit arrangements if the

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[5]John V. Krutilla and Otto Eckstein. Multiple Purpose River Development (Baltimore, 1959), p. 125.

[6]A. C. Harberger. The Interest Rate in Cost-Benefit Analysis, Federal Expenditure Policy for Economic Growth and Stability (Washington, 1957), p. 240.

TABLE XXIV

ESTIMATED NET COST OF FOOD AID IN PER CENT OF FACE VALUE OF THE AID FOR EACH OF THE THREE MAJOR PROGRAMS, ALTERNATIVE I[1]

Aid Program	Estimation based on:		
	ARS (wheat)	Lower ARS	Upper ARS
Sale on dollar credit:			
20-year terms[2]	-20.2	-35.2	- 1.2
40-year terms[2]	-13.5	-28.5	5.5
Non-convertible currency	28.4	13.4	47.4
Grants	71.3	56.3	90.3

[1]Alternative I refers to commercial export as the alternative to food aid.

[2]A default rate of 10 per cent and a discount rate of 5.5 per cent are assumed.

assumptions on which the analysis is based are valid. The net gain is to be interpreted as the revenue obtained from aid recipients in excess of the export revenue that could have been obtained if no food aid programs were in existence.

The net gain under the 20-year terms was estimated to be 20.2 per cent of the face value of the aid or 20 cents per dollar's worth. The upper and lower limits were estimated to be 35.2 and 1.2 per cent, respectively.

If the default rate is higher than the 10 per cent assumed above, the net gain is lower. The net gain is zero for a default rate of 46 per cent under the 20-year terms and 58 per cent under the 40-year terms.

The net cost to the United States of sales for non-convertible currencies was estimated to be 28.4 per cent of the face value of the aid or 28 cents per dollar's worth of aid. The upper and lower limits were estimated to be 47.4 and 13.4 per cent, respectively.

The net cost of food aid distributed on a grant basis was estimated to be 71.3 per cent of the face value or 71 cents per dollar's worth of aid. The upper and lower limits were estimated to be 90.3 and 56.3 per cent, respectively.

As previously indicated, in the case of grants, the cost of transportation is paid by the U.S. Only the cost of transportation related to foreign vessels is included in the net cost of food aid. The additional transportation cost due to use of U.S. vessels is considered a subsidy to the merchant marine with no bearing on food aid. Hence, since no disbursements are required by grant recipients, the net cost consists of the export revenue foregone plus the cost of ocean

transportation by foreign vessels.

The net costs associated with wheat aid are shown in Tables XXV and XXVI for no substitution and substitution, respectively. As in the previous analysis, a default rate of 10 per cent and a discount rate of 5.5 per cent were assumed. The net costs per dollar's worth of wheat aid were found to be small for a low level of aid and increasing for increasing aid levels. This phenomenon is primarily due to the price depressing effects of an increasing supply of wheat on the commercial market. As more wheat is transferred from aid programs to commercial export, the export prices drop relatively more than the increase in quantity sold, hence the revenue foregone per dollar's worth of wheat exported under aid programs falls.

If no substitution between wheat and feed grains is assumed the donor country realizes an average net gain of 10.2 per cent of the face value of wheat exported under 20-year credit terms. In other words, the revenue obtained from the aid recipients exceeded the revenue foregone by 10 cents per dollar's worth of wheat. If perfect substitution were assumed, the donor realized a net cost of 13.8 per cent of the face value of the wheat. As previously mentioned, the assumption of perfect substitution appears to be most realistic, hence the latter estimate is probably the most reliable.

If the quantity of wheat exported under food aid programs during 1964-66 had been reduced by 75 per cent, the net gain associated with the remaining 25 per cent was estimated to be 64.2 per cent of the face value if no substitution were assumed and 9.2 per cent if perfect substitution were assumed.

The net cost at the margin, i.e., the net cost associated with the

TABLE XXV

ESTIMATED NET COST OF WHEAT AID IN PER CENT OF FACE VALUE OF THE AID FOR THE VARIOUS AID PROGRAMS UNDER THE ASSUMPTION OF NO SUBSTITUTION, ALTERNATIVE I[1]

Per Cent Reduction in Total Food Aid	Sales on Dollar Credit				Sales for Non-Convertible Currency		Grants	
	20-year terms		40-year terms					
	Average	Marginal	Average	Marginal	Average	Marginal	Average	Marginal
25	27.8	27.8	35.5	35.5	77.4	77.4	120.0	120.0
50	15.8	4.8	22.5	11.5	64.4	53.4	107.4	94.8
75	7.8	- 8.2	14.5	- 1.5	56.4	40.4	99.3	83.1
100	-10.2	-64.2	- 3.5	-57.5	38.4	-15.6	81.3	28.1

[1]Alternative I refers to commercial export as an alternative to food aid.

TABLE XXVI

ESTIMATED NET COST OF WHEAT AID IN PER CENT OF FACE VALUE OF THE AID FOR THE VARIOUS AID PROGRAMS UNDER THE ASSUMPTION OF PERFECT SUBSTITUTION ALTERNATIVE I[1]

Per Cent Reduction in Total Food Aid	Sales on Dollar Credit				Sales for Non-Convertible Currency		Grants	
	20-year terms		40-year terms					
	Average	Marginal	Average	Marginal	Average	Marginal	Average	Marginal
25	27.8	27.8	35.5	35.5	77.4	77.4	120.0	120.0
50	25.8	24.8	32.5	31.5	74.4	73.4	117.6	115.2
75	20.8	10.8	27.5	17.5	69.4	59.4	112.3	102.3
100	13.8	- 9.2	20.5	- .5	62.4	41.4	105.5	84.3

[1]Alternative I refers to commercial export as an alternative to food aid.

last 25 per cent of the wheat exported under food aid programs during 1964-66, was estimated to be 27.8 per cent of the face value of the aid. Since the wheat price is above the price of feed grains on a weight basis at the margin, no substitution of wheat for feed grains is assumed to take place.

The net costs associated with the 40-year credit terms were found to be somewhat higher than those associated with the 20-year terms. This is due to the larger present value of disbursements under the 20-year terms.

The average net cost associated with sale of wheat for non-convertible currencies was estimated to be 38.4 per cent of face value if no substitution were assumed and 62.4 per cent if perfect substitution were assumed. The net cost at the margin was estimated to be 77.4 per cent of the face value of the aid.

The average net cost realized by the donor country for wheat shipped on a grant basis was 81.3 and 105.5 per cent of face value under no substitution and perfect substitution, respectively. The marginal net cost was found to be 120 per cent of the face value of the aid or $1.20 per dollar's worth of aid.

Alternative II: Production Control

Assuming that production control is the best alternative outlet for food presently exported under food aid programs, the net cost of food aid was defined in Chapter III as

$$NC_{PC} = \frac{P_R}{P_w}(1 - C_{PC}) + T_2 - PV/\Delta S$$

where

NC_{PC} = net cost per dollar's worth of food

P_R = prices received by farmers

P_w = prevailing world market prices

C_{PC} = treasury cost required to reduce the quantity produced by an amount that, valued at prices received by farmers, is worth one dollar.

PV = present value of disbursements

ΔS = quantity of food exported under food aid programs, valued at prevailing world market prices.

T_3 = transportation cost of food aid payable by the donor country.

The net cost per dollar's worth of food is estimated for four levels of reduction in food aid.

The price ratio (P_R/P_w) was calculated for each of the major food aid commodities. To obtain the price ratio corresponding to food aid, each of the commodity price ratios was weighted by the amount of the corresponding commodity exported under food aid programs during 1964-66. The price ratio was estimated to be .868. The intermediate computational steps and data sources are shown in Appendix I.

The procedure used to estimate the treasury cost associated with production control may be outlined as follows. First, a relationship was established between the efficiency of government programs to reduce production and the level of acreage diversion.[7] Then the additional acreage diversion required to reduce the quantity produced by an amount

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[7]The efficiency is defined as the amount by which production is reduced per dollar of treasury outlay. The amount was valued at farm prices.

equal to the food aid during 1964-66 was estimated. By adding the required additional acreage diversion to the actual acreage diversion during 1964-66, the levels of acreage diversion corresponding to each of the four levels of reduction in food aid could be obtained. Hence, the efficiency of government programs corresponding to production reductions of magnitudes equal to each of the four levels of reduction in food aid could be estimated.

The efficiency of government programs aimed at production control is decreasing as more land is removed from production. Past studies indicate that the efficiency is approximately four for a low level of acreage diversion, falling to about two if 50-60 million acres are diverted and falling to about one if 80 million acres are diverted from production.[8] If a linear relationship is assumed between the efficiency and the acreage diverted, the average and marginal cost of production control may be estimated for any level of acreage diversion. The linear relationship of the marginal efficiency is given by:

$$Y = 4.0 - \frac{3}{80}(X_1 + X_2)$$

where

Y = marginal efficiency of government programs

X_1 = average annual acreage diversion during 1964-66 (million acres)

X_2 = additional acreage diversion corresponding to the various levels of reduction in food aid (million acres).

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[8] Based on Luther G. Tweeten, Earl O. Heady, and Leo V. Mayer, Farm Program Alternatives. CAED Report No. 18 (Ames, Iowa, 1963).

The treasury cost (C_{PC}) required to reduce the quantity produced by an amount that, valued at farm prices, is worth one dollar is given by the inverse of the efficiency or 1/Y.

The actual acreage diversion during 1964-66 was 55.5, 57.4, and 60.6 million acres for each of the three years respectively, yielding an annual average of 57.8 million acres.[9] The acreage used to grow the commodities exported under food aid programs during 1964-66 was estimated to be 20.9 million acres annually.[10]

The efficiency of government programs, the treasury cost of curtailing production and the revenue foregone corresponding to each of the four levels of reduction of food aid were estimated. The results are summarized in Table XXVII. The total acreage diversion shown in Table XXVII is calculated as the actual diversion during 1964-66 plus the additional diversion required to reduce the supply of food, feed, and fiber by an amount equal to the food aid. The efficiency of the last dollar spent on acreage diversion programs was estimated to be 1.05.

The marginal efficiency corresponding to a marginal unit of 25 per cent of the food aid may be estimated by lagging the marginal estimates 12.5 percentage points. Since the marginal efficiency is assumed

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[9] U.S. Department of Agriculture, Agricultural Statistics, 1966.

[10] The acreage required to grow the food, feed, and fiber exported under aid programs during 1964-66 was estimated as the quantity of each of the major food aid commodities divided by the average yield per acre during that period. The quantity of wheat exported under food aid programs was estimated to have occupied 20.9 million acres annually. The remaining major food aid commodities occupied a total of approximately 10,000 acres annually. It is possible that the yield on the land removed from production would be slightly below average, hence the estimated acreage needed to be removed might be slightly downward biased.

TABLE XXVII

ESTIMATED ACREAGE DIVERSION, EFFICIENCY, TREASURY COST AND REVENUE FOREGONE FOR VARIOUS LEVELS OF REDUCTION IN FOOD AID

Per Cent Reduction in Total Food Aid	Total Acreage Diversion Required (million acres)	Estimated Efficiency			Treasury Cost Per Dollar's Worth, Valued at Farm Prices		Revenue Foregone in Per Cent of Face Value of Aid	
		Marginal (last unit)	Marginal (lagged 12.5 per cent)[1]	Average	Marginal (lagged)	Average	Marginal (lagged)	Average
25	63.0	1.64	1.73	1.73	.578	.578	36.6	36.6
50	68.3	1.44	1.55	1.64	.645	.610	30.8	33.9
75	73.5	1.25	1.34	1.54	.746	.649	22.0	30.5
100	78.7	1.05	1.15	1.44	.870	.694	11.3	26.6

[1]The marginal efficiency lagged 12.5 per cent indicates the marginal efficiency if the marginal unit is given by a 25 per cent reduction in food aid (see text).

to be a linear function of the level of acreage diversion, the point estimate of the marginal efficiency that refers to the mid-point of each 25 per cent interval is the marginal efficiency for that particular 25 per cent. By using this marginal concept, the estimates become directly comparable to other estimates in this chapter.

The treasury cost of curtailing production increased from 58 cents per dollar's worth of commodities, valued at farm prices, if production were curtailed by 25 per cent of the 1964-66 level of food aid in addition to the actual production control to 69 cents if production were curtailed by the total amount of food aid.

The revenue foregone by maintaining food aid programs rather than curtailing production was estimated to be 26.6 per cent of the face value of the aid or 27 cents per dollar's worth, valued at prevailing world market prices. The revenue foregone by maintaining food aid in excess of 75 per cent of the actual aid was estimated to be 36.6 per cent of the face value of the aid.

The net costs of food aid programs are given by the revenue foregone plus relevant transportation costs less the present value of disbursements made by aid recipients. The estimated net costs for each of the major aid programs are shown in Table XXVIII. The estimates are valid for wheat as well as for food, feed, and fiber. As previously indicated, the acreage required to grow food aid commodities other than wheat was only some 10,000 acres as compared to 20.9 million acres for wheat. Furthermore, the price ratio (P_R/P_W) for wheat was approximately equal to that for food, feed, and fiber (Appendix G).

As indicated in Table XXVIII the net cost of exporting food under long-term dollar credit is negative, i.e., the present value of the

TABLE XXVIII

ESTIMATED NET COST OF FOOD AID IN PER CENT OF FACE VALUE OF THE AID FOR THE VARIOUS AID PROGRAMS, ALTERNATIVE II[1]

Aid Program	Per Cent Reduction in Total Food Aid							
	25		50		75		100	
	Marginal	Average	Marginal	Average	Marginal	Average	Marginal	Average
Sale on dollar credit								
20-year terms[2]	-35.6	-35.6	-41.4	-38.3	-50.2	-41.7	-60.9	-45.6
40-year terms[2]	-28.9	-28.9	-34.7	-31.6	-43.5	-35.0	-54.2	-38.9
Non-Convertible currency	13.0	13.0	7.2	10.3	- 1.6	6.9	-12.3	3.0
Grants	55.9	55.9	50.1	53.2	41.3	49.8	30.6	45.9

[1]Alternative II refers to production control as an alternative to food aid.

[2]A default rate of 10 per cent and a discount rate of 5.5 per cent are assumed.

disbursements made by aid recipients exceeds the revenue foregone by not curtailing production. If all food aid were exported on long-term dollar credit and production control were the best alternative outlet for surplus commodities, the donor country would realize a gain equal to 45.6 per cent of the face value of the aid under 20-year terms and 38.9 per cent under 40-year terms by allocating the surplus commodities to foreign aid rather than curtailing production.

If all food aid were sold for non-convertible currency, the net cost to the donor country was estimated to be 3 per cent of the face value of the aid. Finally, if no disbursements were required, the net cost was estimated to be 45.9 cents per dollar's worth of aid.

Estimation of the Social Gain

A procedure to estimate the social gain of food aid programs was outlined in Chapter III. The net social gain of food aid was defined as the net benefit to the recipient countries, the aid component, less the net cost to the donor country. Estimation of the net cost is based on the alternative value of the food included in food aid programs. Hence, the magnitude of the estimated net cost depends on the alternatives to food aid considered feasible. The net costs corresponding to each of two alternative outlets were estimated previously.

The estimated average and marginal net social gain and their distribution between donor and recipient countries are shown in Tables XXIX and XXX for each of the two alternative outlets for surplus commodities. The average net social gain expresses the net addition to social output obtained by maintaining the food aid programs during 1964-66 rather than allocating the food aid commodities to the

TABLE XXIX

ESTIMATED AVERAGE NET SOCIAL GAIN OF FOOD AID IN PER CENT OF FACE VALUE, AND ITS DISTRIBUTION BETWEEN DONOR AND RECIPIENT COUNTRIES

Aid Program	Alternative I[1]			Alternative II[2]		
	Average Net Social Gain	Distribution		Average Net Social Gain	Distribution	
		Aid Recipients	Donor		Aid Recipients	Donor
Long-term credit						
20-year terms	13.4	- 6.8	20.2	38.8	- 6.8	45.6
40-year terms	13.9	0.4	13.5	39.3	0.4	38.9
Non-Convertible currency	8.3	36.7	-28.4	33.7	36.7	- 3.0
Grants	8.3	79.6	-71.3	33.7	79.6	-45.9

[1]Estimations based on the export market as the only feasible alternative outlet.

[2]Estimations based on production control as the only feasible alternative outlet.

TABLE XXX

ESTIMATED MARGINAL NET SOCIAL GAIN OF FOOD AID IN PER CENT OF FACE VALUE, AND ITS DISTRIBUTION BETWEEN DONOR AND RECIPIENT COUNTRIES

Aid Program	Alternative I[1]			Alternative II[2]		
	Marginal Net Social Gain	Distribution		Marginal Net Social Gain	Distribution	
		Aid Recipients	Donor		Aid Recipients	Donor
Long-term credit						
20-year terms	10.7	- 9.5	20.2	26.1	- 9.5	35.6
40-year terms	11.2	- 2.3	13.5	26.6	- 2.3	28.9
Non-Convertible currency	5.6	34.0	-28.4	21.0	34.0	-13.0
Grants	5.6	76.9	-71.3	21.0	76.9	-55.9

[1]Estimations based on the export market as the only feasible alternative outlet.

[2]Estimations based on production control as the only feasible alternative outlet.

corresponding alternative use. The marginal net social gain refers to the marginal 25 per cent of the 1964-66 level of food aid, i.e., the net social gain obtained from the food aid in excess of 75 per cent of the actual aid.

The average net social gain was estimated to be between 13.9 and 8.3 per cent of the face value of the aid if the export market were a feasible alternative outlet for food aid commodities. If production control were considered the best alternative outlet, the average net social gain realized by maintaining food aid programs was estimated to be between 39.3 and 33.7 per cent of the face value of the aid.

If both alternative outlets were in fact feasible, production control would not be relevant since commercial export was by far the best alternative to food aid. However, as mentioned previously, while the market clearing price may serve as a value indicator it is doubtful that the export prices would actually be permitted to drop as necessary to establish a free market equilibrium if all food aid commodities were released on the world market. Institutional arrangements such as the International Grains Arrangement also inhibit the necessary price adjustments. Therefore, production control seems to be the most realistic alternative outlet for surplus commodities presently exported under food aid programs.

The net social gains realized under credit arrangements exceed those obtained under other aid programs. This phenomenon is due to imperfections in the international money market. The returns to capital under equal risk is higher in the recipient countries than in the donor country. Hence, the social gains realized under credit arrangements consists of the gains obtained by allocating the commodities to food

aid rather than to the best alternative outlet plus the gains obtained by re-allocating capital from lower to higher returns.

The proportion of the net social gain realized by aid recipients is given by the aid component and the proportion obtained by the donor country is given by the negative net cost. For food aid exported under 20-year credit terms, the aid recipient realizes a net loss of 6.8 per cent of the face value of the aid. Hence, the recipient countries paid 6.8 cents more for each dollar's worth of food aid than it was actually worth to them.

If the food aid was received under the 40-year terms, the recipient countries obtained approximately one-half cent in actual aid per dollar's worth of food received. The U.S., on the other hand, realized a net gain of 20.2 and 13.5 cents per dollar's worth of food under each of the two programs, respectively. The net gain obtained by the aid recipient countries indicates the amount of untied cash aid that would have had an impact on economic progress equal to the impact obtained by the food aid. Alternatively, the social gain from food aid obtained by recipient countries may be considered as the benefit obtained by the countries in excess of the potential benefits available from borrowing an amount of money equal to the face value of the food aid at a rate of interest equal to the discount rate used in the estimations of the aid component.

The net gain obtained by the donor country indicates the revenue obtained from surplus commodities used for food aid in excess of the revenue obtainable from the best alternative use of the surplus commodities.

As shown in Table XXX, the net social gains are somewhat lower at

the margin than on the average. The distribution between aid recipients and donor country at the margin shows a pattern similar to that for the average values.

Knowledge of the net social gain generated by food aid programs and its distribution between donor and recipients is essential for intelligent decision making on subjects such as the terms of the food aid, the magnitude of aid, etc. These and other policy implications will be discussed in the chapter to follow.

Reported Value, Estimated Cash Equivalent, Net Cost, and Social Gain of the Total U.S. Food Aid 1964-66

Based on the previously estimated aid components associated with each of the major food aid programs, the value in terms of untied cash aid of the food aid received by the survey countries was estimated. The estimated cash equivalent is the amount of untied cash aid that would have been of equal benefit to the individual recipient countries as the food aid actually received during 1964-66. The results are shown in Table XXXI.

The reported value of food aid exported under Title I of PL 480 (long-term dollar credit and sales for non-convertible currencies) is based on the negotiated prices which usually are in line with prevailing export prices. The value of food aid exported under Title II (grants) is based on actual cost to the Commodity Credit Corporation of purchase, storage, and transportation of the commodities. The export value of food grants during the period 1964-66 was approximately 58 per cent of the cost to the Commodity Credit Corporation.

As shown in Table XXI, the reported value of the food aid received

TABLE XXXI

REPORTED VALUE OF FOOD AID RECEIVED BY SURVEY COUNTRIES AND ESTIMATED CASH EQUIVALENT, ANNUAL AVERAGE 1964-66

	Reported Value[1]				Estimated Cash Equivalent				Cash Equivalent in Per Cent of Reported Value
	Non-Convertible Currency	Dollar Credit	Grants	Total	Non-Convertible Currency	Dollar Credit[2]	Grants	Total	
					$ million				
India	466.7	0	30.9	497.6	247.8	0	16.2	264.0	53.1
Pakistan	112.3	0	14.9	127.2	--	0	--	--	--
Yugoslavia	6.1	92.4	7.5	106.0	--	--	--	--	--
Brazil	62.5	22.7	28.0	113.2	21.1	-3.5	13.2	30.8	27.2
Korea	64.6	0	27.5	92.1	21.0	0	10.9	31.9	34.6
Turkey	42.4	0	5.9	48.3	9.7	0	2.2	11.9	24.6
China	21.7	17.9	10.2	49.8	5.4	-3.2	4.2	6.4	12.9
Israel	32.2	3.0	.9	36.1	18.5	0.2	.4	19.1	52.9
Greece	7.3	13.3	5.2	25.8	2.7	0.6	2.5	5.8	22.5
Chile	6.6	7.0	9.1	22.7	2.8	0.1	4.3	7.2	31.7
Morocco	6.7	1.1	20.2	28.0	4.2	0.2	11.7	16.1	57.5
Congo	15.7	0	3.6	19.3	9.9	0	2.1	12.0	62.2
Indonesia	7.6	6.5	3.2	17.3	--	--	--	--	--
Colombia	5.1	2.8	8.2	16.1	1.5	-0.3	3.4	4.6	28.6
Total (Survey Countries)[3]	731.5	67.8	149.7	949.0	344.6	-5.9	71.1	409.8	43.2

[1]The reported value of commodities included in sales for non-convertible currency and sales on dollar credit is based on prevailing export prices while the value related to grants is based on CCC costs. The export value of food grants during the period 1964-66 was approximately 58 per cent of CCC costs. Data from Operations Analysis.

TABLE XXXI (Continued)

[2]A default rate of 10 per cent is assumed.

[3]Excluding the three countries for which the cash equivalent could not be estimated.

by the 11 survey countries for which the necessary information was available was $949 million. The estimated cash equivalent was $409.8 million, 43.2 per cent of the reported value. This means that the 11 recipient countries on the average would have obtained the same benefit from 43 cents of untied cash aid as from $1 of food aid during 1964-66.

The major recipient of food aid during 1964-66, India, received more than one-half of the total food aid obtained by the 11 survey countries. Hence, the Indian estimate plays a dominating role in the average estimates. It was estimated that India would have gained equal benefit from either 53 cents of untied cash aid or $1 of food aid. The average cash equivalent associated with the 10 survey countries, excluding India, was estimated to be 38.3 per cent of the reported food aid value, or considerably lower than if India was included.

The relatively high real value of food aid to India is partly explained by the high value of food relative to cash aid as earlier estimated, and partly by the fact that India received all her food aid under the two programs, sales for non-convertible currency and grants, both of which have a high aid component.

An analysis of the total U.S. food aid during 1964-66 was performed. The results are shown in Table XXXII. The value of the total U.S. food aid per year during 1964-66 was reported as $1,569.4 million. Since the value of grants is reported on the basis of total CCC costs the face value of the aid, i.e., the value based on prevailing export prices, was somewhat smaller, $1,473.7 million. Based on the previously estimated average value of food aid, the value to the recipient countries was estimated to be $1,173.1 million. The cash equivalent was estimated to be $495.6 million, yielding an aid component of 33.6

TABLE XXXII

REPORTED VALUE, CASH EQUIVALENT, NET COST AND SOCIAL GAIN OF THE TOTAL U.S. FOOD AID 1964-66

	Per Cent of Face Value	Annual Average $ million
Reported Value[1]	106.5	1,569.4
Face Value[2]	100.0	1,473.7
Value to Recipient Countries	79.4	1,173.1
Disbursements Required (U.S.)[3]	29.2	430.6
Disbursements Required (Recipients)[4]	28.4	418.6
Cost of Transportation (Paid by U.S.)	1.7	25.5
Cost of Transportation (Paid by Recipients)	17.6	258.9
Cash Equivalent	33.6	495.6
Revenue Foregone[5]	28.3	417.5
Net Cost to the U.S.	- .8	- 12.4
Social Gain	34.5	508.0

[1]As reported by U.S. Government Statistics

[2]Evaluation based on prevailing export prices

[3]The present value of down payment, repayments, and interest payments using as discount rate the alternative cost of capital to the U.S.

[4]As above, except that the discount rate reflects the alternative cost of capital to aid recipient countries.

[5]Assuming that production control was the best alternative outlet for excess productive capacity.

cents per dollar's worth of aid.

Due to the increasing emphasis on export on long-term dollar credit, a program with a small and often negative aid component, it is likely that the cash equivalent of food aid in the years to come will be significantly below the estimates for 1964-66.

If production control was the best alternative to food aid, the net cost to the U.S. of the actual food aid during 1964-66 was estimated to be -$12.4 million or a net gain of about eight-tenths of a cent per dollar's worth of food.

The net social gain realized during 1964-66 is then found as the difference between the aid component and the net cost. Hence, the net social gain per year was estimated to be $508 million or 34.5 cents per dollar's worth of food aid.

General conclusions and policy implications related to this and other analyses performed in this chapter will be discussed in the chapter to follow.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

Food, feed, and fiber have constituted a substantial part of U.S. foreign economic assistance during recent years. In order to obtain a high degree of efficiency in foreign economic assistance programs, certain relationships between food aid and other types of aid must be known. Relatively little attention has been paid to the quantitative relationships concerning relative values, costs, and efficiency. The major objectives of this study were to estimate the value of food aid to recipient countries relative to other types of aid, the cost to donor countries using the opportunity cost principle, and the efficiency of food aid relative to other types of aid in obtaining economic progress in recipient countries.

U.S. foreign economic assistance began to play a major role in world affairs during and immediately after World War II. Even though food, feed, and fiber played a considerable role in the Marshall Plan, it was not until 1953, when the Mutual Security Act was amended to include a special section dealing with surplus food commodities, that food aid became a major aspect of the total foreign economic assistance. Use of surplus agricultural commodities was further promoted in 1954 by Public Law 480. Public Law 480 became the framework for the most extensive foreign food aid program in history. During 14 years,

1955-68, $18.2 billion of U.S. farm products were exported under this program. Public Law 480, as it exists today (1969), provides for foreign aid in agricultural commodities under three principal arrangements. Title I of the Act provides for sales for non-convertible currencies and sales on long-term dollar credit while Title II provides for grants. A less important arrangement, barter, is maintained in Title III.

The primary data used in the present study were obtained from a mail survey conducted during 1967-68. The survey was designed to reach a number of persons in each of the major food aid recipient countries who were knowledgeable on economic development and external economic assistance.

The marginal and average values of food aid relative to untied cash aid were estimated on the basis of the survey results. The value of the last dollar's worth of food aid during 1964-66, where "worth" is expressed by prevailing export prices, was found to be 77 cents in terms of untied cash aid. The average value of the total food aid was slightly higher, some 80 cents. The marginal value of food aid was high for Pakistan and Yugoslavia. The degree to which the marginal value decreased for an increase in the amount of food aid was high for Pakistan and relatively low for India. The average value of food aid was found to be high for Morocco, Congo, and India.

The extent to which food aid substitutes for commercial food import was estimated. It was found that during the period 1964-66, each bushel of wheat exported under PL 480 reduced the quantity of wheat imported commercially by the aid recipient countries by about two-fifths of a bushel. The last bushel of wheat exported under PL 480

was found to have replaced about one-fourth of a bushel in the commercial market. The estimate for wheat may be the best single estimate for food, feed, and fiber.

Based on the estimates for wheat, upper and lower limits of the estimates for food, feed, and fiber were established. Using this procedure, it was found that the reduction in commercial food imports due to food aid was between 66 and 24 per cent of the export value of the aid.

A theoretical model was developed to estimate the expected export price of food, the market clearing price, if all food aid were discontinued and the commodities presently exported under aid programs were exported commercially. It was found that the export price of wheat would have dropped by about one-fifth of the actual price if the commodities exported under food aid programs during 1964-66 had been exported commercially. Similarly, it was found that the export prices of food, feed, and fiber in aggregate would have dropped by about six per cent if all food, feed, and fiber had been transferred from food aid to commercial export.

A theoretical model to estimate the real aid involved in food aid, the aid component, was developed and the aid component present in each of the three major U.S. food aid programs during 1964-66 was estimated. The aid component was estimated as the actual value of food aid to recipient countries less the present value of all disbursements required by the recipient countries including transportation cost insofar as they were to be paid by recipient countries.

The aid component present in food aid exported under long-term dollar credit arrangements was found to be negative if it were assumed

that repayments and interest payments were performed as agreed. A negative aid component means that the present value of disbursements required by the recipient countries exceeds the actual value of the food received. It was found that for each dollar's worth of food aid received under 20-year terms, where the food is valued at prevailing export prices, the recipient countries paid 12 cents more than the actual value of the food to the recipient country. The excess payment under 40-year credit terms was two cents per dollar's worth of food. The excess payment was somewhat higher for the last unit of food aid.

However, it may not be realistic to expect that the dollar credit is actually paid back as agreed. If interest is paid as agreed but only one-half of the credit is repaid, the average aid component was estimated to be 13 cents per dollar's worth of food under the 20-year terms and 10 cents under the 40-year terms. The recipient countries would break even at a default rate of 24 per cent under 20-year terms and seven per cent under 40-year terms. If the quantity of food aid was lowered to a point of optimum combination of food and other types of aid, the aid component was found to be considerably higher.

The average aid component present in U.S. food aid sold for non-convertible currencies during 1964-66 was estimated to be 37 cents per dollar's worth of food aid. The aid component present in the last dollar's worth of food was estimated to be 58 cents if it is assumed that the U.S. requirements for non-convertible currencies are satisfied prior to the receipt of the last unit of currency. If, on the other hand, it is assumed that the same proportion of the last unit of currency is used in place of dollar spending as for all previous units, the aid component present in the last dollar's worth was estimated to

be 34 cents. The former assumption appears most reasonable.

Since no disbursements are required from recipients of food grants, the aid components associated with grants equal the actual value of the food aid to the recipient countries, i.e., 80 cents on the average and 77 cents at the margin.

The aid component was estimated for each of the survey countries using the actual amounts of food aid received under each of the aid programs during 1964-66. The reported value of the food aid exported to the 11 survey countries included was $949 million. The estimated cash equivalent, i.e., the aid component, was estimated to be $410 million or 43.2 per cent of the reported value. This means that the 11 survey countries on the average would have obtained the same benefit from 43 cents of untied cash aid as from $1 of food aid during 1964-66.

The cash equivalent of the total U.S. food aid during 1964-66 was estimated to be 31.6 per cent of the reported value and 33.6 per cent of the export market value. The difference between the estimate for the survey countries and the total food aid is due to a considerable difference in the proportion of the non-convertible currency used to replace dollar spending in the survey countries and the countries not surveyed.

It was found that the major recipient of food aid during 1964-66, India, would have gained equal benefit from either 53 cents of untied cash aid or $1 of food aid.

A theoretical model was developed to estimate the net cost to the donor country of food aid. The net cost is defined as the revenue foregone by allocating the commodities to aid programs rather than to

the best alternative use plus transportation costs related to food aid and payable by the donor country less the present value of disbursements required from the aid recipients.

Two alternative outlets for food aid commodities, commercial export and production control, were considered. It was found that the U.S. realized a negative net cost of food aid exported on long-term dollar credit; i.e., the revenue obtained from surplus commodities exported under credit arrangements exceeded the potential revenue from the best alternative use of the surplus commodities. If the commodities were sold for non-convertible currencies, the U.S. realized a small net cost, three cents per dollar's worth of food if production control was considered a feasible alternative to food aid and 28 cents if it would have been feasible to sell the food aid commodities in the commercial export market. The net cost of food donations was estimated to be 46 and 71 cents per dollar's worth of food for each of the two alternatives, respectively. Commercial export is not a very realistic alternative outlet for surplus commodities. The export prices are heavily influenced by institutional arrangements, hence the prices most likely would not be permitted to drop as necessary to expand commercial exports to a level needed to clear the market of all free supplies.

If production control was the best alternative to food aid, the net cost to the U.S. of the actual food aid during 1964-66 was estimated to be -0.8 per cent of the face value of the aid; i.e., the U.S. realized a net gain of eight-tenths of a cent per dollar's worth of food aid.

This implies that the cost to the U.S. of maintaining the actual food aid during 1964-66 was approximately the same as the cost of

reducing production by an amount of food, feed, and fiber similar to that exported under food aid programs.

A procedure to estimate the social gain of food aid programs was developed. The social gain was defined as the net benefit to the recipient countries, the aid component, less the net cost to the donor country. If production control was considered the best alternative, the net social gain was found to be 39 cents per dollar's worth of food under 40-year credit terms and decreasing to 34 cents if all food aid was sold for non-convertible currencies or given as grants. The social gain obtained from the actual 1964-66 food aid was found to be 34.5 per cent of the face value of the aid.

Conclusions

Implications

According to the results obtained in this study, the use of U.S. food, feed, and fiber surpluses as foreign aid during 1964-66 resulted in a greater contribution to world social output than if the surpluses or excess productive capacity had been allocated for the best alternative use. Hence, the net effect of U.S. food aid programs was an increase in world economic efficiency.

The distribution of the net social gain between donor and aid recipients was determined by the terms of the aid. It was found that the entire net social gain accrued to the recipient countries if the food aid was traded for non-convertible currencies or received as donations. In addition to the total net social gain, a net transfer of resources from donor to recipient countries was estimated to have

taken place under these programs. Conversely, under credit arrangements, the donor country attained the entire net social gain. Furthermore, it was found that unless the rate of default of the credit was high, a net transfer of resources from the aid recipient countries to the donor country would take place. This finding appears to contradict conventional knowledge and beliefs on which foreign economic assistance programs are based. If foreign aid is defined as a net transfer of resources from a more developed to a less developed country, the long-term dollar credit arrangements do not qualify as aid programs according to the results from this study. The reasons for the somewhat surprising findings are discussed below and a corrective measure is suggested.

Evaluation of U.S. food aid on the basis of prevailing export prices results in a considerable over-statement of the value of the food to aid recipient countries. If evaluation is based on Commodity Credit Corporation costs, the bias is even greater. Since the majority of U.S. food aid is given under arrangements requiring some money outlay by the recipient countries, the actual aid involved in food aid transactions is considerably smaller than the value to recipient countries of the food. Hence, the gap between the value of U.S. food aid as currently reported and the actual aid received by the aid recipients is very great indeed.

Using the value of food aid, as currently reported, as an indicator of the flow of actual aid to developing countries is very misleading. Neither prevailing export prices nor CCC costs reflect the actual value of food aid to recipient countries nor the required disbursements from aid recipients. Use of prevailing export prices or CCC costs as

value indicators for food aid misinforms the public. Inflated valuation of the aid may reduce the total flow of real aid to developing countries. From the point of view of the donor country's legislators, the reported value of the aid flow indicates the actual aid contribution. However, if the reported value is inflated, the amount of real aid is less than what the legislators were actually willing to contribute. If the value of food aid is not correctly reported, other types of aid may be misallocated. Furthermore, the share of the total economic assistance provided by any one donor country may not be correctly reported. For a country where the ratio of food to nonfood is high, the reported share is upward biased, ceteris paribus. The same problem exists in nonfood aid where the face value of loans and grants are lumped together as "aid".

One way to provide correct information concerning the value of foreign aid flows would be to evaluate and report all foreign economic assistance on the basis of the value to recipient countries less the disbursements required. The common denominator used to express the value to the recipient countries of the various types of aid may be the amount of untied cash aid (convertible currency) of equal benefit, the aid component. The value of food aid to recipient countries may be estimated directly or it may be expressed by the market clearing price as defined in this study. Use of the latter value indicator introduces a slightly upward bias in reported value.

Pricing of commodities exported under aid programs requiring repayment either in non-convertible currency or dollars, on the basis of prevailing world market prices, causes unduly high repyament obligations. The required repayment from aid recipients exceeds the revenue

foregone by the donor country.

A corrective measure would be to price commodities exported for non-convertible currencies or under dollar credit arrangements on the basis of the market clearing price as defined in this study. The required disbursements could be based on this price insofar as the present value of disbursements required by the donor country did not exceed the revenue foregone associated with best alternative use of the food aid commodities.

A workable procedure for pricing and evaluating food aid on the basis of the market clearing price may be outlined as follows: (1) Initially, estimate the market clearing price for each of the major food aid commodities on the basis of the model developed in this study; (2) for each aid transaction, discount the actual world market price according to the estimates found under (1); (3) adjust the estimates under (1) periodically.

The results from this study indicate that the cost to the U.S. of providing surplus agricultural commodities to food deficit countries under aid programs during 1964-66 was approximately equal to the cost required to reduce production in the absence of food aid programs. It is likely, however, that the cost to the U.S. of food aid will be considerably lower in the future due to the increasing emphasis on dollar credit arrangements. In the light hereof, it appears that correct pricing and evaluation of food aid in the future is extremely important if a high degree of efficiency in foreign economic assistance is to be obtained.

The results from the study further suggest that if maximum economic progress in aid recipient countries per unit of cost to the donor

country is the ultimate objective of foreign economic assistance, efforts in food aid and nonfood aid need to be coordinated to a much higher degree than is presently found. Furthermore, decisions concerning food aid should take into account existing alternative outlets for food, feed, and fiber surpluses.

Limitations

Basic data for this study were obtained from the major food aid recipients only. If a high degree of correlation exists between any particular factor under study and the quantity of food aid received by any individual country, the results may not be representative for the total U.S. food aid. However, no indication has been found to that effect.

The findings from this study relate to the period 1964-66. The extent to which the empirical results can be expected to be valid for years to come depends on the behavior of the large number of external factors underlying the analysis. The value of food aid relative to cash aid depends on the quantity of food produced in the aid recipient countries and a number of other factors that may change considerably from year-to-year.

The study is of macro economic nature. Hence, the effect of changes in certain economic factors such as production potential in the agricultural sector, balance of payments of the individual country, etc., cannot be measured directly.

Need for Further Study

Research is needed to determine an optimum combination of food

aid, nonfood aid, and domestic agricultural production control. An optimizing model is needed that, for any given level of real aid and U.S. domestic farm income, could point out the combination of food aid, nonfood aid, and production control that would minimize the cost to the U.S. Treasury.

It appears that a more detailed study of the actual value to the recipient countries of food aid relative to specific types of nonfood aid is needed. Such study might be based on a country-by-country analysis. Little is known, for example, about the efficiency of agricultural inputs (e.g., fertilizers, irrigation equipment, crop scientists) as aid commodities relative to food aid and inputs for the nonagricultural sector.

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APPENDIX A

COPY OF THE QUESTIONNAIRE USED[1]

CONFIDENTIAL

Department of Agricultural Economics
Oklahoma State University
Stillwater, Oklahoma

November 1967

QUESTIONNAIRE

1. Country:[2]

2. (Background information) total economic assistance from the United States to your country for the last three years was as follows (estimated market value, $ million):[2]

	Fiscal Years			Average
	1964	1965	1966	per year
	millions of U.S. dollars			
Food and Fiber:				
Purchased for local currency				
Donations				
Long Term dollar credit				
Non-food Assistance:				
AID-loans				
AID-grants				
Other Non-food asst.				
Total Economic Assistance				
Food and fiber				
Non-food items				

3. Assuming that all food shipments under PL 480 (Food for Peace) are valued at world market prices, it is possible that the benefit to recipient countries of an additional dollar's worth of food differs from the benefit of an additional dollar in cash assistance which can be used by the recipient country in any way.

   Suppose your country had a choice of receiving either an additional $1 million worth of food as donations or a certain additional amount of cash assistance ($ U.S.) as donations over and above current economic assistance from the U.S.A. Indicate the amount of cash that in your judgement would yield the same benefit to your country as an additional $1 million worth of food donations, where food is valued according to world market prices (check one of the boxes):

   ☐ $1.0 million in cash

   ☐ $ .8 million in cash

   ☐ $ .6 million in cash

   ☐ $ .4 million in cash

   ☐ $ .2 million in cash

4. Compared with the 1964-66 average, do you anticipate that your food aid assistance by 1980 from the U.S. will need to be:

   ☐ More

   ☐ Less

   ☐ About the same

Footnotes at end of questionnaire.

5. Please indicate what effect you believe a shift from purchase of U.S. food with local currency to purchase on long term dollar credit would have on your country's price level, economic growth, political stability, and agricultural development (check a box in each line):

1. Price level:	☐ Inflate;	☐ Deflate;	☐ No effect
2. Economic growth:	☐ Accelerate;	☐ Retard;	☐ No effect
3. Political stability:	☐ Stabilize;	☐ Destabilize;	☐ No effect
4. Agr. development:	☐ Accelerate	☐ Retard;	☐ No effect

6.a) What do you believe would be the effect on your country's economic development if the present system of year-to-year agreements concerning food shipments under PL 480 (purchase for your currency, donations, and purchase on long term dollar credit) were replaced by a system of long term agreements assuring your country certain annual shipments of specified food items over a number of years?

☐ Enhance economic development

☐ Retard economic development

☐ No effect

6.b) How many years would you want such long-term agreements to cover?

☐ 3 years ☐ 10 years

☐ 5 years ☐ 15 years or longer

6.c) Would introduction of such long-term agreements make it beneficial for your country to take a larger proportion of the total economic assistance from the U.S.A. in the form of food than under the present system?

☐ Yes

☐ No

If yes, indicate the approximate percentage increase in the amount of food that would be beneficial: _____%

6.d) Do you believe that your country's government would be willing to participate in such long-term agreements if it included obligations for your country to purchase (on long-term dollar credit) certain specified amounts of food per year during the term of the agreement?

☐ Yes

☐ No

7. Suppose that U.S.A. reorganized its economic assistance programs such that each country were given a choice between a certain amount of food or a certain amount of cash ($ U.S.), in both cases as free gifts.

For each of the following five alternative total annual amounts of food valued at world market prices, please indicate the amount of cash that in your judgment would yield the same benefit to your country as each individual amount of food (consider the time period 1968-1972).

Annual amount of food[2]	Amount of cash of equal benefit
million worth	$_____ million
million worth	$_____ million
million worth	$_____ million
million worth	$_____ million
million worth	$_____ million

Footnotes at end of questionnaire.

8.a) Depending on the total level of economic assistance from the United States, the mix of items making up this assistance that would be of maximum benefit to your country might vary. Suppose that all U.S. economic assistance were in cash form and your country could use it as it saw fit. For the levels of U.S. economic assistance given below, what percentage of each total do you feel needs to be spent on the following items in the 1968-72 period.

If total annual U.S. assistance were:[2]	$_____ millions	$_____ millions	$_____ millions
Import of food, feed and fiber	_____%	_____%	_____%
Import of items other than food, feed and fiber	_____%	_____%	_____%
Total (the two items in each column should add to 100%)	100 %	100 %	100 %

8.b) (optional) Now, consider only import of non-food items. Indicate below, for the middle level of total economic assistance what percentage of the funds allocated to import of non-food items you feel should be spent on:

Import of items to increase domestic farm output	_____%
Import of items for direct use by consumer	_____%
Import of items to increase domestic output of nonfarm industries	_____%
Total (the three items should add to 100%)	100%

8.c) (optional) Now, consider the above mentioned group "items to increase domestic farm output." Indicate below for the middle level of total economic assistance what percentage you feel needs to be spent on:

Import of fertilizer	_____%
Import of fertilizer plants and equipment	_____%
Import of irrigation equipment	_____%
Import of farm machinery and equipment (tractors, etc. excluding irrigation equipment)	_____%
Import of technical assistance (crop and livestock specialists, teachers, professors, agr. engineers training of natives abroad, etc.)	_____%
Import of items to improve marketing and transportation facilities for agricultural products, (storage facilities, etc.)	_____%
Other:_____	_____%
Total (the seven items should add to 100%)	100%

8.d) (optional) Now, consider the group "items to increase domestic output of nonfarm industries." Indicate below for the middle level of total economic assistance what percentage you feel needs to be spent on:

Import of machines and equipment to establish industrial plants and facilities	_____%
Import of raw materials (steel, iron, copper, etc.)	_____%
Import of items to improve transportation facilities (motor vehicles, railroad equipment, etc.)	_____%
Import of items to expand electrical or other power supplies	_____%
Other:_____	_____%
Total (the five items should add to 100%)	100%

Footnotes at end of questionnaire.

8.e) Suppose that we consider a past period, say 1964-67 instead of the future period 1968-72 in the questions 8a to 8d. Would that change your answer, and if so, in what way?

_____

_____

_____

_____

9. It is often argued that economic assistance in the form of food to some degree replaces ordinary foreign trade of food commodities. Average annual wheat shipments under PL 480 (purchase for your currency, donations, and purchase on long term dollar credit) to your country over the last three years were[2] thousand tons. Suppose now that a smaller quantity of wheat had been available under these terms. Indicate in your judgment, the increase in your country's commercial import, if any, that would have taken place for each of the following reductions in PL 480 wheat shipments:

If the reduction in PL 480 wheat shipments were[2]	Commercial wheat imports would have increased by
Thousand tons	_____ Thousand tons
Thousand tons	_____ Thousand tons
Thousand tons	_____ Thousand tons
Thousand tons	_____ Thousand tons

10. In your judgment, what could the United States do to improve the economic assistance programs to your country? (feel free to write on back of sheet or on separate sheet):

_____

_____

_____

_____

_____

_____ _____

Name Position

(optional -- it is not necessary to fill in your name)

Please return the questionnaire as soon as possible in the enclosed return envelope. If you do not have time to answer all the questions please complete as much of the questionnaire as your time allows and return it.

Thank you for your cooperation.

---

[1] Questionnaires were sent out in English, French and Spanish.

[2] This information was filled in for each individual country before the questionnaire was sent out.

APPENDIX B

COUNTRIES PARTICIPATING IN THE SURVEY, AVERAGE ANNUAL FOOD AID 1964-66, NUMBER OF PERSONS INCLUDED IN THE SURVEY AND RESPONSE

Country	Average Annual Food Aid 1964-66		Number of Persons		Per Cent Response
	$ Million[1]	Per Cent of Total U. S. Food Aid	Contacted	Responded	
India	485	30.0	84	12	14.3
Pakistan	121	7.5	52	3	5.8
Yugoslavia	103	6.4	10	1	10.0
Brazil	102	6.3	23	9	39.1
Korea, Republic of	81	5.0	29	11	37.9
Turkey	46	2.8	67	15	22.4
China, Republic of	46	2.8	17	5	29.4
Israel	33	2.0	19	6	31.6
Greece	27	1.7	11	4	36.4
Chile	19	1.2	38	8	21.1
Morocco	19	1.2	11	1	9.1
Congo (Kinshasa)	18	1.1	16	1	6.3
Indonesia	16	1.0	31	2	6.5
Colombia	13	.8	33	10	30.3
Total	1129	69.8	441	88	20.0

[1]Evaluation based on prevailing world market prices.

APPENDIX C

THE OCCUPATION AND POSITION OF THE PERSONS PARTICIPATING IN THE SURVEY

Nationality and Position	Number of Persons Contacted	Number of Persons Responded	Per Cent Response
Citizens of the Countries Under Survey:			
Cabinet Members	41	7	17.1
Other Government Officials	44	8	18.2
Economists and Political Scientists	222	46	20.7
Others	58	11	19.0
U. S. Citizens	68	16	23.5
Citizens of Other Countries	8	0	0
Total	441	88	20.0

APPENDIX D

PROCEDURE TO ESTIMATE THE MARGINAL VALUE OF FOOD AID AT VARIOUS LEVELS OF INCREASE

The assumed linear relationship between marginal value and the level of increase in food aid for each individual country is given by:

$$\frac{y - y^1}{x - x^1} = \frac{y^2 - y^1}{x^2 - x^1}$$

$$\text{or } y = \frac{y^2 - y^1}{x^2 - x^1} x + \frac{y^1 - y^2}{x^2 - x^1} x^1 + y^1$$

or, in general, $y = a + bx$

where y = the marginal value

x = the percentage increase

y^1 = the estimated marginal value corresponding to $500,000 worth of food aid

y^2 = the estimated marginal value corresponding to a 25 per cent increase

x^1 = the percentage increase corresponding to $500,000 worth of food aid

x^2 = 12.5 per cent increase.

The percentage increase corresponding to an increase of $500,000

worth of food aid for each individual country is: India .1, Pakistan .4, Yugoslavia .5, Brazil .5, Korea .6, Turkey 1.1, China 1.1, Israel 1.5, Greece 1.9, Chile 2.7, Morocco 2.7, Congo 2.8, Indonesia 3.2, and Colombia 3.9.

APPENDIX E

ESTIMATED INCREASE IN COMMERCIAL WHEAT IMPORTS

FOR CERTAIN HYPOTHETICAL REDUCTIONS IN

IMPORTS UNDER FOOD AID PROGRAMS

Country	Average Annual Wheat Import Under PL 480 1964-66	Estimated Increase in Commercial Imports if PL 480 Import Had Been Reduced by:			
		25%	50%	75%	100%
	1000 tons				
India	5,839	184	521	1116	1269
Pakistan	1,396	174	399	673	998
Brazil	861	187	348	524	681
Korea	440	51	131	226	322
Turkey	283	15	35	74	110
China	228	38	67	90	110
Israel	186	35	73	111	144
Greece	3	0	0	0	0
Chile	128	26	51	76	100
Morocco	156	25	50	75	100
Congo	3	1	2	2	3
Colombia	82	13	28	44	61
Total	9,605	749	1,705	3,011	3,898

APPENDIX F

ESTIMATION OF THE ELASTICITY OF EXPORT SUPPLY OF FOOD, FEED, AND FIBER

Let

Q_e = Quantity exported

Q_s = Total supply of food, feed, and fiber

Q_d = Domestic demand

E_e = Elasticity of export supply

E_s = Elasticity of domestic supply

E_d = Elasticity of domestic demand

P = Equilibrium price.

Then

$$Q_e = Q_s - Q_d$$

$$\frac{dQ_e}{dP} = \frac{dQ_s}{dP} - \frac{dQ_d}{dP}$$

$$\frac{dQ_e}{dP} \frac{P}{Q_e} = \frac{dQ_s}{dP} \frac{P}{Q_s} \frac{Q_s}{Q_e} - \frac{dQ_d}{dP} \frac{P}{Q_d} \frac{Q_d}{Q_e}$$

$$E_e = E_s \frac{Q_s}{Q_e} - E_d \frac{Q_d}{Q_e}$$

$$= .20 \frac{21,911}{4,671} + .18 \frac{17,240}{4,671} = .938 + .664 = \underline{1.60}$$

Data Sources:

E_s = .20 is from Earl Heady and Luther Tweeten, Resource Demand and Structure of the Agricultural Industry (Ames, 1963), pp. 433-34.

E_d = -.18 is from Luther G. Tweeten, The Demand for United States Farm Output, p. 360.

Q_s = 21,911 is the average annual farm value of 79 principal crops for 1964-66 ($ million). Taken from Agricultural Statistics, 1966 and 1967. United States Department of Agriculture.

Q_e = 4,671 is the reported value of the annual commercial agricultural export, average for 1964-66 ($ million). Taken from 12 Years of Achievement Under Public Law 480, p. 18.

APPENDIX G

TABLE XXXIII

PRESENT VALUE OF DOWN PAYMENT, REPAYMENTS, AND INTEREST PAYMENTS IN PER CENT OF FACE VALUE OF CREDIT, 20-YEAR ARRANGEMENT

Default Rate (Per Cent)	Discount Rate (Per Cent)										
	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
0	80.8	77.7	74.8	72.1	69.5	67.1	64.8	62.7	60.6	58.7	56.8
1	80.3	77.2	74.3	71.6	69.1	66.6	64.4	62.2	60.2	58.3	56.5
2	79.7	76.6	73.8	71.1	68.6	66.2	63.9	61.8	59.8	57.9	56.1
3	79.1	76.1	73.3	70.6	68.1	65.7	63.5	61.4	59.4	57.5	55.7
4	78.5	75.5	72.7	70.1	67.6	65.3	63.0	60.9	59.0	57.1	55.3
5	78.0	75.0	72.2	69.6	67.1	64.8	62.6	60.5	58.6	56.7	54.9
6	77.4	74.4	71.7	69.1	66.6	64.3	62.2	60.1	58.1	56.3	54.6
7	76.8	73.9	71.2	68.6	66.2	63.9	61.7	59.7	57.7	55.9	54.2
8	76.2	73.3	70.6	68.1	65.7	63.4	61.3	59.2	57.3	55.5	53.8
9	75.6	72.8	70.1	67.6	65.2	62.9	60.8	58.8	56.9	55.1	53.4
10	75.1	72.2	69.6	67.1	64.7	62.5	60.4	58.4	56.5	54.7	53.0
20	69.3	66.7	64.3	62.0	59.9	57.8	55.9	54.1	52.4	50.8	49.2
30	63.6	61.2	59.1	57.0	55.0	53.2	51.5	49.8	48.3	46.8	45.4
40	57.8	55.7	53.8	52.0	50.2	48.6	47.0	45.6	44.2	42.9	41.6
50	52.1	50.2	48.5	46.9	45.4	43.9	42.6	41.3	40.1	38.9	37.8
60	46.3	44.7	43.3	41.9	40.6	39.3	38.1	37.0	36.0	35.0	34.0
70	40.5	39.2	38.0	36.8	35.7	34.7	33.7	32.8	31.9	31.0	30.2
80	34.8	33.7	32.7	31.8	30.9	30.1	29.3	28.5	27.8	27.1	26.4
90	29.0	28.2	27.5	26.8	26.1	25.4	24.8	24.2	23.7	23.1	22.6
100	23.3	22.7	22.2	21.7	21.2	20.7	20.4	19.9	19.6	19.2	18.8

TABLE XXXIV

PRESENT VALUE OF DOWN PAYMENT, REPAYMENTS, AND INTEREST PAYMENTS IN PER CENT OF FACE VALUE OF CREDIT, 40-YEAR ARRANGEMENT

Default Rate (Per Cent)	Discount Rate (Per Cent)										
	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
0	72.0	68.3	65.0	62.1	59.7	57.5	55.6	53.9	52.5	51.2	50.1
1	71.7	68.0	64.8	61.9	59.5	57.3	55.4	53.7	52.3	51.1	50.0
2	71.4	67.7	64.5	61.7	59.3	57.1	55.2	53.6	52.2	50.9	49.9
3	71.1	67.5	64.3	61.5	59.0	56.9	55.0	53.4	52.0	50.8	49.8
4	70.8	67.2	64.0	61.3	58.8	56.7	54.9	53.3	51.9	50.7	49.6
5	70.5	66.9	63.8	61.0	58.6	56.5	54.7	53.1	51.7	50.5	49.5
6	70.2	66.6	63.5	60.8	58.4	56.3	54.5	52.9	51.6	50.4	49.4
7	69.9	66.3	63.4	60.6	58.2	56.1	54.3	52.8	51.4	50.3	49.3
8	69.5	66.1	63.0	60.3	58.0	56.0	54.2	52.6	51.3	50.1	49.1
9	69.2	65.8	62.8	60.1	57.8	55.8	54.0	52.5	51.1	50.0	49.0
10	68.9	65.5	62.5	59.9	57.6	55.6	53.8	52.3	51.0	49.9	48.9
20	65.8	62.7	60.0	57.6	55.5	53.7	52.1	50.7	49.5	48.5	47.7
30	62.8	59.9	57.4	55.3	53.4	51.8	50.3	49.1	48.1	47.2	46.4
40	59.7	57.1	55.9	53.0	51.3	49.8	48.6	47.5	46.6	45.8	45.2
50	56.6	54.3	52.4	50.7	49.2	47.9	46.9	45.9	45.1	44.5	44.0
60	53.5	51.5	49.9	48.4	47.1	46.0	45.1	44.3	43.7	43.1	42.7
70	50.4	48.8	47.3	46.1	45.0	44.1	43.4	42.7	42.2	41.8	41.5
80	47.3	46.0	44.8	43.8	42.9	42.2	41.6	41.1	40.8	40.5	40.3
90	44.2	43.2	42.3	41.5	40.8	40.3	39.6	39.5	39.3	39.1	39.0
100	41.2	40.4	39.7	39.2	38.7	38.4	38.1	37.9	37.8	37.8	37.8

APPENDIX H

NON-CONVERTIBLE CURRENCY INCLUDED IN AGREEMENTS SIGNED JULY 1, 1954 THROUGH DECEMBER 31, 1966 AND THE U.S. DOLLAR SPENDING SUBSTITUTED

Country	Total Amount	U.S. Dollars Replaced	Per Cent of Total Used to Replace Dollar Spending
India	3,483,050	521,461	15.0
Pakistan	1,142,457	100,583	8.8
Yugoslavia	619,797	46,488	7.5
Brazil	503,393	91,010	18.1
Korea	537,758	81,973	15.2
Turkey	544,314	162,561	29.9
China	201,318	48,252	24.0
Israel	320,421	47,963	15.0
Greece	127,823	43,818	34.3
Chile	87,704	22,844	26.0
Morocco	46,787	11,217	24.0
Congo	87,048	11,147	13.0
Indonesia	291,903	90,250	30.9
Colombia	66,224	18,119	27.4
Other Countries	3,239,330	1,361,086	42.0
Total	11,298,327	2,658,772	23.6

Calculated on the Basis of: The Food Aid Program 1966, Annual Report on Public Law 480. U.S. Congress, 90th Congress, 1st Session, House Document No. 179 (Washington, D. C., 1967).

APPENDIX I

CALCULATION OF A WEIGHTED AVERAGE OF THE RATIO OF FARM TO EXPORT PRICES, DATA AND INTERMEDIATE RESULTS

Commodity	P_R [1]	P_w [2]	$\frac{P_R}{P_w}$	Q [3]	$\left(\frac{P_R}{P_w} Q\right)/\Sigma Q_i$ [4]
Wheat (bu.)	1.45	1.68	.863	817.8	.617
Corn (bu.)	1.21	1.39	.871	58.5	.045
Grain Sorghum (bu.)	1.03	1.22	.844	47.1	.035
Barley (bu.)	1.01	1.19	.849	5.3	.004
Rice (cwt.)	4.87	5.37	.907	74.4	.059
Cotton (cwt.)	26.20	29.86	.877	139.6	.107
Soybeans (bu.)	2.64	2.89	.913	1.2	.001
				1143.9	.868

[1] Seasonal average prices received by farmers, 1964-66. From: Agricultural Statistics, 1967.

[2] Average export prices, 1964-66. Calculated on the basis of data from: Agricultural Statistics, 1967 and 12 Years of Achievement Under Public Law 480.

[3] Average annual export under food aid programs, 1964-66 (million dollars). From: 12 Years of Achievement Under Public Law 480.

[4] Calculated contribution to the weighted average of the price ratios.

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