WELFARE COSTS OF ALTERNATIVE AGRICULTURAL POLICIES IN AUSTRIA

Thesis for the Degree of M. S.

MICHIGAN STATE UNIVERSITY
WERNER KIENE

1971

ABSTRACT

WELFARE COSTS OF ALTERNATIVE AGRICULTURAL POLICIES IN AUSTRIA

By

Werner Kiene

Austria - a member country of EFTA - has been adjusting her agricultural policy over the last decade to facilitate an association with the EEC. Farm prices and surpluses, however, have dominated recent discussions in the European Communities Council of Ministers which indicate the evidence of some doubt regarding the Common Agricultural Policy.

A comparison of Austria's current agricultural policy with other alternatives could suggest new directions, especially in a period when the cho sen model (the EEC agricultural policy) might undergo some changes.

The objectives of this study were to define a suitable analytical model for determining the welfare costs of agricultural protection and to apply this model in contrasting the welfare cost of the existing policy versus a hypothetical deficiency payment system. Austria's current policy is characterized by a variable levy which is combined with direct payments for several commodities.

Werner Kiene

A partial equilibirum model was used to determine the production cost of protection and the consumption cost of protection. Under a variable levy policy, total welfare cost of protection consists of both production-and consumption costs. Under a deficiency payment policy no consumption cost can occur since there is no tariff valid at the demand curve. It was necessary to expand the basic model in order to accomodate for substitution and input-output relationships. The equations obtained indicated that the welfare costs of protection depend on the values of domestic production and consumption, the height of the tariff and the price elasticities of demand and supply.

To provide a useful estimate of the costs of total agricultural protection, eleven major commodities were examined over a period of four years. A "One Import Good" model was applied individually to wheat, rye, sugar, butter and cheese. To take account of the inter-dependence between feedgrains and livestock, a "Final and Intermediate Goods" model was utilized. A "More than One Good" model was used to take care of the existing substitution in the consumption of pork, poultry and eggs. Each model showed that the costs of protection under a deficiency payment system are considerably less than under the existing variable levy policy.

Various computational methods led to a high and a low alternative for each cost estimate. The total annual welfare costs of protection of all eleven commodities were between 353 and 644 million Austrian Schillings under the existing policy. Under a deficiency payment system, however, annual welfare costs of protection vary only between 146 and 382 million Austrian Schillings.

Past experience has shown that the absolute welfare cost figures have little meaning for the policy maker. Welfare costs of protection constituted only a small fraction of National Income. The values gained significance, however, when they were compared with the income transferred to producers due to the protective measure. The analysis indicated a considerably lower average welfare cost per unit of income transferred under the deficiency payment policy than under the current policy. The average welfare cost of saving one unit of foreign exchange was found to be the same for both policies. The study suggested that a marginal cost analysis of the two alternatives would result in the recommendation of a mix of both policy alternatives - a stage which Austria has been trying to leave during recent years.

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Werner Kiene

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Agricultural Economics

1971

ACKNOWLEDGMENT

The author wishes to express sincere appreciation to Dr. Dale E. Hathaway for his help and encouragement as major professor and thesis advisor.

The author is also grateful for the helpful suggestions given by Professors Vernon L. Sorenson and Lester V. Manderscheid.

Appreciation is expressed to the Department of Agricultural Economics at Michigan State University for the financial assistance provided and to those individuals and institutions which enabled the author to prepare this study.

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CHAPTER I

Introduction

Over the past years Austria, like several other European countries, has been adapting her economic policies to the standards set by the European Economic Community with the ultimate goal of joining the "Inner Six" at some later date.[1] One of the main problem areas in this adaption process is agriculture and the necessary policy to guide Austria's agriculture through this process. Most attention has been given to structural improvements in order to create the physical conditions necessary for joining the Common Market. To assimilate to the EEC agricultural price policy, the Austrian Government decided to cut direct payments to farmers for food grains, milk and milk products, and fertilizers beginning with 1967.

Farm prices and surpluses, however, have dominated recent agricultural discussions in the European Communities Council of Ministers which indicate the evidence of some doubt regarding the existing Common Agricultural Policy.[2]

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[1]Erich P. Hochleitner, "Zwischenbilanz der Bemuehungen Oesterreichs um einen Vertrag mit der EWG," Oesterreichische Zeitschrift fuer Aussenpolitik, Vol. 7, Heft 4/5, 1967, p. 273.

[2]European Community, March 1969, p. 15.

In recent meetings EEC farmers' unions discussed possibilities of moving to direct payment schemes to support EEC agriculture.[3]

A comparison of Austria's existing agricultural policy with other alternatives could suggest new directions, especially in a period when the chosen model (the EEC agricultural policy) might undergo some changes.

Austria's Existing Policy and a Deficiency Payment Policy

The existing[4] policy is not uniform for all commodities, but is generally characterized by guaranteed or contracted producer and consumer prices above the world market level. The consumer prices of some commodities are reduced by subsidies paid at the wholesale level out of the Federal budget. Even with the subsidy the prices of these supported commodities are usually above world market level.

Under a deficiency payment scheme prices are guaranteed to producers. Consumers purchase at world market prices,

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[3]Personal communication with Dr. Klaus Lotz, Deutscher Bauernverband, German Farmers' Union, Bonn.

[4]This paper defines "existing" up to the present time, although there were changes in the agricultural policy due to cuts in the Federal Price support programs beginning with 1967.

leaving the difference between the world price and the guaranteed price to be paid by the Government. The size of the deficiency payment thus depends on the development of the world market prices. Only this type of "pure" deficiency payment policy will be used in this analysis.[5]

Under the assumption of the political, social and economic necessity for some kind of public policy to raise the income of agricultural producers to a certain level of parity income one may define two opposing views -- price support by direct or by indirect payments. In evaluating these two positions, one faces essentially the problem of direct or indirect taxation.

As indicated above, a compromise between these extreme views exists in the Austrian case. Although Austria's policy has been moving to the extreme of indirect payments, it is interesting to observe recent research which suggests the use of a mixed policy[6] -- a stage which Austria has been trying to leave since 1967.

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[5]For an extensive treatment on deficiency payments, see Timothy E. Josling, The United Kingdom Grains Agreement (1964): An Economic Analysis (East Lansing: Institute of International Agriculture, 1967).

[6]Timothy Josling,"A Formal Approach to Agricultural Policy," Journal of Agricultural Economics, Vol. 20, (May, 1969), pp. 175-195.

This paper tries to evaluate the two policies in terms of the difference in welfare costs between the two systems. The author is, however, aware that the cost factor is only a part of the set of variables used to judge a specific policy.

A Short Review of Existing Studies on Cost of Protection

One of the first major statistical examinations of the costs of protection was the Bridgen[7] report undertaken in 1929 to determine the excess cost of the Australian tariff. The difference between the market value of that part of output which was due to protection and the costs of importing an equivalent amount of goods was defined as excessive costs. Corden[8] pointed out that Bridgen neglected the change in producers' surplus and the consumption costs of protection which leads to a distorted result.

Another large scale investigation was done on the costs of protection of the Canadian tariff by Young in 1957.[9]

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[7] J. B. Bridgen, et. al., The Australian Tariff: An Economic Inquiry, 2nd ed., (Melburne: Melburne University Press, 1929).

[8] W. M. Corden, "The Calculation of the Cost of Protection," Economic Record, Vol. 33, (April, 1957), pp. 29-51.

[9] J. H. Young, Canadian Commercial Policy (Ottawa: Queen's Printers, 1957).

He also neglected the change in producers' surplus and consumption costs by defining cash cost as the difference between the amount spent on purchasing commodities under the tariff and their value at free market prices. Based on work by Corden[10] and Johnson,[11] Dardis[12] developed the approach which is used in several other publications[13] of hers.

Josling's[14] research is the first empirical work on using the welfare cost of protection under different policy alternatives as an active policy test.

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[10]W. M. Corden, "The Calculation of the Cost of Protection," Economic Records, Vol. 33 (April, 1957), pp. 29-51.

[11]H. G. Johnson, "The Cost of Protection and the Scientific Tariff," Journal of Political, Economy, Vol. 68 (August, 1960), pp. 327-345.

[12]Rachel Dardis, "The Welfare Cost of Agricultural Protection," (Unpublished Ph.D. Thesis, University of Minnesota, 1965). This thesis gives further reference to research and empirical work done on costs of protection and has been published in a somewhat abridged form under the title: Measures of the Degree and Cost of Economic Protection on Agriculture in Selected Countries, USDA, Economic Research Service, Techn. Bul. No. 1384.

[13]Rachel Dardis, "The Welfare Cost of Grain Protection in the United Kingdom," Journal of Farm Economics, Vol. 49, (August, 1967), pp. 597-609.

Rachel Dardis, "Intermediate Goods and the Gain from Trade," Review of Economics and Statistics, (Nov., 1967).

Rachel Dardis, "The Welfare Cost of Alternative Methods of Protecting Raw Wool in the United States," American Journal of Agricultural Economics, Vol. 51, (May, 1969), pp. 303-319.

[14]Timothy Josling, "A Formal Approach to Agricultural Policy," Journal of Agric. Economics., Vol. 20, (May, 1969), pp. 175-195.

Significance and Objectives of the Study

Economic theory and research done in the past indicate that there is a significant difference in welfare cost in protecting agricultural commodities under different policy schemes. Political discussions on Austria's agricultural policy have included the argument of cost difference but no study is yet available pointing out the welfare cost of protection and comparing these costs under alternative policies. Several approaches have been suggested to get estimates on the cost of protection. The applicability of these approaches has to be justified in terms of their conformity with existing economic theory. The results obtained have to be evaluated in the framework of values and beliefs which are valid in the economic community under concern.

The objectives of this thesis are:

(1) To find a suitable analytical model to determine the welfare costs of agricultural protection;

(2) To examine the welfare costs of protection under the existing price policy;

(3) To project the welfare costs of protection under a deficiency payment system.

Chapter II will give a more detailed description of Austria's agriculture and agricultural policy necessary to understand the situation under which the two policy alternatives are analyzed.

The analysis upon which the cost examination is based is outlined in Chapter III. It will be shown that one type of model can be used for determining the cost of protection under both alternatives.

Eleven major agricultural commodities are chosen for an evaluation of the cost of protection in Chapter IV. The available data will be adjusted to fit the analytical model presented in the previous chapter. The welfare costs of these eleven commodities are estimated and compared under the two alternatives.

The summary and conclusions are set forth in Chapter V.

CHAPTER II

Austria's Agriculture

Structure

The 1968 estimate shows a total population of 7,350,000 on an area of 83,849 square kilometers (32,376 square miles.)[1] These figures make Austria comparable in size to the U.S. State of Maine, and in population to the State of New Jersey.

As in other industrialized countries, the relative share of agriculture within the total economy is decreasing. The agricultural labor force, which was 32.3 percent of the total civilian employment in 1951, declined to 19.5 percent by 1968. The relative share of the agricultural population in the total population dropped from 21.9 percent to 16.4 percent between 1951 and 1961. The contribution of agriculture and forestry to the gross national product was 10.5 percent in 1959 and 7.6 percent in 1967. Between 1950 and 1965 the number of farms decreased by 10 percent from 433,000 to 379,700. The nature of the age structure of the agricultural population indicates further changes for the future.

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[1]Land-und Forstwirtschoftliche Landes-Buchfuehrungs-Gesellschaft m.b.H., Oesterreichisches Agrar - Handbuch (Vienna: L B G, 1964), p. 17.

About 5.4 percent of persons employed in agriculture are over 65 years of age. Thirty-four percent are older than 50. Among farm owners, 13.6 percent are over 65 and 25 percent are between 35 and 65 years of age.

Due to internal and external conditions influencing the operation of the holding, about 126,000 mountain farms are classified in the Austrian mountain farm register. Only efficient cattle production, forestry and tourism will keep those farms on a competitive level.

Table 1 shows the distribution of farms according to their sizes and soil utilization. Rows (L) and (M) indicate that 51.1 percent of all farms are smaller than 7 hectares, but only 6.2 percent of them constitute the sole source of income for their owners. About 49 percent of all Austrian farms are operated on a part-time basis. Tourism plays an important role for part-time operation, mainly in moutain areas.

Production

Oceanic west weather on the northern side of the Alps, continental and Mediterranean climate in the east and in the south, variations in altitude and soil conditions influence agricultural production. These conditions and traditional structural conditions have been mainly responsible for Austria's diversified production pattern.

Table 1. Percentage distribution of holdings in agriculture and forestry according to soil utilization and size

Table 1. Percentage distribution of holdings in agriculture and forestry according to soil utilization and size

farm size in ha / soil utilization	up to 2	2 to 5	5 to 7	7 to 10	10 to 20	20 to 30	30 to 50	50 to 100	100 to 200	200 and over	Austria Total	Full time Operated
A. Forests only	-	1.1	0.4	0.5	0.7	0.2	0.2	0.2	0.2	0.1	3.6	0.6
B. Grass-Forests	-	0.7	0.4	0.6	1.5	1.0	0.9	0.6	0.2	-	5.9	2.7
C. Crops-Forests	-	0.5	0.2	0.3	0.7	0.5	0.4	0.1	-	-	2.7	1.7
D. Grass	-	6.7	2.1	1.9	3.9	2.3	2.2	1.6	0.6	0.3	21.6	12.5
E. Crops-Grass	-	4.1	2.2	2.4	5.1	2.4	1.0	0.2	-	-	17.4	11.1
F. Crops	-	5.3	2.3	2.6	5.9	2.5	1.1	0.2	-	-	19.9	12.3
G. Crops-Wine	-	0.6	0.6	0.8	1.4	0.4	0.1	-	-	-	3.9	3.3
H. Wine-Crops	0.3	1.1	0.4	0.3	0.5	0.1	-	-	-	-	2.7	2.4
I. Wine	2.2	0.8	0.2	0.1	0.1	-	-	-	-	-	3.4	3.4
J. Special Cultures	0.7	0.2	-	-	-	-	-	-	-	-	0.9	0.9
K. Others	18.0	-	-	-	-	-	-	-	-	-	18.0	-
L. Austria Total	21.2	21.1	8.8	9.5	19.8	9.4	5.9	2.9	1.0	0.4	100.0	-
M. Full time Operated	2.9	2.1	1.2	8.1	17.6	9.2	5.9	2.9	1.0	-	-	50.9

The area within the boundaries indicates full-time operation.

Source: Friedrich Schmittner, "Die Oesterreichische Agrarstruktur". Paper presented at the 10th Congress of the International Association of Agricultural Students, Vienna, Austria, September, 1966. (Mimeographed).

The need for rationalization and simplification of agricultural production has resulted in a trend to adapt production by region, farm type and farm size. This led to a concentration of crop production, pig production and cattle fattening in the lowland and to milk production and cattle breeding in mountain areas.[2] Farms in the plains and hilly regions produce over 90 percent of the nation's crop output. Mountain farms account for one-third of total animal production. There is a positive correlation between increasing farm size and the shift of production from milk, rye and potatoes to wheat. Livestock products account for about 75 percent of total sales value and crops account for 25 percent. Farm produced crops included, however, a considerable share of feeding stuffs for livestock and their share in total sales value underestimates their importance in the production pattern.

Mechanization and rationalization have resulted in a steady increase in volume of both crops and livestock products. Table C2 in Appendix C shows the trends in the production of bread grain, coarse grain, meat, eggs, milk, milk products

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[2]OECD, Agricultural Policies in 1966, (Paris: OECD, 1967), p. 141.

and sugar beets. Production has been fairly stable for rye, oats, veal and sugar beets, but has been increasing for wheat, barley, beef, pork, poultry, eggs, milk and milk products.

Consumption

The increase in income has resulted in a significant change in the food consumption pattern. Table 2 shows the per capita consumption of major agricultural products.

Table 3 indicates that per capita national income has increased from US$588 in 1958 to US$1033 in 1966 or by 77 percent. (Federal Republic of Germany 81 percent, Switzerland 72 percent, U.S. 49 percent for the same time period).

Changes in the size of the population had minor effects on total consumption since population increased only by 4.3 percent between 1958 and 1966. (Federal Republic of Germany 10.4 percent, Switzerland 15.4 percent, U.S. 12.6 percent for the same time period).

Wheat and rye:[3] Due to the high consumption of dark bread in Austria, rye is considered as a bread grain. For

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[3]OECD, Food Consumption and Agricultural Production in Austria, (Paris: OECD, 1969).

Table 2. Food consumption per head in Austria, selected years[a]

	1947/48	1955/56	1964/65	1965/66	1966/67	1967/68
			Kg/yr			
bread and flour	126.1	109.7	91.9	90.8	89.7	87.4
beef	7.8	12.6	14.9	15.6	16.6	17.3
veal	1.8	3.6	3.0	2.9	2.6	3.1
pork	7.9	26.9	36.9	37.3	35.6	36.7
poultry	0.3	1.0	5.9	6.3	7.3	7.2
meat total	19.7	47.3	63.2	64.5	64.3	66.5
eggs	2.3	8.1	14.2	14.3	14.2	14.0
milk	78.6	164.6	141.1	140.0	136.0	135.7
butter	2.3	4.1	5.3	5.4	5.5	5.7
cheese	0.7	2.7	3.6	3.6	3.8	4.1
sugar	7.8	33.8	36.9	40.2	39.9	45.5[b]
potatoes	113.1	95.7	80.1	75.6	76.6	75.0

[a]Source: Bricht der Praesidentenkonferenz der Landwirtschaftskammern Oesterreichs 1968, Vienna 1969, Tables, p. 14.

[b]High figure due to storage purchases because of anticipated increase in the price of sugar.

Table 3. Estimates of per capita national income, selected years, selected countries

	1958	1963	1965	1966	Percentage change between 1958 and 1966
	U S Dollars				
Austria	588	831	962	1033	77
Fed. Rep. of Germany	838	1259	1455	1518	81
Switzerland	1195	1677	1929	2056	72
U. S.	2115	2562	2910	3153	49

Source: UN, Yearbook of National Income Accounts Statistics 1967, (New York: UN, 1968)

both wheat and rye, there was a fast decline in per capita consumption up to 1961/62. Consumption has stablized somewhat in recent years. Total consumption of bread grains in 1961/62-1963/64 was 93 kg. per capita. (83 kg. in Switzerland, 73 kg. in Germany, 54 kg. in the U.S.) This consumer behavior explains the exceptional position of food grain in Austria's agricultural policy.

Feed grain: Induced by the increasing consumption of meat, an increase in the derived demand for feed grain has occurred. The inter-dependence between feed grain and meat consumption has been taken into account in the following chapters.

Meat: Meat consumption per head in Austria in 1961/62-1963/64 was 62 kg. and was increasing. The level of pork consumption is the highest in western Europe. This may be explained by price advantages relative to other types of meat, and by traditional consumption habits.

Eggs: Egg consumption has increased from 8.1 kg. per capita in 1955/56 to 12.5 kg. in 1961/62-1963/64. Here, too, the interdependence with the consumption of feed grain has been accounted for in the following analysis.

Milk and milk products: There was a considerable decrease from 164.6 kg. per capita in 1955/56 to 135.7 kg. per capita in 1966/67 in the consumption of fluid milk.

Consumption of butter decreased in the mid-fifties, but since then has been rising again. Cheese and condensed milk have taken an upward trend due to their positive income elasticities.

Sugar: Consumption of sugar has risen steadily over the past years up to 36.1 kg. per capita in 1961/62-1963/64. Further information on consumption is listed in Table 2.

Agricultural Policy

Post World War II history: Low yields in the post war period and excessive demand for foods resulted in the Price Regulation Law (Preisregelungsgesetz) of 1945 and in the Food Administration Law (Lebensmittelbewirtschaftungsgesetz) of 1947.[4] These laws have been modified several times in order to stabilize prices and to guarantee effective distribution as well as increased production of food. Economic policies up to 1950 were in Austria more "consumer oriented" than comparable measures in Germany, which were rather "investment oriented."[5]

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[4]Getreideausgleichsfonds, Handbuch der Oesterreichischen Getreidewirtschaft, (Vienna: 1967), p. 171.

[5]F. W. Buechel, "Westdeutsche Und Oesterr. Agrarpreispolitik seit Ende des Zweiten Weltkrieges," Berichte ueber Landwirtschaft, (Hamburg-Berlin: Parey-Verlag, 1960) pp. 161-188.

The European Recovery Program (Marshall Plan), starting in 1948, and the general increase of overseas supply and increased domestic production eased the tense food situation and the Austrian agricultural policy turned towards explicit protection of domestic production. Most sections of the Food Administration Law of 1947 expired in 1950. To cope with the improved domestic and foreign supply, the three Marketing Laws for grain, milk and livestock (Getreidewirtschaftsgesetz Milchwirtschaftsgesetz, Viehverkehrsgesetz) were passed in 1950 establishing Marketing Boards for each of the three main commodity groups. (The crucial supply conditions due to the Korean War led to a reactivation of the Food Administration Law in 1952). The three Marketing Laws were renewed in 1956 (Verkehrs-gesetze 1956) and finally unified into the Marketing Order Law (Marktordnunsgesetz) of 1958.

In spite of the regulations specified in this law and executed by the Marketing Boards, the disparity in income between the agricultural and non-agricultural sector has been increasing and led to the Agricultural Act (Landwirtschafts-gesetz) of 1960.[6]

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[6]EFTA, Agriculture in EFTA, (Geneva: EFTA, 1965).

Existing Policy: The Agricultural Act of 1960 was the ideological basis for Austria's agricultural policies in the sixties and defines the following aims:

(a) To maintain the agricultural population in a sound economic condition and to ensure that it participates in the development of the national economy.

(b) To improve productivity and competitiveness, especially by structural measures.

(c) To improve the standard of living of those engaged in agriculture and to ensure the best possible food supplies considering the whole economy and interests of consumers.

(d) In realizing this Act, mountain farmers ought to be given special attention.

These aims suggest implicitly the policy of a rather high level of self-sufficiency which, however, is not the explicit aim of the Agricultural Act. Figures 1 and 2 show the level of self-sufficiency of Austria's agriculture.

The Agricultural Act orders that a "Green Report" on the situation of Austria's agriculture is to be submitted to the cabinet by September 15th of each year. On the basis of this report, the Cabinet gives its "Green Plan" to the Parliament (Nationalrat) by October 15th of the same year. The "Green Plan" deals mainly with the "basis of production," research, advisory work, re-afforestation, better breeding of plants and animals and with the "structural improvements" (reaching optimum farm sizes, land consolidation, regional development).

Figure 1. Level of self-sufficiency of total agriculture

Source: Bericht ueber die Lage der oesterreichischen Landwirtschaft 1968, BMFL, Vienna 1969.

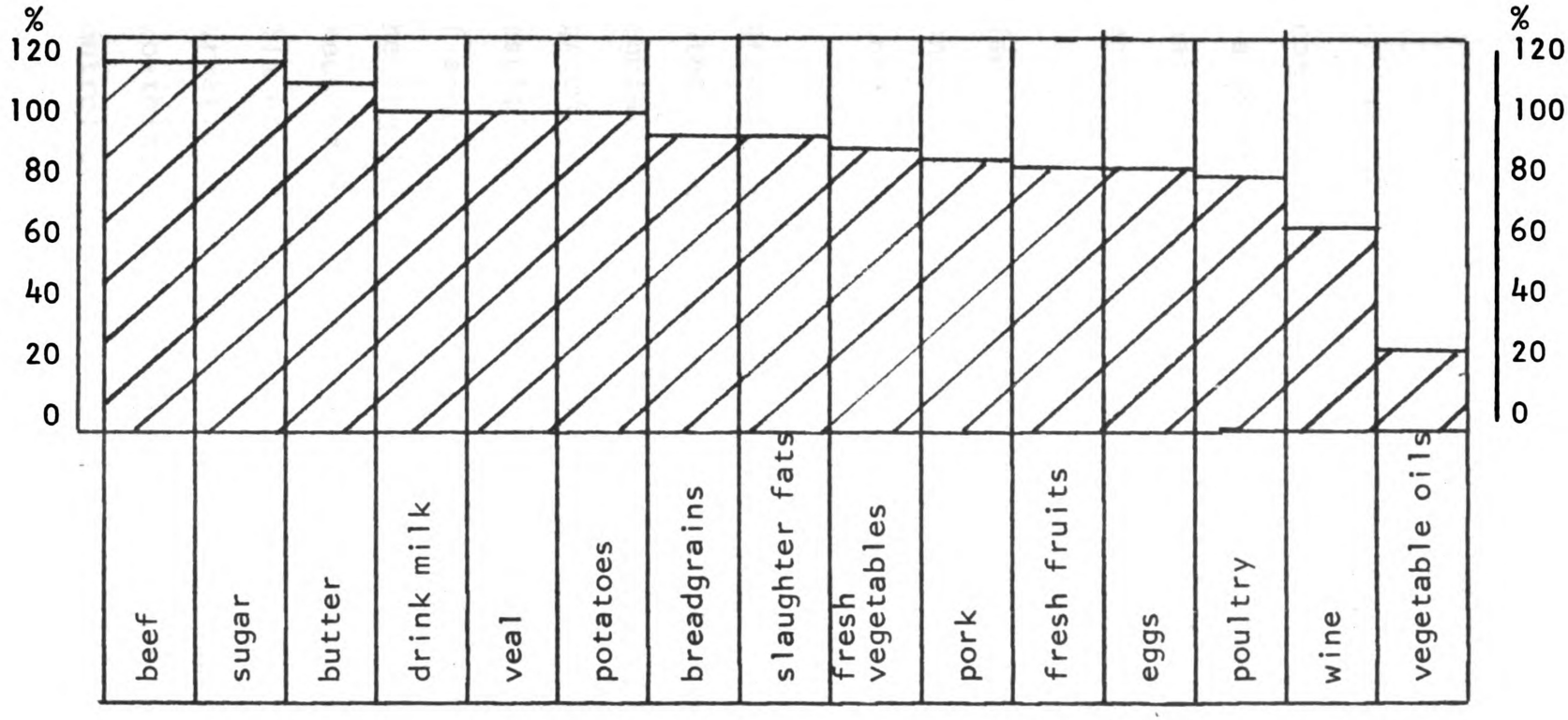

Figure 2. Level of self-sufficiency of agricultural commodities for 1966-67

Source: Bericht ueber die Lage der oesterreichischen Landwirtschaft 1968, BMFL, Vienna 1969.

The programs specified by the "Green Plan" are financed from special items of the Federal Budget (Kapitel 19 Titel 8, 8 a-c and 10; 601 and 603, respectively). Table 4 indicates that the largest portion of these funds is spent on improvement of production, improvement of structure and credits.

In addition to the funds provided under the "Green Plan" about 460 million AS (Austrian Schillings) are spent annually by the Provincial governments on programs in connection with the "Green Plan".

Market Regulation: Prices and quantities of several agricultural commodities are regulated mainly under the authority of the Food Administration Law of 1952, the Price Regulation Law of 1957, the Market Order Law of 1958 and the Agricultural Act of 1960. The agricultural policy and resulting prices and quantities are discussed on the basis of annual results from 1980 representative bookkeeping farms. The regulatory programs for the main commodities are executed by the Grain Marketing Board (Getreideausgleichsfonds), Milk Marketing Board (Milchwirtschaftsfonds) and Livestock Marketing Board (Viehverkehrsfonds), respectively.[7] Thus, two-thirds of the agricultural production is under the control of the three marketing boards.

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[7]BMFLF, Taetigkeitsbericht 1967, (Vienna: BMFLF, 1968).

Table 4. Funds used in accordance with the Green Plan

	1962	1963	1964	1965	1966	1967
	Mil of Austrian Schillings[a]					
Improvement of Basis of Production	135,86	169,73	166,37	198,87	173,53	209,51
Improvement of Structure	251,15	274,83	322,43	376,37	317,59	390,93
Marketing and Disposal Measures	101,49	112,19	119,55	99,26	75,48	82,48
Social-political Measures	26,10	28,60	28,32	32,60	33,00	40,53
Credit-political Measures	73,23	101,50	112,06	146,45	152,11	175,52
Unspecified	0,83	3,70	3,73	0,52	0,75	0,76
Total	588,66	690,55	752,46	854,07	752,46	899,73

Source: Bericht ueber die Lage der oesterreichischer Landwirtschaft

[a]Each AS = US$0.04

Producer and consumer prices for food grains, milling products, sugar, milk, butter, special kinds of cheese and import and consumer prices for grains and eggs are determined through decisions by the Price Commission according to the law on price regulations after they have been discussed by the Chambers of Commerce, Labor and Agriculture and representatives of the responsible Ministers.[8] Prices for milk and bread grains are pooled and all producers receive the same prices regardless of their location. The prices of other major agricultural inputs and products are discussed -- like most non-agricultural commodities -- by the Parity Commission on Price and Wage questions. The prices for those commodities, however, are not directly fixed.

Bread grains: Since 1953 the actual guaranteed producer price of 100 kg. wheat has been AS 249. The guaranteed producer base price for 100 kg. rye has been AS 230. These prices would lead to prices for flour and bread considered too high for the consumer. Therefore, the Government pays a subsidy out of the federal budget to cover a part of these prices. By January 1, 1967, the subsidy for 100 kg. wheat has been cut from AS 52 to AS 17 and for rye from

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[8]OECD, Agricultural Policies in 1966, (Paris: OECD, 1967), p. 145.

AS 55 to AS 20. The base prices for bread grains (guaranteed producer price minus the fixed subsidy) is differentiated monthly in such a way that they are lowest in July and highest from March to June of the following year. The producer price for quality wheat and durum-wheat has been fixed at a higher level in order to stimulate production (AS 257 and AS 308, respectively for 100 kg. in 1967). Other programs of the Cereal Marketing Board include a "Storage Action" in order to reduce the effects on the market caused by the seasonal production of grain. Depot holders whose stocks exceed their normal level are reimbursed for the cost of interest, storage losses and storage costs. A transport equalization program enables a uniform price to be paid to all producers.

Feed grains: By an increase of the import delivery price (Inport abgabe-bzw. Grosshandelseinstellpreis), comparable to the EEC threshold price, in 1964 and 1966 domestic production of feed grains has been stimulated; mainly because the higher prices for feed grain have narrowed the price difference between wheat and barley. Thus, the necessity of an import subsidy for imported feed grains has been changed into the necessity for a levy on imported feed grains in 1967 due to the increased domestic price. The receipts obtained from the levy are used directly for the

equalization of transport costs, denaturation of wheat, promotion of sales of animal products, aid programs for mountain farms and purchase of governmental grain reserves.

Milk and milk products: Producer prices are uniform throughout the country. The guided price is composed of the basic price and of the price per fat unit and was AS 227 for 100 liters, 3.2 percent fat in 1967. Increases in the producer prices for milk in the past have been distributed to various degrees on the consumer prices of the end products. Each of the 441 dairy enterprises has a regulated supply and delivery area. In order to equalize transportation costs, the Milk Marketing Board collects a compensatory levy from the dairy enterprises which is then redistributed according to production and processing conditions. Due to a low margin between producer and consumer prices, the Milk Marketing Board operates with a deficit which is made up by government payments and a levy imposed on imported dairy products. Export of the surplus production is possible only by a subsidy financed from various sources (crisis fund, fund for market relief) out of consumer and producer prices. The fact that milk is the main source of income for mountain farms is held as the leading argument for support of the milk price.

Livestock and meat: The market for slaughter cattle, veal, pigs, and horses is administered by the Livestock Marketing Board by means of direct and indirect measures. Direct regulation is executed by a variable levy in order to equalize the domestic-foreign price difference. Import quotas are offered on the basis of an import plan and are granted to the lowest bidder. Importers pledge to deliver the livestock at a certain date. To operate on a basis of indirect regulation a "price-band" (Preisband, comparable to EEC "Orientation Prices") is defined which limits the highest and lowest acceptable price. In case of too low prices, the Livestock Marketing Board may request private enterprises to purchase and feed or store livestock or meat in order to reduce excess supply. If prices are high, the request for resale and imports alleviates an excess demand situation and forces the price back within the limits of the "price-band." Though this system of indirect price regulation is limited by the capacity of storage facilities, it has had a valuable effect on the stabilization of prices.[9] The Livestock Marketing Board does not buy meat or livestock, but refunds storage costs for chilled meat using the receipts

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[9]Getreideausgleichsfonds, Handbuch der Oesterreichischen Getreidewirtschaft, (Vienna: 1967).

of the import levy. Up to August 1967 sugar beet producing farms and agricultural distilleries in the lowlands could be required to take in cattle from mountain farms to fatten them.

Sugar: Prices are determined by the Ministries and Chambers of Commerce, Labor and Agriculture. The producers' association and the sugar beet processing industry negotiate annually a quota which is distributed among farmers according to individual basic quotas.

Other agricultural policy programs: The market for horticultural products is regulated by a four-phase system according to the seasonal domestic supply conditions. Promotion programs for wine are quality oriented.

Besides the measures already discussed which directly or indirectly affect input costs, special support programs for fertilizers and fuel oils are in existence. Transportation of straw from surplus (lowland) to deficit (mountain) areas and transportation of domestically produced feed grains is subsidized. Consumer information programs and a school milk program are financed to increase domestic consumption of farm products.

Foreign trade:[11] Agricultural, forestry and food products

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[11]C. E. A. Salzburg, Oesterreichs Land und Forstwirtschaft (Vienna: Oesterreichischer Agrarverlag, 1968), pp. 34-35.

contributed 12.8 percent to Austria's exports and 15.4 percent to imports in 1966. Seventy-two percent of the agricultural exports are exported to the EEC, nineteen percent to EFTA countries and nine percent to other countries. The levy regulations applied by the EEC countries since 1967 make exports of agricultural commodities into the EEC increasingly difficult and threaten to reduce Austria's share of cattle and beef exports into Germany and Italy.

Due to Austria's geographical location, most imports of hogs, beef, veal, poultry, and eggs are from Eastern Europe. In 1966, sixty-nine percent of livestock and meat imports originated from Eastern Europe, seventeen percent from EFTA and six percent from EEC. Most of the imports of vegetables, fruits, and feed grains, however, come from the EEC.

CHAPTER III

Analytical Framework[1]

Partial Equilibrium

In spite of the limitations of the partial equilibrium approach in international trade a partial equilibrium model has been used to determine the welfare costs of protecting selected commodities. This approach is justified under the assumption that the indirect effects of removing the protection are negligible. The assumption holds in the Austrian case since:

1. The commodities under concern constitute a relatively small part of the total economy.
2. The commodities have low domestic demand and supply elasticities. The introduction or elimination of tariffs will therefore result in small changes in the volume of trade.
3. The country's foreign trade in the selected commodities forms a relatively unimportant part of the world market which results in a perfectly elastic world market as far as the country is concerned.

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[1]For most of the methodology used in estimating the costs of protection, I am in debt to the procedure devised by Rachel Dardis in her thesis on this subject: Rachel Dardis, "The Welfare Cost of Agricultural Protection," (Unpublished Ph.D. thesis, University of Minnesota, 1965).

4. Most of the effects not considered by the partial equilibrium model will appear in the results of both policy systems under discussion and can be disregarded in a comparison of the two systems.

Thus, changes in total employment, changes in the terms of trade and balance of payments and changes in the prices of non-agricultural commodities can be neglected.

Tariffs

Domestic and world market prices have been compared in order to determine the welfare costs of protection under the two policy systems. Since the nominal tariff rate is not an adequate measure of protection, Harberger's[2] equivilent tariff concept has been employed. Let

P = domestic price
P^O = world market price.

The percentage tariff "U" is the price difference between domestic price and world market price in percent of the domestic price and

$$U = \frac{(P-P^O)}{P} 100 .$$

The ad valorem tariff "T" indicates the price difference between the domestic and world market as a percentage of the

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[2]Harberger, A. C., "Using the Resources at Hand More Effectively," American Economic Review, Vol. 49, 1959, pp. 134-146.

world market price. Thus,

$$T = \frac{P-P^O}{P^O} 100.$$

The tariffs are related to each other by the equation

$$T = \frac{U}{100-U} 100.$$

The term tariff alone is used in this paper solely to indicate a price difference between domestic and world market prices due to any kind of protection. Thus, the term tariff stands here for the expression "$P-P^O$" and is analogous to the specific tariff.

Price and Quantity Quotations at Different Marketing Levels

The application of a partial equilibrium model assumes a uniform price level on the demand and supply side. To find the equilibrium at the same price level, all prices were compared at the wholesale level. Furthermore, it is assumed that there are no changes in the quantity of the good as it is moved from the farm to the retail level.

Due to the lack of Austrian data on transportation rates and makreting margins, it was assumed that the c.i.f. import prices free Austrian border were comparable with domestic wholesale prices.

Consumers' Surplus and Producers' Surplus

Since the concept of welfare cost is based on the existence of producers' surplus and consumers' surplus it is necessary to explain first these two terms.

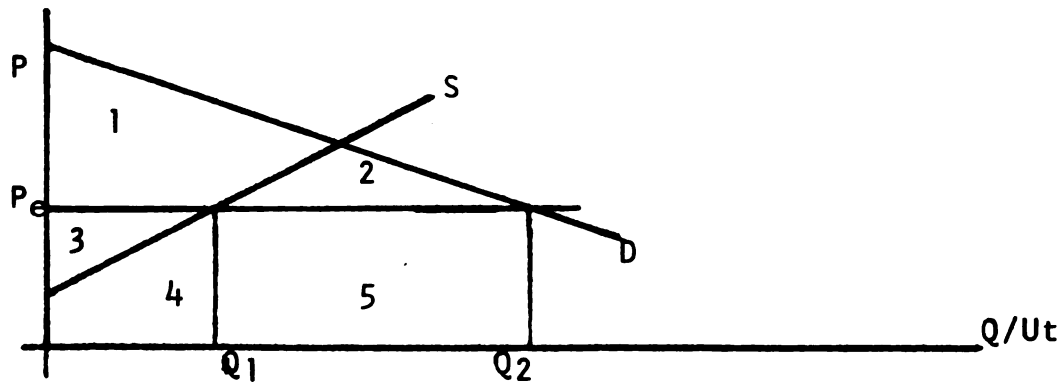

Figure 3. Consumers' Surplus and Producers' Surplus

Marshall[3] and others have shown that a consumer consuming at Q_2 in Figure 3 gains total satisfaction amounting to the area (1 + 2 + 3 + 4 + 5). At the prevailing price, however, he pays only the area (3 + 4 + 5) for the amount Q_2 purchased. They define the excess area of unpaid satisfaction -- area (1 + 2) -- as consumers' surplus. It is the amount above the price P_e actually paid that the consumer would be willing to pay for a given amount of a commodity rather than go without it.

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[3]Alfred Marshall, Principles of Economics (9th ed., London: Macmillan and Co., Limited, 1961), p. 124 and p. 811.

At price P_e area (3) must be regarded as producers' surplus or rent since any producer producing to the left of Q_1 will be able to charge (under the assumption of competition) the full price though operating at much lower total expenses--area (4). (Assume that S is the summation of the individual firms' marginal cost curves.)

Equipped with the concept of tariffs and of producers'--and consumers' surplus it is now possible to proceed in the analysis of welfare costs of protection. To simplify the analytical approach it is assumed that protection of domestic agricultural production occurs by means of either indirect or direct price support policies. Import quotas, however, are neglected in this study although the models presented below explain quotas as well as tariffs.

A.) Welfare Cost of Protecting Domestic Production Through Indirect Price Support

Under this policy a levy is charged on imports enabling domestic producers to sell their products above the world market price. On the other side the levy forces consumers to consume domestically produced as well as imported commodities at prices above world market prices.

1) One Import Good

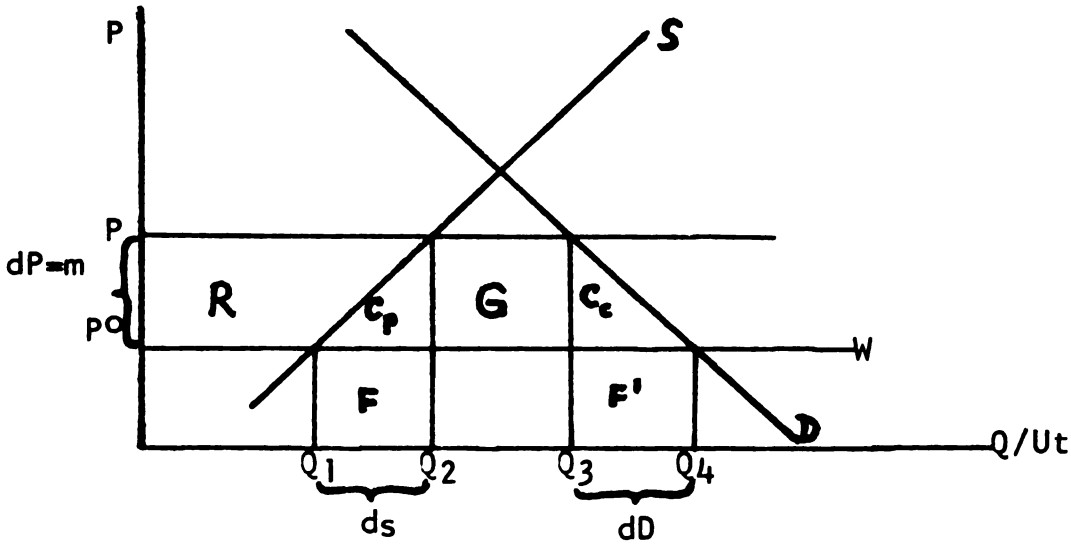

Figure 4. Cost of protection in a one import good model

In figure 4 linear demand and supply function approximate the shape of the true functions. Let

$S = \sum_{i=1}^{n} MC_i$ = domestic supply curve

D = Hicks Compensating Demand Curve
P^{OW} = World supply curve
P^{O} = World market price
P = Domestic producer price
dp = m = price difference due to protection
R = Change in producers' surplus or rent
G = Tariff revenue
$(R+Cp+G=C_C)$ = Change in consumers' surplus.

Since all available data are "post-protection-data" it seems useful to calculate the cost of protection in terms of the gain obtained from eliminating protection; thus necessitating the use of the percentage tariff as a measure of the height of the tariff.

The elimination of the tariff "m" causes a reduction of producers' surplus of (R), a loss of the tariff revenue (G) and a gain in consumers' surplus of ($R+Cp+G+C_c$). Comparing gains and losses indicates the cost of protection which is represented by the area of the two triangles C_p and C_c where

C_p = production cost of protection and

C_c = consumption cost of protection. Thus

$C = C_p + C_c$ = total cost of protection. (1)

Algebraic Representation of Welfare Costs

To find numerical values for C_p and C_c demand-and-supply-price elasticities have to be employed.

$C_p = 1/2\ m\ d\ S = 1/2\ m \frac{dS}{dP} \cdot dP = 1/2\ m^2 n \frac{Q_2}{P}$ leads to

$C_p = 1/2\ t^2\ n\ V_p^t$ where (2)

n = elasticity of supply at price (P)

t = percentage tariff = $\frac{m}{P}$

$m = dP$ = price difference due to protection

V_p^t = value of domestic production under protection

$= Q_2 P$

The calculation of the consumption cost (C_c) needs more elaboration.

$C_c = 1/2\ mdD = 1/2\ m\ (-\frac{dD}{dP})\ dP = 1/2\ m^2 k$ (3)

where $k = -\frac{dD}{dP}$ is Slutsky substitution term which is expanded according to the Slutsky substitution

theorem.[4] Thus,

$$k = -\frac{\partial D}{\partial P} - \frac{\partial D}{\partial Y} D = e \frac{D}{P} - y \frac{D^2}{Y} = \frac{eV_c^t - y \frac{(V_c^t)^2}{Y}}{P^2}$$

where e = price elasticity of demand $= -\frac{\partial D}{\partial P} \frac{P}{D}$

y = income elasticity $= \frac{\partial D}{\partial Y} \frac{Y}{D}$

Y = personal income

V_c^t = value of domestic consumption under protection $= Q_3 P$.

Now

$$C_c = 1/2\ t^2 V_c^t (e - y \frac{V_c^t}{Y}). \tag{4}$$

Since the proportion of income spent on agricultural commodities is relatively small, the expression $y \frac{V_c^t}{Y}$ can be neglected leading to the final equation for consumption cost of protection such that

$$C_c = 1/2\ t^2 e V_c^t \tag{5}$$

The total welfare cost of protection expressed in numerical values is therefore

$$C = C_p + C_c = 1/2 t^2 n\ V_p^t + 1/2\ t^2\ eV_c^t \tag{6}$$

The result indicates that the costs of protection vary proportionally with the elasticities and the height of the tariff.

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[4] Hicks, J. R., Value and Capital (Oxford University Press, 2nd ed., 1946), pp. 307-309.

ii) More Than One Import Good

To determine the welfare costs of protecting more than one good, the model outlined above is extended so as to take care of the influence of cross-elasticities on the demand and supply functions.

Equations 8 and 10 yield production and consumption cost of protection, respectively. Equation 11 determines the total welfare cost of protecting n substitutable goods.

n = number of protected goods under consideration

$i = 1.2. \ . \ . \ .n$

P_i = domestic price of the protected good

$dP_i = m_i$ = change in price of good i when protection is removed

Y = personal income

$D_i = f(P_1P_2 \ . \ . \ . \ Pn, Y)$ = domestic consumption under protection

$S_i = g(P_1P_2 \ . \ . \ . \ Pn)$ = domestic production under protection

Cp_i = production cost of protecting good i

Cc_i = consumption cost of protection of good i

C = total cost of protection of n goods

These costs are estimated by the summation of the individual costs of production and consumption.

$$Cp_i = 1/2\ dS_i m_i$$

$$Cc_i = 1/2\ dD_i m_i$$

when the change in S_i and D_i (i.e., dS_i and dD_i) is caused by the change in prices of <u>all</u> commodities under question (1,2,...n).

Thus
$$dS_i = \sum_{j=1}^{n} \frac{dS_i}{dP_j}\ dP_j = \sum_{j=1}^{n} \frac{dS_i}{dP_j}\ m_j .$$

Letting
$$\frac{dS_i}{dP_j} = h_{ij}\ (j=1,2\ \ldots n)\ \text{we obtain}\ dS_i = \sum_{j=1}^{n} h_{ij} m_j .$$

Substitution in Cp_i leads to

$$Cp_i = 1/2 \sum_{j=1}^{n} \frac{dS_i}{dPj}\ m_j m_i = 1/2 \sum_{j=1}^{n} h_{ij} m_j m_i .$$

The summation of the individual costs of production yields

$$\sum_{i=1}^{n} Cpi = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} \frac{dS_i}{dP_j}\ dP_j \cdot dP_i = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} h_{ij} m_i m_j . \quad (7)$$

In order to be able to utilize given parameters such as

n_{ij} = cross elasticity of supply = $\frac{dS_i}{dP_j} \cdot \frac{P_j}{S_i}$ and

t_i = percentage tariff of good i = $\frac{m_i}{P_i}$

$V^t_{p_i}$ = value of domestic production of good i under protection = $S_i P_i$, equation 7 is transformed into

$$\sum_{i=1}^{n} Cp_i = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} t_i t_j n_{ij} V^t_{p_i} \quad (8)$$

Similar steps lead to a useful equation of the summation of the individual costs of consumption:

$$dD_i = \sum_{j=1}^{n} - \frac{dD_i}{dP_j} dP_j = \sum_{j=1}^{n} - \frac{dD_i}{dP_j} mj = \sum_{j=1}^{n} k_{ij} m_j$$

where

$$k_{ij} = - \frac{dD_i}{dP_j} = \text{Slutsky substitution term.}$$

Substitution in Cc_i leads to:

$$Cc_i = 1/2 \sum_{j=1}^{n} - \frac{dD_i}{dP_j} mjmi = 1/2 \sum_{j=1}^{n} kij\ mj\ mi.$$

Thus

$$\sum_{i=1}^{n} Cc_i = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} - \frac{dD_i}{dP_j} d\ PjPi = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} k_{ij}\ mimj \quad (9)$$

Using the Slutsky substitution theorem for k_{ij}[5] and the fact that a relatively small fraction of theincome is spent on agricultural goods, it follows that:

$$\sum_{i=1}^{n} Cc_i = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} t_i t_j e_{ij} Vc_i^t \ . \quad (10)$$

Total welfare cost of protecting more than one good equals

$$C = 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} t_i t_j n_{ij} Vp_i^t + 1/2 \sum_{i=1}^{n} \sum_{j=1}^{n} t_i t_j e_{ij} Vc_i^t . \quad (11)$$

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[5]For a more detail derivation see Dardis' Thesis.

The total costs of protection of substitutable goods derived by means of formula 11 are lower than if the total costs of the individual commodities had been summed up.

iii) Final and Intermediate Goods

The following model has been used in the grain-livestock sector since the simple addition of the individual costs of these two sectors would over-estimate the costs of protection by double counting. It is assumed that the intermediate good is used predominately in one final industry.

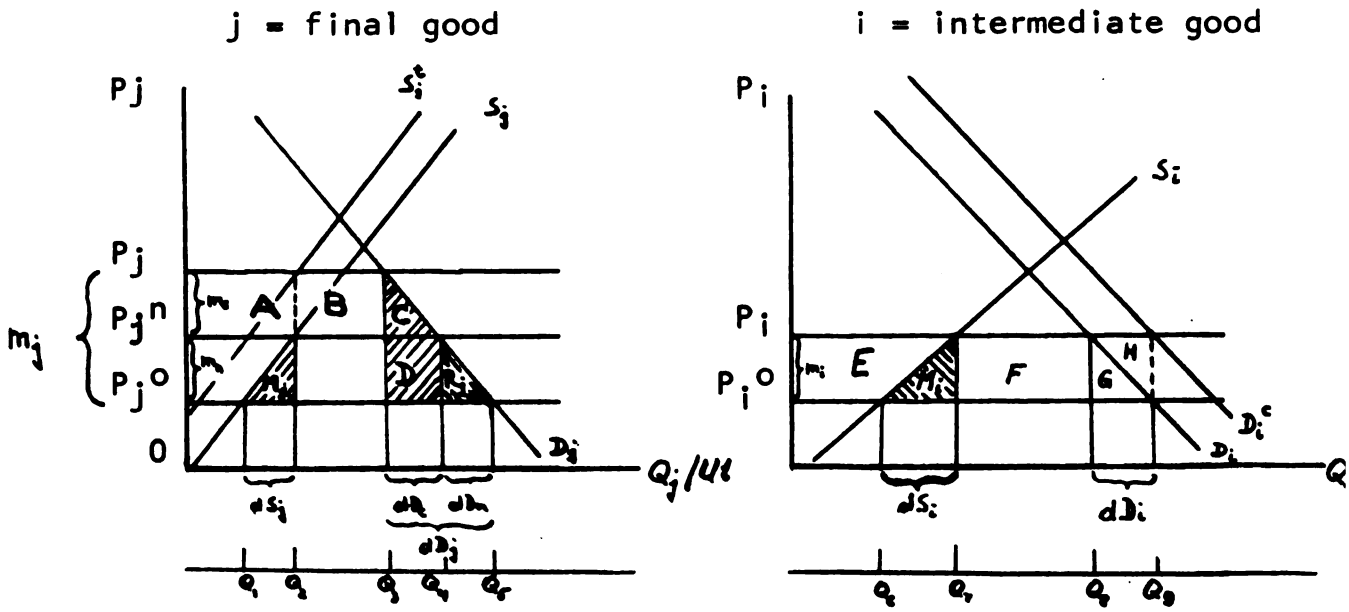

Figure 5. Cost of protection in a final and intermediate good model

The shaded areas in Figure 5 indicate the costs of protection.

Pj^o = Price of Final good without protection.

Pj^n = Price of final good with protection of final good only.

Pj = Price of final good with protection of both goods.

P_i^o = Price of intermediate good without protection.

P_i = Price of intermediate good with protection.

m_n = Net tariff on final good only (due to protection of final good)

m_c = Hypothetical compensatory tariff on final good due to tariff on intermediate good.

m_j = Gross tariff on final good due to tariff on both goods.

m_i = Tariff on intermediate good.

D_j = Demand curve on final good.

S_j = Supply curve on final good.

S_j^t = Supply curve of final good after tariff on intermediate good has been imposed.

D_i = Demand curve of intermediate good.

D_i^c = Demand curve of intermediate good due to the compensatory tariff on the final good.

Q_1 and Q_6 is initial production of j and i.

Q_5 and Q_9 is initial consumption of j and i

To facilitate the explanation of the "More Than One Import Good" model the cost of protection is calculated here directly and not in terms of gains from eliminating the protection. Both methods lead to the same result.

As shown in the "One Import Good" model it follows that the costs of protection due to the tariff m_n are C_j^n where

$$C_j^n = 1/2\ m_n\ dS_j + 1/2\ m_n\ dD_n = M_j + R_j \qquad (12)$$

Now the intermediate good is protected by m_i. This will cause an increase of domestic production of i, but will lead to a reduction of demand of i due to the increased price. Since marginal costs have been increased, a shift of the supply curve of the final good to the left follows. This would cause a shift of the equilibrium position back to the intersection of P_j^n with S_j^t and a change in producers' surplus. Changes in producers' surplus, however, in j are equivilent to profit changes in i. Since only one of these changes should be estimated, a hypothetical compensatory tariff m_c is added to hold producers' surplus constant in j.

The compensatory tariff m_c is added so as to keep production at Q_2 which is the same level of output of the final good as was reached by the imposition of the original net tariff. This raises the price level of the final good, but also the VMP of the intermediate good and, thus, shifts the demand curve of the intermediate good to the right until consumption of i is at the initial level Q_9, however, at a higher price. Since production of j at P_j^n and at P_j is the same, it follows that the demand for i is the same under D_i and D_i^c, if no substitution has occurred.

The increase of the price level of the final good due to the compensatory tariff m_c does not create any producers' surplus in the final good sector since production occurs now on a higher supply curve. There is, however, an increase in total revenue in producing the final good due to the higher price P_j.

As in the "One-Import Good" model, the costs of the tariff m_c on the final good are C + D. Since:

change in total producer's revenue = (A)

plus change in tariff revenue = +(B-D)

minus change in consumer's surplus = -(A+B+C)

yields $C_j^c = C+D$ or algebraically $C_j^c = dD_c(m_n+1/2m_c)$ (13)

Similar considerations hold for the intermediate good sector where the costs of the tariff m_i are M_i. Since:

change in producers' surplus = (E)

plus change in tariff revenue = +(F+G+H)

minus change in total consumer's outlays = - (E+M_i + F+G+H)

yields $C_i^t = M_i$ or algebraically $C_i^t = 1/2\ m_i dS_i$. (14)

Summing up equations 12, 13 and 14, the <u>total costs</u> of protecting both industries are represented by $C^t = M_j+C+D+R_j+M_i$ or algebraically

$C^t = 1/2m_n dS_j + 1/2m_j dD_j + 1/2m_i dS_i$ where (15)

$M_j = 1/2 m_n dS_j$ = net production costs of protecting the final good sector

$C+D+R_j = 1/2 m_j dD_j$ = gross consumption costs of protecting the final good sector

$M_i = 1/2 m_i dS_i$ = gross production costs of protecting the intermediate good sector.

Equation 15 can now easily be expressed in terms of elasticities as shown in equations 6 and 11 .

Determination of the Net Tariff on the Final Good

The net tariff which is necessary for the estimation of net production costs of protecting the final good can be calculated as $m_n = m_j - m_c$. This approach necessitates the derivation of m_c. Under the assumption of fixed coefficients of production and taking a_{ij} as the amount of intermediate good in producing one unit of the final good, it follows that $m_c = a_{ij} m_i$. Thus

$$m_n = m_j - a_{ij} m_i. \qquad (16)$$

Dardis points out that since there is some substitution in the intermediate good sector, m_c is overestimated. Thus, m_n is underestimated due to the equation $m_n = m_j - m_c$ and an underestimation of the net production costs follows. A more accurate estimate for m_c has been derived by Dardis, such that

$$\frac{\partial P_j}{\partial P_i} = \frac{\partial q_j}{\partial P_i} \cdot \frac{P_j}{q_j n_j} = \frac{n_{ji} P_j}{n_j P_i} \qquad \text{where}$$

∂P_j = compensatory tariff on final good

∂P_i = tariff on intermediate good

n_j = price elasticity of supply for final good

n_{ji} = price cross elasticity of supply for final and intermediate good

Thus, $m_c = \frac{n_{ji} P_j}{n_j P_i} \cdot m_i$ and

$$m_n = m_j - \frac{n_{ji} P_j}{n_j P_j} \cdot m_i \qquad (17)$$

It is obvious that only a good estimate of the elasticities will yield a reliable estimate for m_n in equation (17).

Effective Tariff and the Final and Intermediate Goods-Model

The concept of effective protection has been applied in recent research also to the measurement of the cost of protection[6]. The cost of protection is approximated by the formula

$$\Delta W = 1/2 \quad (g_j^2 E_j V_p^t + t_j^2 e_j V_c^t) \text{ where} \qquad (18)$$

ΔW = change in welfare, g_j = effective tariff on j, E_j = elasticity of supply of value added ($E_j = v_j n_j$, where v_j = value added, n_j = supply price elasticity for j), t_j = percentage tariff on j, V_p^t = value of domestic production under

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[6]H. G. Johnson, "The Theory of Effective Protection and Preferences," Economica, Vol. 36, May 1969, pp. 119-137.

protection, V_c^t = value of domestic consumption under protection.[7]

It seems that Johnson does not treat both sectors completely. Formula 18 does not include the production costs of protection of the intermediate sector. The derivation of equation 15 , however, suggests that the area M_i = (gross production costs of protecting the intermediate good sector) has to be added to the welfare costs of protection of both sectors.

B) Welfare Cost of Protecting Domestic Production Through Direct Price Support

This policy guarantees a certain price to domestic producers above the world market price financed directly by means of a deficiency payment from the government's annual budget. Consumers continue to consume at world market prices. Since the model outlined above applies to both indirect and direct protection only a short description follows below.

One Import Good

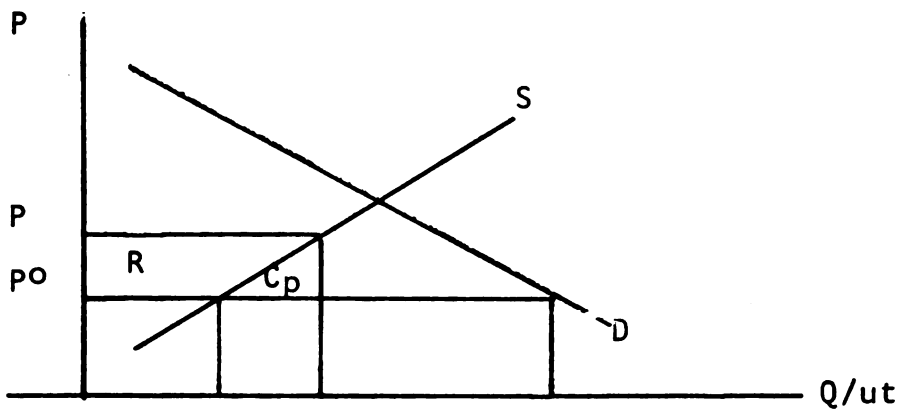

Figure 6. Cost of protection under a deficiency payment system.

[7]This formula deviates from formula 21 in Johnson's paper as far as the valuation of domestic production and consumption is concerned.

The welfare cost of protection are obtained by comparing the change in producers' surplus--the area (R)--with the budget cost of the deficiency payment--the area ($R + C_p$). The cost of protection is therefore equal to the area (C_p) which can be transformed into numerical values as outlined in equation 2 .

More Than One Import Good

There, too, only production cost can exist. Equation 8 yields therefore total welfare cost of protection.

Final and Intermediate Goods

Again the total welfare cost of protection (C^t) is originated by production costs only. With respect to figure 5 it follows that $C^t = M_j + M_i$.

From the analysis it is concluded that under a deficiency payment policy no consumption costs can occur since there is no tariff valid at the demand curve. Thus, the welfare costs of protection for a deficiency payment system are considerably below the costs of the existing policy which is to be shown in the following chapter.

CHAPTER IV

Procedure and Results of Cost Estimation

To provide a useful estimate of the costs of total agricultural protection, eleven major commodities were examined over a period of four years. Since it seemed not justifiable to treat all commodities with the same model, the products were grouped to fit specific models outlined in the analytical chapter.

Thus, the "One Import Good" model was applied individually to wheat, rye, sugar, butter and cheese since there is not enough interdependence between any of those products to necessitate the use of a more refined model. To take account of the interdependence between feedgrains and livestock, the "Final and Intermediate Goods" model was utilized. The "More Than One Good" model was used to take care of the existing substitution in the consumption of pork, poultry and eggs.

Comparison of Costs Between the Two Policies

Since under a deficiency payment system consumers consume at world market prices, no consumption costs of protection occur. Thus, it holds for all models that

$C_p + C_c = C$ equals costs of protection under the existing policy

$C_p = C$ equals costs of protection under a deficiency payment policy where

C_p = production costs of protection

C_c = consumption costs of protection

The final equations for the calculation of the costs of protection--equations 6, 11 and 15 in Chapter III--indicate that the costs of protection depend on the values of domestic production and consumption, the height of the tariff and the price elasticities of demand and supply.

Domestic Production and Consumption

The values of domestic production were derived by multiplying the quantity of domestic production with the specific domestic price. Data for the quantity of domestic production were obtained from the FAO Production Yearbook and for the year 1967 from Austrian national statistics[1] and are listed in Appendix C, Table C2. The domestic wholesale price was taken from Austrian national statistics. The price of pork had to be converted from live weight to carcass weight using the conversion factor 1.24. All prices used are listed in Table C2 of Appendix C.

To obtain the values of domestic consumption the values of net-imports were added to the values of domestic production (Table C2 of Appendix C). Export- and import data were obtained from Austrian national statistics. Butter and cheese (1964-67) and wheat (1967) show net exports. It can, however, be shown

[1]See Appendix B for exact sources of statistical data.

that the models used in the analysis apply also to this situation.[2]

Tariffs

The tariff was evaluated as a percentage tariff (i.e., price difference between domestic and world market divided by the domestic price). The source for domestic prices is discussed above.

The world market price was obtained by dividing the value of imports by the quantity imported. To apply this procedure to pork and poultry all quantities listed in live weight had to be converted into carcass weight (Table C3, Appendix C). The world market price obtained by this method is thus an import price c.i.f. Austrian border and is compared in Table C4 of Appendix C with other world market prices. The comparison indicated that the obtained import prices c.i.f. Austrian border lie considerably above all other world market prices quoted. This difference exists due to transportation costs, but also due to the fact that the imported goods are usually of higher quality than the average of domestically produced goods for which the domestic wholesale price is calculated in national statistics.

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[2]Rachel Dardis, "The Welfare Costs of Agricultural Protection," (Unpublished Ph.D. thesis, University of Minnesota, 1965), p. 16.

The import prices of some commodities had to be adjusted to a more meaningful level since the obtained import price c.i.f. Austrian border did not seem reliable enough. Thus, for wheat the import price c.i.f. Rotterdam increased by eight percent was used. The sugar world market price was obtained by averaging Austrian, German and Swiss c.i.f. border prices. The wholesale price of first quality Danish butter quoted in London was used as an estimate for the world market price of butter. The prices used as world market prices in the analysis are given in Table C4 of Appendix C.

The gross tariff is listed as specific, percentage and ad valorem tariff in Table C5 of Appendix C. Since all feed grains were used as one aggregate intermediate good for the livestock sector, a weighted average tariff had to be derived for feed grains. The gross specific tariff for feed grains was obtained by the formula[3]

$$m_i = \frac{\Sigma pq - \Sigma p^o q}{\Sigma q}$$

The percentage tariff is

$$t_i = \frac{\Sigma pq - \Sigma p^o q}{\Sigma pq}$$ where

p = domestic producer price for barley, corn and oats.

p^o = world market price for barley, corn and oats.

q = quantity of domestic product with tariff (barley, corn and oats).

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[3] Ibid., p. 55.

Price Elasticities of Supply and Demand

Austrian elasticities were not available, thus necessitating the use of U.S. elasticities. Since these U.S. values are obtained from studies discussing all commodities simultaneously it is assumed that their inter-commodity consistency will give more accurate results than the application of various existing European figures which usually have been estimated separately depending on the commodity under consideration.

The supply elasticities were given at farm level and are listed in Table C7 of Appendix C. Demand elasticities were given at retail level and are shown in Table C8 of Appendix C. Since the analysis uses supply and demand functions at the wholesale level, all elasticities were converted into elasticities at wholesale level in the following way:

Let P_w = domestic price at wholesale level

P_r = domestic price at retail level

P_f = domestic price at farm level

e_w = domestic price elasticity of demand at wholesale

e_r = domestic price elasticity of demand at retail

n_w = domestic price elasticity of supply at wholesale

n_f = domestic price elasticity of supply at farm level

Dardis[4] and others show that under the assumption of constant-dollar marketing margins $e_w = e_r \cdot \frac{P_w}{P_r}$ and $n_w = n_f \cdot \frac{P_w}{P_f}$

[4] Ibid., p. 25.

Lacking applicable European data, U.S. figures on marketing margins were used to define the percentage of marketing costs allocated between farm and wholesale level and between wholesale and retail level. Farmers' share in retail prices was obtained from an estimate on German farm-retail price spreads. Table C6 of Appendix C shows the procedure applied to obtain the price ratios between the marketing levels. Tables C7 and C8 of Appendix C list the adjusted elasticities.

The use of the "More Than One Good" model in the livestock sector necessitated the use of cross elasticities of demand. To obtain the wholesale values the given retail cross elasticities were multiplied with the wholesale-retail price ratio of the price variables. The cross elasticities on both levels are listed in Table C9 of Appendix C.

Cost of Protection of Wheat, Rye, Sugar, Butter and Cheese

For each of these commodities an individual estimate of the costs of protection was made since it was assumed that there is only minor substitution in consumption between those products and since no cross elasticities of supply were available to take account of existing substitution of production.

Values of Appendix C were used to calculate the costs of protection by means of equation 6 , derived in the analytical chapter, where total costs of protection equals production

Table 5. Costs of protection of wheat, rye, sugar, butter and cheese

		Consumption Costs of Protection		Costs of a Deficiency Payment Policy: Production Costs of Protection		Costs of the Existing Policy: Total Costs of Protection	
			Adjusted[a] values		Adjusted[a] values		Adjusted[a] values
		in MIL. Austrial Schillings					
WHEAT	1964	1	0	0	0	1	1
	1965	12	10	3	3	14	13
	1966	6	5	1	1	7	6
	1967	56	47	14	15	70	60
RYE	1964	4	4	1	1	5	5
	1965	5	4	1	1	6	5
	1966	5	4	1	1	5	5
	1967	34	28	8	8	42	37
SUGAR	1964	15	13	27	30	43	43
	1965	45	37	76	84	121	121
	1966	107	87	179	198	284	286
	1967	56	46	94	104	150	150
BUTTER	1964	26	21	7	11	33	32
	1965	47	38	13	20	59	57
	1966	61	49	25	77	77	74
	1967	51	40	14	21	64	62
CHEESE	1964	2	2	1	1	3	3
	1965	1	1	0	0	2	2
	1966	5	4	2	3	6	6
	1967	21	17	8	11	28	29

[a]Adjusted values refer to the adjustment due to the use of elasticities at wholesale level.

costs plus consumption costs of protection. Thus,

$$C = Cp + Cc = 1/2\ t^2 n V_p^t + 1/2\ t^2\ e\ V_c^t$$

Table 5 shows the costs under both policy schemes. The adjusted values are due to the use of elasticities at wholesale sale level and yield as expected lower values on the demand side and higher values on the supply side. The adjusted values for total costs differ from the unadjusted values according to the relation between the price ratios used to determine the elasticities at wholesale level.

Although there are year to year fluctuations, an increasing trend in the costs may be noted which is partly due to the fact that the government has reduced the price support payments over the last years and ordered a severe restriction of those payments beginning with the year 1967, especially for food grains (wheat and rye), which resulted in a shift in the nature of these costs from explicit budgetary costs to implicit welfare costs of protection.

Table 6. Price Supports Financed From the Federal Budget

		Expenditures	Receipts	Net Expenditures
		in Mil. Austrian Schillings		
1964	Food grains	666	2	664
	Milk	1662	277	1385
1965	Food grains	571	7	564
	Milk	1748	290	1458

Source: Bundesfinanzgesetze fuer das Jahr 1966 and 1967.

Cost of Protection of the Feed Grain-Livestock Sector

Table 7 indicates that wheat and rye are of minor importance as feed grains leaving barley, corn and oats as the main variables of interest. Since there was no considerable difference between the world market price and the domestic price for beef and veal and since only a minor portion of feed grains is used as input for beef and veal production, it was assumed that pork, poultry and eggs were the most important variables under protection. The interrelationship between feed-grains and livestock and the fact that more than seventy percent of feed grain is predominantly used in the production of livestock satisfies the assumptions underlying the "Final and Intermediate Goods" model which was used here.

Table 7. Percentage of grains used for feeding

	1960-64	1965-66	1966-67
	%	%	%
Wheat	13.6	21.9	28.9
Rye	10.0	13.4	18.4
Barley	70.1	72.2	70.4
Corn	88.5	90.7	86.3
Oats	86.9	86.7	88.3

Source: OECD, Food Consumption Statistics, 1954-1966 (Paris: OECD, 1968).

Equation 15 of Chapter III defines costs under the existing policy which consist of net production costs of protecting the final good sector plus gross consumption costs of protecting the final good sector plus gross production costs of protecting the intermediate good sector.

i) The Livestock Sector

The costs for the final good sector were obtained by aggregating the costs of protection of pork, poultry and eggs, taking cross elasticities of demand into account. Thus, a modified "More Than One Good" model was applied yielding the following equation for total costs of protecting the livestock segment of the model:

$$C = 1/2 \sum_{j=1}^{3} r_j^2 n_j V_j^r + 1/2 \sum_{j=1}^{3} \sum_{k=1}^{3} t_j t_k e_{jk} V_j^t \text{ where}$$

$j = k =$ pork, poultry, eggs.

$r_j =$ net percentage tariff of good j

$n_j =$ price elasticity of supply of good j

$V_j^r =$ value of domestic production of good j under the net tariff

$t_j =$ gross percentage tariff of good j

$e_{jk} =$ cross price elasticity of demand between good j and k

$V_j^t =$ value of domestic consumption of good j under the gross tariff

In Table 9 the costs obtained by this equation are compared with the costs of protection if no cross elasticities of demand are considered. Equation 16 was used to calculate the net tariff on the livestock sector. The necessary production coefficients were obtained from estimates on German grain-meat ratios which are listed in Table 8 .

Table 8. Calculation of share of feedgrain in costs of pork, poultry, eggs without tariff

	Grain-Meat ratio		Import[c] price 1964/67	Value of feedgrain per ton meat	Share of feedgrain in meat prices
			AS/ton	AS	
Pork	1960/65[a]	3.25	14,654	5,905	0.40
Poultry	1964/65[b]	2.3	15,557	4,179	0.27
Eggs	1964/65[b]	3.7	13,274	6,723	0.51
Feedgrains Average			1,816		

[a]Calculated from: George E. Rossmiller, The Grain-Livestock Economy of West Germany, Institute of International Agriculture, Michigan State University, Research Report No. 1 (East Lansing, Mich., 1968), p. 162.

[b]Source: Ibid., p. 143.

[c]Calculated from Appendix C, Table 4C.

Table 9. Costs of protection of the feed grain-livestock sector

		Consumption Costs of Protection		Costs of a Deficiency Payment Policy: Production Costs of Protection				Costs of the Existing Policy: Total Costs of Protection			
		Millas	adjusted[a] values Millas	Millas[d]		adjusted[a] values Millas[d]		Millas[d]		adjusted[a] values Millas[d]	
Pork	1964	56	43	4	6	6	9	60	63	49	52
	1965	123	94	11	14	16	21	134	138	110	115
	1966	104	79	9	14	13	22	112	118	92	100
	1967	95	82	8	14	11	20	102	108	93	102
Poultry Meat	1964	100	78	38	51	65	88	138	151	143	166
	1965	80	62	27	36	47	62	107	116	109	124
	1966	47	37	16	21	28	37	63	69	65	74
	1967	78	59	27	36	47	62	103	112	106	121
Eggs	1964	20	17	20	40	23	47	42	61	40	63
	1965	9	8	3	6	4	7	13	16	11	15
	1966	16	13	13	27	15	31	29	43	28	44
	1967	15	12	12	25	14	28	27	40	26	41
Total Livestock Variant Ab	1964	177	137	61	97	49	144	240	274	232	281
	1965	212	164	41	57	66	91	253	269	230	255
	1966	167	128	38	63	56	90	204	229	184	218
	1967	185	143	47	74	72	111	232	259	225	264
Total Livestock Variant Bc	1964	158	123	61	97	49	144	219	255	172	267
	1965	188	144	41	57	66	91	228	244	211	235
	1966	149	114	38	63	56	90	186	211	170	204
	1967	165	127	47	74	72	111	211	239	119	238
Feed Grain	1964			14	14	14	14	14	14	14	14
	1965			15	15	15	15	14	15	16	16
	1966			12	12	13	13	12	12	13	13
	1967			31	31	32	32	31	31	32	32

Table 9, cont.

		Consumption Costs of Protection		Costs of a Deficiency Payment Policy: Production Costs of Protection				Costs of the Existing Policy: Total Costs of Protection			
		Millas	adjusted[a] values Millas	Millas[d]		adjusted[a] values Millas[d]		Millas[d]		adjusted[a] values Millas[d]	
Total Feed Grain Livestock Sector Variant A[b]	1964	177	137	75	111	63	158	254	288	245	295
	1965	212	164	56	72	83	107	269	285	246	271
	1966	167	128	50	75	39	103	217	242	197	231
	1967	185	143	77	104	104	143	263	290	257	295
Total Feed Grain Livestock Sector Variant B[c]	1964	158	123	75	111	63	158	233	269	186	281
	1965	188	144	56	72	82	107	244	260	226	251
	1966	149	114	50	75	69	103	199	224	183	217
	1967	165	127	77	104	104	143	242	270	231	270

[a]Adjusted values refer to the adjustment due to the use of elasticities at wholesale level.

[b]Variant A was obtained without considering cross elasticities of demand between the three livestock products

[c]Variant B takes account of the cross elasticities of demand between the three livestock products.

[d]The right column indicates the application of the concept of effective protection.

ii) The Feed Grain Sector

The costs for the intermediate good sector consist only of production costs since the consumption costs are embodied in the final good sector. Barley, corn and oats were treated as one product with a weighted average tariff the derivation of which has been discussed above. The costs of protection of feed grains are listed in Table 9 . They were obtained by means of the equation

$C = Cp = 1/2\ (t_i^2 n_i V_i^t)$ where

t_i = the weighted average of the percentage tariff of all feed grains

n_i = price elasticity of supply of feed grains

V_i^t = value of domestic consumption of feed grain under the tariff.

Table 9 lists the costs under both policies. In addition, the table shows that applying the concept of effective protection as outlined in equation 18 results in a higher cost estimate than the procedure devised by Dardis. It should, however, be noted that only the values in the last two blocks are true estimates of the costs of protection since only here full account is given to the interdependence between the feed grain and livestock sector. The values of the individual commodities though are useful indicators of the weight to be assigned to each commodity.

Again, it has been shown that the costs of protection under a deficiency payment system are considerably less than under the existing policy.

Total Cost of Protection of all Commodities under Consideration

The welfare costs of protecting all the products discussed above are computed in Table 10. The difference between the four alternatives indicates how much the analysis depends on the elasticity values used. The costs are between 353 and 644 million Austrian Schillings under the existing policy. Under a deficiency payment system, however, costs of protection vary only between 146 and 382 million Austrian Schillings.

Table 10. Welfare Costs of Protection of all Commodities under consideration[a]

		With elasticities at farm and retail level		With elasticities at wholesale level	
		Deficiency Payment Policy	Existing Policy	Deficiency Payment Policy	Existing Policy
		Mill As	Mill As	Mill As	Mill As
Without cross elasticities of demand in livestock sector	1964	146.397	372.121	200.761	378.054
	1965	164.566	486.974	215.415	468.815
	1966	207.539	621.975	382.954	608.590
	1967	240.722	643.532	303.553	635.082
With cross elasticities of demand in livestock sector	1964	146.397	353.102	200.761	363.333
	1965	164.566	462.166	215.415	449.605
	1966	207.539	604.002	382.954	594.659
	1967	240.722	622.929	303.553	609.128

[a]Estimates obtained by applying the concept of effective protection to the feed grain-livestock sector.

Welfare Cost of Protection as Economic Indicator

The costs of protection as percentage of National Income are listed in Table 11 for the largest and smallest alternative of each policy scheme and vary for the existing policy between 0.016 and 0.030 percent and for a deficiency payment scheme between 0.005 and 0.014 percent.

Table 11. Welfare costs of protection of all commodities under consideration as percentage of national income

Existing Policy		Deficiency Payment Policy	
High Alternative	Low Alternative	High Alternative	Low Alternativ
%	%	%	%
0.018	0.016	0.006	0.005
0.026	0.023	0.010	0.008
0.030	0.028	0.014	0.012
0.030	0.027	0.013	0.021

Source: National Income Figures were obtained from Oesterreichisches Statistisches Zentralamt, Statisches Handbuch Fuer Die Republik Oesterreich, 1968 (Vienna, Oesterreichische Staats druckerei, 1968), p. 55.

i) Welfare Cost of Protection and Income Transfer

Dardis[5] suggests to measure costs as percentage of extra income which has accrued to the producers due to the protection.

[5] Ibid., p. 55.

This extra income can be defined as change in producers' surplus due to the tariff which is in the notation of figure 4 represented by area (R). $R = Q_2 \cdot m - Cp$, where Q_2 = quantity of domestic production, m = specific tariff, and Cp = production costs of protection. In the case of pork, poultry and eggs, the net specific tariff was used since producers' surplus is changed only by this rate.

The values for costs as percent of change in producers' surplus for pork, poultry and eggs can only serve as a basis of comparison between those three products since the analysis is based on their interdependence with the feed grains sector.

The values in Table 12 are useful in comparing the two policies. Within a given policy they may be viewed as cost indicators of protecting the respective commodities. Poultry, butter and sugar show the highest figures within a given policy scheme. A deficiency payment, however, yields in all cases lower cost figures than the existing policy.

If we invert the relationship mentioned above it is possible to read the percentage figures in Table 12 as average welfare cost of obtaining one unit of change in producers' surplus due to the protection. In other words, Table 12 gives the average welfare cost of income transfer from consumers to the producer. In the example of wheat it may be seen that in 1967 the average cost of transferring AS 1.00 to farm income

Table 12. Calculation of costs of protection as percentage of the change in producers' surplus due to protection or average welfare cost of income transfer to producers

		Change in Producers' Surplus	Costs as a Percent of the Change in Producers' Surplus	
			Existing Policy	Deficiency Payment Policy
		Mill AS	%	%
Wheat	1964	28	1.9	0.5
	1965	135	9.3	2.1
	1966	100	5.5	1.2
	1967	430	14.3	3.5
Rye	1964	63	7.7	1.9
	1965	59	9.1	2.0
	1966	60	8.6	1.9
	1967	184	19.9	4.5
Sugar	1964	500	8.3	5.8
	1965	676	17.8	12.4
	1966	1,268	22.5	15.6
	1967	818	18.3	12.7
Butter	1964	292	10.8	3.6
	1965	424	13.5	4.6
	1966	473	15.6	5.2
	1967	464	13.3	4.5
Cheese	1964	83	3.4	1.3
	1965	70	2.6	1.0
	1966	142	4.5	1.8
	1967	308	9.3	3.8
Pork	1964	822	6.7	1.5
	1965	1,101	10.6	2.1
	1966	942	10.1	1.8
	1967	x	9.2	1.8
Poultry	1964	193	54.67	1.5
	1965	170	50.40	13.8
	1966	143	36.27	10.6
	1967[a]	x	47.11	12.9
Eggs	1964	324	8.85	3.7
	1965	190	8.37	4.3
	1966	256	8.46	3.5
	1967	x	8.56	3.9

Table 12, cont.

		Change in Producers' Surplus	Costs as a Percent of the Change in Producers' Surplus	
			Existing Policy	Deficiency Payment Policy
		Mill AS	%	%
Feed grain livestock sector	1964	1,723	10.9	3.8
	1965	1,835	11.7	3.9
	1966	1,739	9.7	3.1
	1967		10.8	3.6
All commo-dities	1964	2,699	10.1	4.0
	1965	3,200	12.9	5.6
	1966	3,792	14.4	7.4
	1967	x	12.5	5.7

x: Data not available

[a]Average of previous three years

was AS 0.14 under the existing policy but would have been only AS 0.03 under a deficiency payment system. Josling[7] calls this amount a "bribe" to factors to induce their entry into the particular industries. This amount has to be below the social valuation of agricultural production in the specific sector in order to be politically justifyable.

ii) Welfare Cost of Protection and Exchange Saving

Figure 7 indicates that protective measures result in saving of foreign exchange necessary to buy imports. These savings are characterized by area ($F+F^1$) under the existing policy or by area (F) under a deficiency payment.

Since discussion on protective measures include very often the balance of payment effects of certain policies it is useful to look at the welfare cost also in terms of foreign exchange.

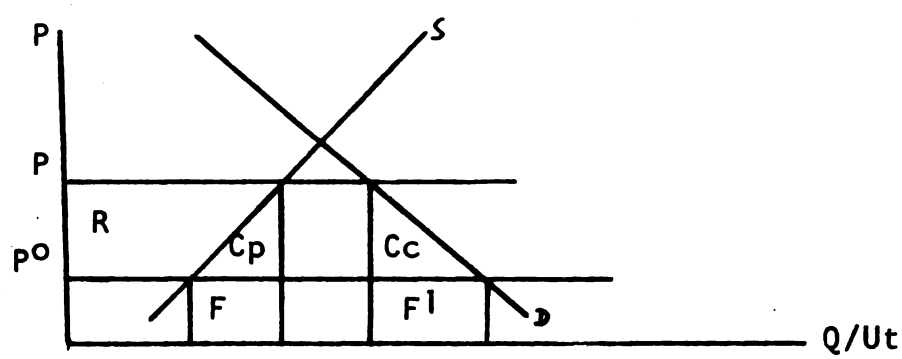

Figure 7. Welfare Cost and Exchange Saving

[7]T. Josling, "A Formal Approach to Agricultural Policy, Journal of Agric. Econ., XX (Mai, 1969), p. 178.

Figure 7 indicates that the average welfare cost of saving one unit of foreign exchange is E where

$$E = \frac{(C_p + C_c)}{(F+F^1)}$$ under the existing policy and

$$E = \frac{C_p}{F}$$ under a deficiency payment.

Transforming this into numerical values yields

$E = \frac{t}{2}$ for <u>both</u> policies where

t = ad valorem tariff = $\frac{P - P_o}{P_o}$

It is now obvious that a deficiency payment uses more foreign exchange absolutely but that the average cost in terms of gains are the same for both policies.

Josling[8] shows that it is possible to find values for the marginal welfare cost of income transfer and exchange saving. These values are similar to the average welfare cost with respect to their tendency but they give a more accurate picture of the situation at the margin of the protective level. The lack of applicable short run elasticities, however, excludes the marginal cost approach.

The preceeding calculations have shown that a deficiency payment policy can be operated at a considerable lower welfare cost to the total economy. Although the difference in percentage of National Income is insignificant there appears to

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[8] <u>Ibid</u>., p. 176.

be a large enough difference between the two policies (if the average costs of income transfer are compared) in order to justify the use of this difference as a policy parameter. The analysis allows the comparison between both the policies and the commodities under question.

CHAPTER V

Summary and Conclusions

Problem

Austria--a member country of EFTA--has been adjusting her agricultural policy over the last decade to facilitate an association with the EEC. Agricultural production faces similar structural problems as they are still prevalent in many regions of the EEC: Small farm size, fragmentation, inefficient farmstead layout, an insufficient internal and external transportation network, and the age structure of the agricultural population are just some of the structural imperfections to be mentioned here. Most of these structural problems are intensified by the fact that a large part of agricultural production takes place in the mountain and hill region.

Past agricultural policies, specially the recent adaptation to the EEC standard, have improved the structure of Austria's agriculture. They could not solve the problem of farm income in a satisfactory way and they had the disadvantage of holding food prices above the world market level. Technology and high prices have increased the level of self sufficiency to a stage of excess supply, thus increasing the tax payer's responsibility to finance export subsidies for several commodities.

Austria's grain policy has been characterized by a mixture of a variable levy system and a deficiency payment system but is now undergoing a change in the direction of adopting a "pure" variable levy system, mainly to fit the EEC pattern. Milk and milk products have been supported on the wholesale level in order to establish a "reasonable" consumer price. Also, these payments have been reduced recently and resulted in an increase of the consumer price. Most other products are administered in a fashion analogous to a variable levy system.

The question arises whether this policy of variable levies comes as close as possible to an optional policy solution. This paper tries to evaluate the existing policy against a "pure" deficiency payment system regarding solely the welfare cost of protection.

Methodology

A partial equilibrium model, with all its limitations, offers the most fruitful approach to determine the implicit social cost of any protective policy. These welfare costs do not show up in private or public cost calculation but they are borne by the economy as a whole in form of resources used (or mis-allocated?). The economic explanation of welfare cost of protection bases mainly on Marshall's concept of producers' and consumer's surplus. Their relationship with

budget cost and tariff revenue is analyzed in Chapter III. It proved to be useful to expand the simple case of a "One Import Good" model to a "More Than One Import Good" model and to a "Final and Intermediate Good" model. The expansion was necessary in order to take account of the interrelationship between substitutable products and especially to cover the case where factors of production and final products are under some level of protection. Equations 6 , 11 and 15 give the final equation for the welfare cost of protection in the three cases under consideration. Each of the equations indicates that the welfare cost of protection is a function of the price elasticities of demand and supply of domestic production and consumption and of the height of the tariff.

The objectives of the study were to examine eleven major agricultural commodities in terms of their welfare cost under the existing policy and under a deficiency payment system for the period between 1964 and 1967. The lack of applicable internally consistent Austrian or European elasticities necessitated the use of elasticity values calculated for the U.S. of the 1950's. The time lag and their consistency were the main justification of their use. Data on domestic prices, production and consumption were obtained from Austrian national statistics. Since the equivalent tariff concept was used it was necessary to employ applicable world market prices. For most commodities it was assumed that the value

of imports divided by the quantity of imports will yield a usable world market price, free Austrian boarder. It is obvious that the accuracy of the final result depends largely upon the reliability of elasticities and import prices.

To find suitable tariff levels for the "Final and Intermediate Goods" model it was felt that existing welfare cost studies could be improved by the use of the effective tariff concept. A more detailed exposition of the analytical tools used in this study is outlined in Chapter III. Further data on production and consumption needed to compare demand and supply at the same marketing level are discussed in the text and in the appendices.

Results

The obtained values for the welfare cost of protection corresponded with the predictions of the models. In all models and for all commodities it could be shown that the cost of a deficiency payment scheme is considerably below the cost of the existing policy. The welfare cost of a deficiency payment system was during the period 1964-1967 between 146 and 382 million Austrian Schillings for a deficiency payment and between 353 and 644 million Austrian Schillings for the existing policy. Inflation is a partial explanation for the rise in welfare cost in both policies during the four years considered.

Past experience has shown that the absolute cost figures have little meaning in policy discussions. Welfare costs of protection constitute only a small fraction of National Income, (Table 11). The values gain significance, however, if they are compared with the income transferred to producers due to the protective measure (Table 12). The analysis shows a considerably lower average welfare cost of income transfer under the deficiency payment policy. Average welfare costs of exchange saving are the same under both policies and are not further pursued. Marginal welfare costs of income transfer and exchange saving would aid an even more relevant comparison of the cost of protection. The lack of accurate elasticities, however, does not justify a further expansion of the calculation.

Table 12 shows that the average cost of transfering AS 1.00 to the Austrian agricultural producers (average over all commodities) ranges between AS 0.10 and AS 0.14 under the existing system but only between AS 0.04 and AS 0.07 under a deficiency payment policy. The values for sugar and poultry meat are considerably above this average.

Conclusions

It was possible to show that a deficiency payment system policy could be operated considerably more effective than the existing policy. The superiority has been manifested in

terms of absolute welfare cost but also in terms of average welfare cost of income transfer.

One has, however, to be aware of the fact that a change in the policy system may necessitate also a change in the administrative system. Costs connected with these changes have not been considered in the analysis. Welfare costs of protection are economic costs and thus they can and should be only one segment of the set of values underlying the public decision making process. The past, however, has shown that the importance of the welfare cost concept has been neglected --mainly due to ignorance.

Many policy experts regard the absolute amount of budget payments and the absolute amount of foreign exchange saved as the significant parameters for policy discussions. From this, some reasoned that unless the agricultural population has dropped to less than four to five percent, it is politically and economically infeasible to administer a deficiency payment system.[1] Recent research has shown that economic analysis can provide more than purely intuitive arguments as to which kind of protective system should be employed to gain optimum social benefits. This research attempts to prove the feasibility of a practical application of a theoretical model in order to gain more useful policy parameters. Improved availability and accuracy of data

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[1] T. van Lierde, Europese Landbouwproblemen En Europese Landbouwpolitiek (Antwerpen: Standaard Wetenschoppelyke Uitgeverij, 1967), p. 74.

would tend to facilitate the calculation of marginal welfare costs of income transfer and of marginal costs of exchange saving along the lines proposed by T. Josling.[2] This procedure provides the possibilities of examining marginal costs of the policies under question and proposes a mix of these policies as the optimization of the welfare cost of protection.

With existing and possible future improvements in the welfare cost analysis it is advisable to regard the results of this research as a step towards a more complete policy tool rather than as a final product. The present paper, however, gives ample indication that a deficiency payment policy saves domestic resources and this very argument questions the usefulness of Austria's move towards a stricter variable levy policy.

The paper, therefore, suggests that a move of the EEC variable levy policy towards some kind of deficiency payment system embodied partially in the previous Austrian policy mix would have achieved a position closer to the optimum policy than it is possible under the present setting.

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[2]T. Josling, "A Formal Approach to Agricultural Policy", Journal of Agricultural Economics, XX (Mai, 1969), p. 188.

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APPENDICES

APPENDIX A

Conversion Rates Used

A. Conversion factors of meat production from carcass weight into live weight:

Pork - 1.24

Poultry - 1.39

Source: FAO Production Yearbook, 1968, (Rome: FAO, 1968), p. 670.

B. Eggs:

1 kg. eggs = 18,182 eggs

Source: Calculated from FAO Production Yearbook, 1968, (Rome: FAO, 1968), p. 393.

C. Exchange rates:

1 Austrian Schilling = 1 A.S. = 1S = $U.S. 0.0384

1 $U.S. = 26 S = 4 DM

Source: International Financial Statistics, Vol. 22, No. 1., Jan., 1969, p. 49.

APPENDIX B

Sources of Statistical Data

A: Statistisches Handbuch Fuer Die Republik Oesterreich 1968 (Vienna: Oesterreichs Statistisches Zentralamt, 1968).

B: Statistische Nachrichten (Vienna: Oesterreichisches Statistisches Zentralamt).

C: Der Aussenhandel Oesterreichs (Vienna: Oesterreichisches Statistisches Zentralamt).

D: Landwirtschaftlicher Paritaetsspiegel (Vienna: Land und Forstwirtschaftliche Landes-Buchfuehrungs-Gesellschaft m.b.H.).

E: FAO Production Yearbook 1967 (Rome: FAO, 1968).

F: FAO Trade Yearbook 1967 (Rome: FAO, 1968).

G: Handbuch Der Oesterreichischen Getreidewirtschaft (Vienna: Getreideausgleichsfonds, 1967).

H: Agrarpreise (Brussels: Statistisches Amt Der Europaeischen Gemeinschaften).

I: OECD, Food Consumption Statistics 1954-1966, (Paris: OECD, 1968).

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APPENDIX C

Table C1. Sources of Statistical Data in Tables C2-C4 Coded According to Appendix B

		Domestic Production	Domestic Price	Imports & Exports and Import Price c.i.f. Austrian Border	Import Price c.i.f. London	Import Price c.i.f. Rotterdam	Import Price c.i.f. Germany	Import Price c.i.f. Switzerland	FAO Export Unit Value	Wholesale Price London 1st Quality
Wheat	1964-66	E: p 35	B	C		H			K	
	1967	A: p 69	B	C		H			K	
Rye	1964-66	E: p 41		C						
	1967	A: p 69		C						
Barley	1964-66	E: p 44	A: p 68	C		H			K	
	1967	A: p 69	A: p 68	C		H			K	
Corn	1964-66	E: p 55	A: p 68	C		H			K	
	1967	A: p 69	A: p 68	C		H			K	
Oats	1964-66	E: p 59	A: p 68	C		H				
	1967	A: p 69	A: p 68	C		H				
Sugar	1964-67	A: p 476	B	C	H		F	F		
Butter	1964-66	A: p 470	B	C					K	H
	1967	A: p 82	B	C					K	H
Cheese	1964-66	A: p 471	B	C					K	
	1967	A: p 82	B	C					K	
Pork	1964-67	E: p 339	B	C	H					
Poultry	1964-67	E: p 328	D	C					K	
Eggs	1964-67	E: p 383	B	C						

Table C2. Quantitites and Values of Production, Consumption and Trade

		Domestic Production	Domestic Price	Domestic Production	Imports		Exports		IM-EX	Domestic Consumption
		1,000 tons	$/metric ton	Mill $	metric tons	1,000 $	metric tons	1,000 $	1,000 $	Mill $
Wheat	1964	751	2,104	1,580	45,890	100,320	16	80	100,240	1,680
	1965	661	2,104	1,391	94,131	177,147	16	71	177,076	1,568
	1966	897	2,104	1,887	107,849	206,164	12	54	206,110	2,093
	1967	1,045	2,476	2,587	20,382	43,660	32,203	52,628	-2,968	2,585
Rye	1964	388	1,891	734	23	99	5	20	79	734
	1965	316	1,891	598	45,286	76,973	-	-	76,973	675
	1966	363	1,891	686	65,762	113,335	-	-	113,335	799
	1967	377	2,260	852	50,989	89,201	2	8	89,201	941
Barley	1964	605	2,297	1,390	233,337	414,387	330	1,061	413,326	1,803
	1965	523	2,362	1,235	311,235	596,919	411	1,502	595,417	1,830
	1966	706	2,402	1,695	245,788	508,656	26	88	508,568	2,204
	1967	772	2,417	1,866	165,909	311,018	21	89	310,929	2,177
Corn	1964	212	2,076	440	397,281	671,427	1,839	8,768	662,659	1,103
	1965	187	2,148	402	397,774	675,839	1,349	6,428	669,411	1,071
	1966	275	2,178	599	345,598	609,391	804	4,230	605,161	1,204
	1967	316	2,268	716	190,877	312,651	1,638	10,078	302,573	1,019
Oats	1964	327	1,910	625	3,191	6,134	-	-	6,134	631
	1965	274	2,042	559	42,430	78,430	-	-	78,041	637
	1966	325	2,053	667	31,011	57,524	-	-	57,524	725
	1967	336	1,948	655	29,888	52,505	-	-	52,505	708
Sugar	1964	333	6,260	2,084	4,658	38,402	310	2,764	35,638	2,120
	1965	235	6,260	1,471	11,457	53,570	67	1,174	52,396	1,523
	1966	367	6,260	2,297	25,699	71,353	212	1,949	69,410	2,366
	1967	X	6,260	X	14,236	56,188	42	742	55,466	X
Butter	1964	42	34,720	1,458	1,055	26,266	3,760	90,496	-64,230	1,394
	1965	45	36,290	1,633	-	-	5,780	131,018	-131,018	1,502
	1966	45	37,070	1,668	-	-	3,729	80,562	-80,562	1,587
	1967	45	37,070	1,519	-	-	5,187	160,284	-106,284	1,413
Cheese	1964	44	23,970	1,054	3,626	77,630	9,792	216,063	-138,433	916
	1965	48	25,700	1,234	3,277	75,517	11,241	272,381	-196,864	1,037
	1966	49	26,560	1,301	3,543	82,557	12,166	287,311	-204,754	1,096
	1967	49	29,930	1,467	3,511	76,907	14,150	331,155	-254,248	1,213
Pork	1964	288	17,583	5,063	10,428	152,876	249	5,960	146,916	5,210
	1965	298	17,236	5,136	13,173	172,778	3,979	47,498	125,280	5,261
	1966	258	20,138	5,195	34,057	525,052	25	980	524,072	5,719
	1967	X	19,803	X	17,572	269,042	322	9,668	259,374	X
Poultry	1965	40	25,500	1,017	11,078	176,847	3	1,057	175,790	1,193
	1966	34	24,500	828	11,260	177,798	7	1,791	176,007	1,004
	1967	39	23,000	904	12,479	214,879	18	4,286	210,593	1,115
	1968	X	23,100	X	12,338	182,798	16	3,665	179,133	X
Eggs	1964	90	17,273	1,563	14,164	177,019	54	2,006	175,013	1,738
	1965	81	18,364	1,489	17,021	252,916	40	1,585	251,331	1,740
	1966	78	18,000	1,399	20,172	271,332	58	3,033	268,299	1,667
	1967	X	17,818	X	19,187	235,813	223	13,009	222,804	X

X: not available -: value is insignficant or zero Source: See Table C1

Table C3. Imports, Exports and Import Prices for Pork and Poultry[a]

		IMPORTS[b]		EXPORTS[b]		IM-EX	Import price c.i.f Austrian Boarder
		Tons[c]	1,000 S	Tons[c]	1,000 S	1,000 S	S/Ton[c]
1964	Pigs (in carcass weight)	8,062	118,866	164	4,122		14,743
	Pork	2,366	34,010	85	1,838		14,374
	Total pork	10,428	152,876	249	5,960	146,916	14,558
1965	Pigs (in carcass weight)	9,845	131,143	1,715	18,591		13,321
	Pork	3,328	41,625	2,264	28,907		12,507
	Total pork	13,173	172,788	3,979	47,498	125,280	12,914
1966	Pigs (in carcass weight)	26,623	403,896	4	198		15,170
	Pork	7,434	121,156	21	782		16,297
	Total pork	34,057	525,052	25	980	524,072	15,733
1967	Pigs (in carcass weight)	10,419	154,989	296	8,657		14,875
	Pork	7,152	114,053	26	1,011		15,947
	Total pork	17,572	269,042	322	9,668	259,374	15,411
1964	Poultry (in carcass weight)	31	3,603	3	1,040		
	Poultry	11,047	173,244	-	17		15,682
	Total poultry	11,078	176,847	3	1,057	175,790	
1965	Poultry (in carcass weight)	4	3,530	7	1,776		
	Poultry	11,256	174,268	-	15		15,481
	Total poultry	11,260	177,798	7	1,791	176,007	
1966	Poultry (in carcass weight)	18	6,072	18	4,266		
	Poultry	12,461	208,807	-	16		16,756
	Total poultry	12,479	214,879	18	4,286	210,593	
1967	Poultry (in carcass weight)	11	6,409	16	3,652		
	Poultry	12,327	176,389	-	13		14,308
	Total poultry	12,383	182,798	16	3,665	179,133	

[a]To convert quantities from live weight into carcass weight the FAO conversion factors (pork-1.24 and poultry-1.39)have been used.

[b]Source: see Table C1

[c]Metric Ton

Table C4. Domestic and Import Prices[a]

		Domestic Price	Import Price c.i.f. Austrian Border	Import Price c.i.f. London	Import Price c.i.f. Rotterdam	Import Price c.i.f. Germany	Import Price c.i.f. Switzerland	FAO Export Unit Value	Wholesale Price London 1st Quality	World Market Price Used
		S/Ton[b]	S/Ton[b]	S/Ton[b]	S/Ton[b]	S/Ton[b]	S/Ton[b]	S/Ton[b]	S/Ton[b]	S/Ton[b]
Wheat	1964	2,104	2,186		1,913			1,719		2,066
	1965	2,104	1,882		1,755			1,586		1,895
	1966	2,104	1,912		1,834			1,643		1,980
	1967	2,476	2,436		1,865			1,708		2,014
Rye	1964	1,891	1,724							1,724
	1965	1,891	1,700							1,700
	1966	1,891	1,723							1,723
	1967	2,260	1,749							1,749
Barley	1964	2,297	1,776		1,526			1,464		1,776
	1965	2,362	1,918		1,562			1,625		1,918
	1966	2,402	2,069		1,702			1,807		2,069
	1967	2,417	1,875		1,683			1,745		1,875
Corn	1964	2,076	1,690		1,566			1,422		1,690
	1965	2,148	1,699		1,616			1,487		1,699
	1966	2,178	1,763		1,632			1,492		1,763
	1967	2,268	1,638		1,602			1,463		1,638
Oats	1963	1,910	1,922					1,433		1,910
	1965	2,042	1,839					1,477		1,839
	1966	2,053	1,855					1,619		1,855
	1967	1,948	1,757					1,476		1,757
Sugar	1964	6,260	8,244	3,692		4,453	4,823			4,640
	1965	6,260	4,676	1,540		2,284	2,108			3.025
	1966	6,260	2,777	1,280		2,139	1,869			2,264
	1967	6,260	3,946	1,358		X	X			X
Butter	1964	34,720	24,065					23,296	27,508	27,508
	1965	36,290	22,669					23,548	26,425	26,425
	1966	37,070	21,604					21,356	26,000	26,000
	1967	27,070	20,490					20,823	26,299	26,299
Cheese	1964	23,970	22,066					19,861		22,065
	1965	25,700	24,231					21,892		24,231
	1966	26,560	23,616					22,550		23,616
	1967	29,930	23,403					22,820		23,403
Pork	1964	17,483	14,558	17,192						14,558
	1965	17,236	12,914	15,769						12,914
	1966	20,138	15,733	18,148						15,733
	1967	19,803	15,411	16,906						15,411
Poultry	1964	25,500	15,682					17,396		15,682
	1965	24,500	15,481					18,031		15,481
	1966	23,000	16,756					17,440		16,756
	1967	23,100	14,308					17,485		14,308
Eggs	1964	17,273	12,497							12,497
	1965	18,364	14,859							14,859
	1966	18,000	13,450							13,450
	1967	17,818	12,289							12,289

X: Not available

[a]Source: See Table C1

[b]Metric Ton

Table C5. Calculated Tariffs

	Gross Specific Tariff S/Ton	Gross Percentage Tariff	Gross Ad Valorem Tariff
Wheat			
1964	38	0.02	
1965	209	0.10	
1966	124	0.06	
1967	426	0.17	
Rye			
1964	166	0.09	
1965	191	0.10	
1966	168	0.09	
1967	511	0.22	
Barley			
1964	521	0.23	
1965	444	0.19	
1966	333	0.14	
1967	542	0.22	
Corn			
1964	386	0.19	
1965	449	0.21	
1966	415	0.19	
1967	630	0.28	
Oats			
1964	000	0.00	
1965	203	0.09	
1966	198	0.10	
1967	191	0.10	
Feed Grains			
1964	348	0.16	0.19
1965	397	0.18	0.22
1966	315	0.14	0.16
1967	479	0.21	0.27
Sugar			
1964	1,620	0.26	
1965	3,235	0.52	
1966	3,996	0.64	
1967	X	X	

Table C5, Cont'd

	Gross Specific Tariff S/Ton	Gross Percentage Tariff	Gross Ad Valorem Tariff
Butter			
1964	7.212	0.21	
1965	9.865	0.27	
1966	11.070	0.30	
1967	10,771	0.29	
Cheese			
1964	1.904	0.08	
1965	1,469	0.06	
1966	2,944	0.11	
1967	6,527	0.22	
Pork			
1964	3,025	0.17	0.20
1965	4,322	0.25	0.33
1966	4,405	0.22	0.28
1967	4,392	0.22	0.28
Poultry			
1964	9,818	0.38	0.61
1965	9,019	0.37	0.59
1966	6,244	0.27	0.37
1967	8,792	0.38	0.61
Eggs			
1964	4,776	0.28	0.39
1965	3,505	0.19	0.23
1966	4,550	0.25	0.33
1967	5,529	0.31	0.45

X: Not available.

Table C6. Marketing Margins and Price Ratios Between Marketing Levels

		Percent						
		Cereals	White Bread	Butter	Cheese	Pork	Chicken	Eggs
A	Farm-Wholesale Price Spread as Percentage of Farm-Retail Price Spread[a]		78	64	65	52	52	61
B	Wholesale-Retail Price Spread as Percentage of Farm-Retail Price Spread[a]		22	36	35	48	48	39
C	Farmers' Share in Retail Price[b]	25		48	48	49	55	60
D	Farm-Retail Price Spread as Percentage of Retail Price = (100-C)	75		52	52	51	45	40
E	B % of D	17		19	18	24	22	16
F	(Wholesale Price): (Retail Price) = (100-E):100	0.83		0.81	0.82	0.76	0.78	0.84
G	(Wholesale Price): (Farm Price) = (100-E): (100-C)	1.11	1.56	1.58	1.59	1.73	2.10	

[a]Calculated from: National Commission on Food Marketing, Cost Components of Farm-Retail Price Spreads for Foods, Technical Study No. 9 (Washington: U.S. Government Printing Office, June 1966), pp. 33-53.

[b]Source: Personal Communications with Dr. V. Sorenson, Prof., of Agricultural Economics, Michigan State University.

Table C7. Price Elasticities of Supply

	At Farm Level[a]	$P_w:P_f$	At Wholesale
Wheat	0.370	1.11	0.41
Feed grains	0.430	1.03[b]	0.44
Butter	0.212	1.56	0.33
Cheese	0.212	1.58	0.33
Pork	0.130	1.49	0.19
Poultry	0.678	1.73	1.17
Eggs	0.298	1.16[c]	0.35

[a]Source: W.A. Cromarty, An Econometric Model for United States Agriculture, Journal of American Statistical Association, Vol. 54 (September 1959), p. 573.

[b]Calculated from: Getreideausgleichsfonds, Handbuch der Oesterreichischen Getreidewirtschaft (Vienna: Getreideausgleichsfonds, 1967,) p. 370.

[c]Calculated from: Oesterreichisches Statistisches Zentralamt, Statistisches Handbuch Fuer Die Republik Oesterreich (Vienna: Oesterreichische Staatsdruckerei, 1968), p. 68 and p. 142.

Table C8. Price Elasticities of Demand

	At Retail[a]	$P_w:P_r$	At Wholesale		At Farm Level[b]
Cereals	-1.500	0.83	-1.24	Wheat	-0.021
Sugar[b]	-	-	-0.18	-	-
Butter	-0.850	0.81	-0.69	Milk for butter	-0.665
Cheese	-0.700	0.82	-0.57	Milk for cheese	-0.536
Pork	-0.750	0.76	-0.57	Hogs	-0.458
Chicken	-1.160	0.78	-0.90	Chicken	-0.737
Eggs	-0.300	0.81[c]	-0.24	Eggs	-0.233

[a]Source: G. E. Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Study, Penn. State Univ. Agric. Experiment Station Bulletin 680 (Univ. Park, Penn., 1961), p. 17.

[b]Source: Ibid., p. 59.

[c]Calculated from: Oesterreichisches Statistisches Zentralamt, Statistisches Handbuch Fuer Die Republik Oesterrerich, (Vienna: Oesterrerichische Staatsdruckerei, 1968), p. 144 and p. 264.

Table C9. Cross Elasticities of Demand

Quantities Demanded of	Retail Prices Of			Wholesale Price Of		
	Pork	Chicken	Eggs	Pork	Chicken	Eggs
Pork	-	0.066	0.003	-	0.051	0.002
Chicken	0.157	-	0.003	0.119	-	0.002
Eggs	0.010	0.011	-	0.008	0.009	-

Source: G. E. Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Supply, Penn. State Univ. Agric. Exper. Station Bul. 680, (Univ. Park, Penn., 1961), p. 17.