

Grain Cartel How Realistic a Threat?

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Abstract. During the past decade, both producing and consuming nations have become increasingly concerned about the interaction between broad foreign policy objectives and international trade in commodity. The proposed formation of an export cartel in food and feed grain has generally taken place in response to large increase in oil prices during the 1970s. While the idea of a grain cartel has been defeated in many wheat exporting countries, its support persists. Would a cartel of the major wheat exporting countries control world wheat supplied and threaten food security in the importing countries.?

The aim of this paper is to provide intuitive reasons which shows that such fears from wheat cartel by the major wheat exporters are not realistic. It also focus on a key argument on why importer may well be exerting some power in trade.

Introduction

The main reason for the initiation of many countries' food security program was the fear of wheat embargo by the exporting countries. Many of us have heard statements such as "A bushel for a barrel". This statement suggest that the way in which food is produced, and distributed among the nations of the world is of critical importance. The proposed formation of an exporter cartel in food and feed grain, where exporters cooperate in the pricing and exporting of grain overseas, has generally taken place in response to large increases in oil prices during the 1970s. To a large extent, crude price increase due to the formation of the oil export cartel which has given rise to the "A bushel for a barrel" phrase. A grain export cartel which, if effective, would place the major grain exporters in a position to deal more effectively in international market and in essence command real prices for grain in line with the real prices of other key raw materials.

Government officials partly through jealousy of OPEC's success in enhancing export earning - are considering "food power" as a countervailing to rising crude oil

prices. However, on this issue it would be a mistake to argue that all the gains from a wheat cartel would come from OPEC nations. OPEC countries are very small wheat importers; hence, the gain from exporters acting as a cartel against them cannot be great (Table 1). Many grain cartel proposals are based on the notion of bartering U.S. wheat for oil produced by OPEC countries. Yet, an examination of the significance of wheat exports to OPEC nations reveals that the potential gains from such a cartel are limited. Data in Table 2 shows that U.S. exports of wheat, to OPEC countries are extremely low. In fact less than 20 percent of U.S. exports go to OPEC countries.

Table 1. Total world wheat production and OPEC wheat imports 1965-1988 (Million metric tons)

Year	World Wheat Production	OPEC wheat import
1965	264.3	1.8
1966	308.7	2.6
1967	297.3	2.5
1968	328.6	2.5
1969	309.8	2.7
1970	315.7	3.4
1971	348.7	5.2
1972	343.2	3.9
1973	372.4	5.8
1974	357.2	6.8
1975	350.4	6.8
1976	415.1	6.9
1977	382.7	8.8
1978	438.5	8.1
1979	442.3	8.4
1980	462.0	11.5
1981	453.8	10.8
1982	485.8	12.7
1983	488.9	14.4
1984	523.2	14.3
1985	505.7	14.7
1986	536.4	13.8
1987	514.8	NA
1988	NA	NA

- Sources.** 1. U.S. Foreign Agricultural Service, 1980, Foreign Production, Supply, and Distribution of Agricultural Commodities.
 2. Schmitz *et al.*, 1981, p. 86.
 3. FAO, Trade Yearbook, 1970-1987.

Table 2. U.S. wheat export to OPEC Price and percent of total wheat exports, 1965-1988

Year	U.S. Export to the World (mmt)	U.S. Export to OPEC (mmt)	Price per ton US\$	Percent
1965			59	NA
1966	18.2*		53	NA
1967			66	NA
1968	14.5		63	NA
1969	16.3		58	NA
1970	16.5		55	NA
1971	19.8		62	NA
1972	16.9		70	NA
1973	33.1	2.085	140	6.3
1974	27.7	4.127	180	14.9
1975	31.9	3.317	149	10.4
1976	25.8	2.709	133	10.5
1977	30.6	5.202	103	17.0
1978	32.5	4.81	128	14.8
1979	42.5		160	NA
1980	36.9		173	NA
1981	49.1		175	NA
1982	39.6		160	NA
1983	38.4		157	NA
1984	37.8		152	NA
1985	24.3	4.860	136	20*
1986	28.3	4.811	115	17*
1987			114	NA
1988			128	NA

- Source:**
1. Terpstra, A.E. 1979. "An Analysis of Possible Cartel and Barter Arrangements to Influence the Price and Availability of Wheat on the International Market". Unpublished paper, the Library of Congress, May 30, p. CRS-15.
 2. Grain export cartels 1981, p. 20.
 3. Statistical Abstract of the U.S. 1987, 107-108th Edition, U.S. Department of Commerce. Bureau of the Census.

NA not available

* Wheat and wheat flour

** Average for 1865 = 1967

Hypothesis to be Tested

This paper is intended to provide intuitive reasons which shows that such fears from wheat cartel by the major exporters are not realistic. The paper will focus on a key argument on why importer may well be exerting some power in trade. It also aims at testing the hypothesis that wheat market is nearly competitive, if that hypothesis were accepted, then fears from wheat embargo by the major exporters are not justified.

Review of Literature

Before 1972, the world wheat market was characterized by price stability and large inventories held by the two major producers and exporters, the United States and Canada, and after 1968/69, by Australia. Price formation in the world wheat market has been analyzed in an oligopolistic framework by McCalla and Taplin [1,2]. Their models are based on a collusive duopoly between the United States and Canada, with other producers either following the price set by the dupolists (with a discount for quality) or pricing sufficiently below to clear their current stocks.

Thomas Grennes and Paul Johnson are skeptical about the ability of oligopoly models to explain the behavior of world wheat prices, and oligopoly appears inappropriate in view of events since 1971 [3]. Attempted collusion by wheat exporters is not in dispute because there has been a continuous and overt effort to implement the various international wheat agreements since the 1930, and new agreement being negotiated in early 1979 and beyond. However, as empirical studies in industrial organization have shown the desire by firms or government to collude is not sufficient to achieve a price in excess of marginal cost. International wheat agreements has been not able for their failure to keep prices within the agreed range [4]. Because substantial barriers to wheat trade result in price differences across countries, the notion of a world wheat price is somewhat ambiguous. The U.S. price may be the best index of a world price because it is the largest exporter and the U.S. government has imposed the least trade control. The behavior of wheat prices since 1974 as shown in Table 1 is dramatic evidence of the lack of oligopoly discipline.

Oligopoly is a market structure lying somewhere between competition and monopoly. Presumably those observers who stress lack of competition describe the wheat market as oligopolistic rather than monopolistic because of the number of producers and the periodic occurrence of price wars. However, the more frequently price wars occur, the closer is the price to marginal cost and the closely the wheat market approaches competitive conditions.

Grennes and Johnson argue that price cutting has dominated monopoly pricing and that oligopoly is not a useful description of the wheat market. An example of this price behavior is the failure to enforce the minimum price provisions of International Wheat Agreement (IWA). The trend of real wheat prices has been downward since 1947 and the sharp fluctuation of prices in the 1970s cannot plausibly be explained by changes in market structure. It is well known that the wheat market is heavily regulated by governments at all levels of activity and many of these regulation result in misallocation of resources. Grennes and Johnson found that variation in world wheat prices is better explained by governmental policies than by changes in market structure. When governmental policies calls for export restriction, the resulting increase in foreign price is consistent with oligopoly behavior by exporting countries. How-

ever, when policy calls for export promotion, the resulting price decline violates oligopoly behavior.

Grennes and Johnson interpretation on policy is that governments restrict or promote wheat export depending on their domestic agricultural and international political goals rather than trying to maximize national income from wheat export which would result from oligopoly pricing.

A domestic wheat price above the competitive levels has been a traditional U.S. policy goal, and export promotion has been a technique for achieving this goal without resorting to direct payments, large inventories or production control. Export promotion has taken many forms such as concessionary sales, increase export quotas, export subsidies, or subsidized export credit. The dominance of domestic policy goals in agricultural trade policy has been stressed for decades by D. Gale Johnson, and evidence from the 1970s continues to support that hypothesis [2].

During period of downward pressure on world wheat prices, U.S. policy has tended to liberalize public law 480 shipment, increase export subsidies, and promote market development (sales to China). These and similar policies have resulted in export volume which depressed wheat prices below oligopoly levels.

Carter and Schmitz in their paper argue that world wheat prices are essentially determined by major wheat importers [5]. The authors believe the world wheat market is usually a buyer's market rather than a seller's market. It is well known that the major importers are restricting trade in wheat. Carter and Schmitz argue that the restrictive policies of the importers are likely to result in a welfare gain to importing nations greater than that under free trade (Table 3). This suggests that perhaps importing countries are using tariffs in an optimal sense rather than merely using them to protect domestic producers from low-priced competitive import.

Table 3. Welfare gains to wheat-importing nations with the imposition of the optimal import tariff

Welfare effect	Net gain million dollars (U.S.)
1. Loss in consumers' surplus	- 9,439
2. Gain in producers' surplus	5,971
3. Import triff revenue	7,202
4. Net gain (3 + 2 - 1)	3,734

Source: Schmitz *et al.*, p. 52

This is not to argue that a duopoly or triopoly structure does not exist among the U.S., Canada, and Australia but rather that the effect of such arrangement is minor relative to buying power exerted by importers.

Success and Failure of Cartels

What is a cartel?

A cartel is a combination of firms whose object is to limit the scope of competitive forces within a market [6]. The conditions under which a monopoly (cartel) can be successful in enhancing its position, relative to a free trade equilibrium, are as follows: [7]

- 1) The monopolist (cartel) must have control over all supply or at least a sufficiently high percentage of it so as to dominate the market.
- 2) The demand for the product should be relatively steep, which means that a large increase in price will result in a small reduction in quantity demanded. Steepness of demand or inelasticity results when a product has no close substitute.
- 3) Entry of new producers into the market must be blocked, or at least limited, so that they cannot enter and undercut monopoly (cartel) prices.
- 4) The monopolist (cartel) must have a clearly defined objective function such as maximizing profit or gross returns.
- 5) Buyers of the product are many and the size of any buyer should be sufficiently small and dispersed so that they cannot exercise countervailing market power.

If these conditions are generally met, a producer cartel is able to set prices via the management of supply in such a way as to maximize its joint profit.

There is a little but growing literature which has analyzed the actual experience of cartels. Eckbo [8], in a comprehensive study of OPEC, includes a review of the analysis of fifty-one cartels. He found that nineteen of the fifty-one arrangements were "successful" in raising price 200 percent above costs of production and distribution. The median duration of successful cartels was 4 years and the average duration, 6.6 years. Eckbo concluded:

Cartels were able to raise prices for four years or more, where concentration of production was high, demands inelastic, the cartel's market share was high, the membership had cost advantages over outsiders, and governments did not get involved in the cartel [8].

The early literature on cartels developed in the 1930s and 1940s was almost always couched in terms of manufactured products where control over production was possible because production units were large and output was not subject to random variability. More recent literature has devoted emphasis to primary product cartels [9,10]. This literature differentiates between nonrenewable resource cartels (for

example, OPEC), and renewable resource cartels. Clearly, it is much easier to deal with the former where one can assume a fixed supply of a resource, thereby leaving the basic problem as the time rate of exploitation. The difficulties of a renewable resource cartel where supply is variable, particularly in the long run, are not easily resolved. If one now adds the two additional factors relevant to grains—namely, that there are thousands of small, independent producers and that the vast majority of production is domestically consumed - the problems of organizing a cartel are theoretically more complicated [9,10].

The question of enforcement is equally difficult. If a cartel is formed and succeeds in raising prices by restricting output the temptation to defect is great. If one member leaves an effective cartel, presumably he is able to benefit from higher prices without the cost of supply reduction. Therefore, he is better off outside the cartel provided that the cartel remains in force and members do not retaliate. But if it is profitable for one to leave, it must also be profitable for others to do so; thus, the cartel breaks down [7].

As suggested above, successful cartels require the restriction and proper management of output; the cartel has to devise enforceable quota rules which allocate supplies among cartel members. The successful cartels, such as OPEC, seem to have resolved this problem or at least they succeeded in several times.

One of the reasons that oil is a more effective cartel than wheat is that OPEC can restrict oil exports without complaints from domestic producers, but the U.S., Canada and Australia can not restrict wheat export without strong resistance from wheat farmers. Thus the dominance of domestic policy goals eroded the potential oligopoly power of the major exporters (Table 4).

Table 4. US Exports as a percentage of production

	1970	1975	1979	1980	1981	1982
Wheat	52.8	55.5	60.6	57.5	60.1	56.6
Coarse Grains*	13.7	21.9	28.8	36.8	25.6	22.0
Rice (rough equivalent)	55.5	44.0	62.6	62.5	44.9	43.8
Peanuts	9.7	11.3	26.6	21.9	14.5	19.2
Soybeans	38.5	35.9	38.9	40.4	46.5	40.4
Cotton	36.4	38.9	61.0	52.8	41.4	...
Tobacco	33.4	29.9	45.1	36.4	33.8	...

Source: OECD National Policies and Agricultural Trade. Country study United States, 1987, pp. 141.

* Corn, oats, barley, sorghum.

Table 5 gives data on wheat market shares for the major exporters - the United States, Canada and Australia. Notice how the U.S. share increased during the 1970s. The reasons included differences in government policy among countries, varying degrees of investment in grain transportation facilities, and weather.

Table 5. Volume of export by major exporters 1973-1986, million tons

Year	U.S.	Canada	Australia	Total export by major exporters	Total world export
1973	33.1	11.4	5.6	51.6	67.3
1974	27.7	10.7	5.5	46.9	63.0
1975	31.9	12.2	8.1	52.7	63.5
1976	25.8	13.4	8.2	48.7	66.5
1977	30.6	16.0	8.4	55.0	61.0
1978	32.5	18.1	10.5	61.1	72.4
1979	42.5	16.7	12.0	71.2	93.1
1980	36.9	17.4	12.0	69.3	96.7
1981	49.1	17.9	11.0	78.0	98.8
1982	39.6	21.4	8.5	69.5	96.7
1983	38.4	21.8	10.5	70.7	100.2
1984	37.8	19.4	15.8	73.0	105.6
1985	24.3	16.7	16.1	57.1	84.3
1986	28.3	20.4	14.5	63.2	89.6

- Sources:**
1. Schmitz A.A., F. McCalla, D.O. Mitchell, and C. Carter. *Grain Export Cartels*; Cambridge MA: Ballinger publishing Co., 1981.
 2. FAO, Commodity Review and Outlook, Several Issues.
 3. FAO trade yearbook 1980-1986.

It is important to interpret the data in a historical perspective because of its direct bearing on the issue of quota allocation among countries. In response to existing trade barriers, countries such as Canada and the United States have generally managed and curtailed grain production. For example, Canada has limited grain production via production quotas, and acreage controls have been used in the United States. These policies have been used without explicit agreement among the countries on what type of policy to use and the extent to which production should be reduced. Thus, in part, the data in Table 5 reflect differences in government policy aimed at reducing grain supplies.

The market-share percentages change from year to year in large part due to the differences in production because of weather. Even if the percentages does not

change over time there is no reason to argue that an agreement on shares could be reached among exporters once the export price was agreed upon since adjustments would have to be made for weather phenomena which causes shares to fluctuate and makes it very difficult to allocate quota among countries [7].

The Wheat Market Structure

One must be careful in defining a market structure that is consistent with imperfect competition. On the face of it, there are far too many individual producers and consumers to apply any conventional model of imperfect competition to most agricultural market. However, if producers (or consumers) are organized into a small number of groups and within a group all producers (or consumers) actions are coordinated, then we have an oligopoly (or oligopsony) among a few cartels of producers (or consumers). A natural grouping is the nation (or for the EEC, several nations). Governments serve as coordinators of producers and consumers, looking after their interest as groups. The model then is of imperfect competition among nations. A few nations dominate the market from either the producing (U.S.A.) or consuming (U.S.S.R) side and set tariffs, price supports, quotas or other instruments to maximize the economic welfare of the producers (or consumers) they represent [1].

International trade in grains has grown rapidly over the postwar period, and this growth has been accompanied by significant changes in market structure. Fewer exporters provide grain to a growing and diverse set of importers (Table 6). Given

Table 6. The changing pattern of the world grain trade exports and imports^a of major cereals^b: 1934-1977 (million metric tons) •

Region	Year				
	1934-38 ^c	1947	1956	1967	1977
North America	+ 5	+ 23	+ 27	+ 51	+ 87
South America	+ 10	+ 3	+ 3	+ 3	+ 11
Oceania	+ 3	+ 1	+ 3	+ 8	+ 12
Western Europe	- 24	- 22	- 28	- 25	- 27
Eastern Europe and USSR	+ 5	n/a	+ 7	+ 2	- 16
Asia	+ 2	- 5	- 10	- 31	- 48
Africa	+ 1	+ 1	0	- 10	- 13

Source: Schmitz, *et al.* 1981, p. 7

a- plus sign denotes net exports; minus sign denotes net imports.

b- includes wheat, rice, barley, maize, rye, and oats.

c- an average for the period covering all the years, 1934 through 1938.

the prevalence of state trading and protective domestic agricultural policies, trade is heavily influenced by the decisions of national governments. It has become apparent within the past ten years that the world wheat market is increasingly becoming a buyer's market. Recently, the production of wheat by the major exporters has been increasing faster than world demand for it. This production increase has been due mainly to increase yields and has been most predominant in Australia and the U.S. In addition, the U.S.S.R. and E.E.C are expected to considerably reduce wheat imports because there have been substantial production improvements in the U.S.S.R. and the E.E.C. grain economy.

The development of high yielding varieties of wheat in less developed countries as part of the green revolution has also reduced their potential demand for wheat. It is wheat that has dramatized the green revolution. The increase in wheat production illustrates the potentials of an outstanding research breakthrough applied in a locale with an impressive indigenous experimental system, with scope for rapid expansion of an effectively irrigated area, and with a well-developed set of institutions and physical facilities for the efficient transmission of knowledge, production inputs, and output.

Dwarf wheat varieties were introduced in large number to be experiment stations of India in the winter season of 1963-64; widespread trials on farmers' fields occurred the next year; substantial import of seed was made in 1965-66; and, by the 1968-69 crop year, seeds of the improved varieties had been multiplied and were widely and amply available to farmers.⁽¹⁾ The 45 percent increase in wheat production from 1966-67 to 1967-68 signaled the beginning of the revolution (Table 7). From 1964-65 to 1970-71, wheat production rose by more than 90 percent per year, well over three times the total long-term growth rate for foodgrain. Sixty percent of the rise in foodgrain production between 1964-65 and 1970-71 was from wheat, though this grain comprised only 14 percent of the total output in 1964-65.

The rapid growth in wheat production was primarily the result of a sharp rise in yields per acre consequent to widespread application of the new dwarf varieties. This growth then increased the profitability of irrigated production, which in turn accelerated investment in acreage expansion.

On a national basis, wheat yields per hectare were boosted by 43 percent from 1964-65 to 1970-71, while acreage increased by 36 percent. Thirty-eight percent of

(1) For further discussion of the introduction and subsequent widespread use of the dwarf wheat and other improved varieties, see Carroll P. Streeter, *A Partnership to Improve Food Production in India*, a special report from the Rockefeller Foundation (New York: Rockefeller Foundation, December 1969), pp. 8-23.

Table 7. Production, area, yield and irrigated area for wheat, India, 1959-60 to 1973-74 (official estimates)

	Production	Gross area	Yield per hectare	Gross irrigated area	Percent of area irrigated	% of Total foodgrains production
	thousand tons	thousand hectares	Kgs.	thousand hectares		
1959-60	10,324	13,380	772	4,262	31.8	13.5
1960-61	10,997	12,927	851	4,233	32.7	13.4
1961-62	12,072	13,570	890	4,326	31.9	14.6
1962-63	10,776	13,590	793	4,593	33.8	13.4
1963-64	9,853	13,499	730	4,724	35.0	12.2
1964-65	12,257	13,422	913	4,945	36.8	13.7
1965-66	10,394	12,572	827	5,404	43.0	14.4
1966-67	11,393	12,838	887	6,125	47.7	15.3
1967-68	16,540	14,998	1,103	6,457	43.0	17.4
1968-69	18,651	15,958	1,169	7,772	48.7	19.8
1969-70	20,093	16,626	1,209	8,611	51.8	20.2
1970-71	23,832	18,241	1,307	9,829	53.9	22.0
1971-72	26,410	19,139	1,380	10,268	53.6	25.1
1972-73	24,735	19,464	1,271	n.a.	n.a.	25.4
1973-74	22,073	19,057	1,158	n.a.	n.a.	21.3

Source: Mellor, John W. *The New Economics of Growth, A Strategy for India and the Developing World*. Cornell University press, 1976, p. 300.

the gain in production in this period is attributed to increased acreage, and 62 per cent to higher yields [12]⁽²⁾.

The Second Green Revolution

The agronomic miracles that transformed under-nourished Asian nations into grain exporters are now merely a distant curtain raiser to a new era. Startling advances in biotechnology and genetic engineering have put us on the threshold of a second green revolution, a transformation of agricultural production that could go far in easing world hunger by the early 21st century.

How might such a dramatic development come to pass? The great agricultural strides of the last few decades grew largely out of traditional breeding techniques. A

(2) Calculated by multiplying the increase in area between 1964-65 and 1970-71, by the yield in 1964-65, and expressing that as a percentage of the total increase in production between 1964-65 and 1970-71, and attributing the rest of the increase in production to increase yield. The data used are from Table 7.

high-yield would be developed by crossbreeding related strains; the desired trait, once found, would thereafter be duplicated by simple reproduction. Today, by contrast, agricultural scientists can combine the genes of wholly unrelated species to engineer what is in effect a new plant – not just a mutation of a related strain.

Agricultural research has already shown its potential for improving the lot of at least some of the world's farmers – in fact, that much of the world faces the problems of what to do with a food surplus. As agricultural science moves into the 21st century, the prospects for new and better varieties of fruits, vegetables, grains and livestock look ever brighter. When the entire world has too much food, then the green revolution and its successor-to-be will have indeed achieved their potential [13].

It is widely assumed that the major exporters have considerable market power in influencing world wheat prices.⁽³⁾ If we consider the market processes involved and the way in which domestic grain price and trade policies have been set over the last fifteen years, it is possible to arrive at a quite different conclusion.

World grain prices are primarily set by policies in the major importing countries rather than in the exporting one. Evidence on this point is provided by Carter and Schmits [5] who show that there is a reasonable basis to conclude that major importers have more market power than exporters.

The international market for grains is both complex and highly unstable, millions of producers and consumers, along with hundreds of firms. The grain trade is characterized by a greater number of importers than exporters. There are more than fifty countries that import grain, and each single importer buys a very small percentage of wheat each year compare to total volume of export.

The market is unstable largely because of weather and government policy, weather variations do affect supply and thus cause fluctuations in both export volume and prices. There are several interesting structural characteristics of the world grain trade today:

- 1) In 1986 three major exporters (the U.S., Canada, Australia) accounted for over 70 percent of world wheat exports (Table 5).
- 2) World wheat production grew significantly over the period 1960-1986. World production data are presented in Table 8, world wheat production increased by

(3) A theoretical analysis of price formation in the world wheat market has been presented by McCalla; Taplin; and Alaouze, Watson, and Sturgess. McCalla and Taplin based their models on a duopoly arrangement between the United States and Canada. These models were extended by Alaouze, Watson, and Sturgess to include Australia, and a theoretical model of triopoly pricing in the world wheat market was developed. Canada is assumed to act as a price leader in the triopoly, and it is concluded that producer prices in wheat exporting countries will be higher under triopoly as opposed to duopoly pricing [1,2,14].

83 percent over the period 1960-78. Most of the growth in production resulted from yields which increased from 1.18 to 1.94 tons per hectare as shown in Table 8.

Table 8. World wheat production 1960-1978

Year	Wheat		
	Area harvested (million hectares)	Production million (mt)	Yield mt/hect
1960	202.9	239.4	1.18
1961	202.4	226.4	1.12
1962	207.1	255.8	1.24
1963	206.6	237.8	1.15
1964	215.8	274.7	1.27
1965	216.2	264.3	1.22
1966	214.6	308.7	1.44
1967	219.3	297.3	1.36
1968	224.2	328.6	1.47
1969	217.8	309.8	1.42
1970	207.0	315.7	1.52
1971	212.9	348.7	1.64
1972	210.8	343.2	1.63
1973	216.8	372.4	1.72
1974	219.9	357.2	1.62
1975	225.2	350.4	1.56
1976	232.3	415.1	1.79
1977	225.7	382.7	1.70
1978	225.9	438.5	1.94

Source: Schmitz *et al.*, 1981, p. 62.

- 3) The U.S. production market share has been diminishing since 1981. This could result from international competition that forced the U.S. to cut back production or due to weather variations which caused production to fall (Table 9).
- 4) Global averages obscure the fact that the importance of the international market is different for exporters and importers and among importers. Among the three major exporters, Canada and Australia export, on the average, well over 70% of their production, while the United States in most years exports over 50 percent of production. Thus, for the major wheat exporters, the international market represents a significant component of total production as shown in Table 5,10.
- 5) The market share data presented in Table 5 are important because they suggest that there might be little difficulty in forming a cartel because of the small

Table 9. Total world wheat production and percent of U.S. production 1965-1987 in million of tons (M/T)

Year	(1)	(2)	(3)
	Total world wheat production (m/t)	U.S. wheat production (m/t)	Percent of U.S. production to total world
1965	264.3	39.4	15
1966	308.7	39.4	13
1967	297.3	39.4	13
1968	328.6	42.9	13
1969	309.8	39.7	13
1970	315.7	37.3	12
1971	348.7	37.5	11
1972	343.2	44.1	13
1973	372.4	42.1	13
1974	357.2	48.9	14
1975	350.4	58.1	17
1976	415.1	58.4	14
1977	382.7	55.4	15
1978	438.5	48.9	11
1979	442.3	58.1	13
1980	462.0	64.5	14
1981	453.8	75.8	17
1982	485.8	75.3	16
1983	488.9	65.8	14
1984	523.2	70.6	14
1985	505.7	66.0	13
1986	536.4	56.9	11
1987	514.8	57.3	11

- Sources:**
1. Commodity Review and Outlook, FAO Economic and Social Development Series 1972-1988, several issues.
 2. Primary commodities, market development and outlook. IMF, Washington, D.C. several issues, 1972-1988.
 3. FAO quarterly bulletin of statistics, several issues. Food and Agricultural Organization of the United Nation. Rome, 1987.

number of countries which make up the export trade. These data shed light on the problems associated with effectively implementing an export cartel. For example, an argument can be made that the more instability which market shares exhibit through time, the greater is the difficulty of major exporters agreeing on a marketing strategy.

- 6) Wheat production and percentage market shares for major wheat producers are presented in Table 10. The United States is consistently the largest wheat producer accounting for approximately 14 percent of world production on average

Table 10. Wheat production, 1973-1988 by major producers in million of tons

Year	U.S.	Canada	Australia	Total wheat production by major producers	Production shares % by major wheat producers*
1973	42.1	14.5	6.5	63.1	17
1974	48.9	13.3	11.4	73.6	21
1975	58.1	17.1	12.0	87.2	25
1976	58.4	23.6	11.8	93.8	23
1977	55.4	19.7	9.4	84.5	22
1978	48.9	21.5	18.2	88.6	20
1979	58.1	17.2	16.2	91.5	21
1980	64.5	19.2	14.5	94.6	20
1981	75.8	24.8	16.4	117.0	26
1982	75.3	26.8	8.9	111.0	23
1983	65.8	26.6	22.0	114.4	23
1984	70.6	21.2	18.6	110.4	21
1985	66.0	24.3	16.2	106.5	21
1986	56.9	31.4	16.2	104.5	19
1987	57.3	26.1	12.2	95.6	17

- Sources:** 1. FAO Trade Yearbook 1978-1984.
 2. FAO Commodity Review and Outlook, several issues.
 3. International Wheat Council. Review of World Statistics. Various issues, 1970-1982.
 * % calculated by using data on table 9.

since 1973-1987. Canada's share about 5 percent of the market. Australia's share fluctuates, generally with production, between 3 and 4 percent of the market. The market share of the three producers decline from 26 percent in 1981 to 17 percent in 1987.

- 7) Most countries involved in the grain trade support domestic agriculture through price supports and the accompanying necessary trade restrictions; in fact, most countries isolate (completely or partially) domestic prices from world prices. It follows that grain policy is a political variable of significant magnitude in the domestic policy concerns of virtually all market participants which involves, among other things, attempts to export domestic price and production instability. Most countries try to prevent events in the international market from disrupting domestic objectives, and consider grain trading relations as diplomatic or international relations variables as well as commercial trade variables.

The world grain market could be a buyer's rather than a seller's market largely because of the existing surplus at the clearing market price and the small percentage of major producers compare to total world wheat production by other countries [15].

The structural characteristics listed above do prove that the world grain market is relatively competitive and freely working. They do also suggest that the influence of government policy and the potential market power of private traders, growers, and the effect of other major producers cannot be ignored.

There has, however, been strong opposition to the notion of a grain export cartel. During the hearings before the Senate Committee on Foreign Relations on May 8, 1979, the Western Wheat Associates, U.S.A., Inc. commented:

We do not believe it is possible to manage an OPEC-type monopoly on world wheat production to raise prices regardless of supply and demand factors. Setting an artificially high price for wheat would stimulate production in many nations that would not be part of the agreement and, in effect, would defeat the purpose of the cartel. Wheat can be produced in more than 100 countries around the world.

The president of the National Association of Wheat Growers stated:

"I want to make it clear that the National Association of Wheat Growers does not advocate a wheat cartel, fixed exporting pricing, or market sharing"

Robbin S. Johnson, assistant vice president of Cargill, Inc., concluded in the same meeting:

Those involved in producing or marketing wheat reject a cartel for three reasons: they know it will not work, they know that they will be hurt most by the attempt to make it work, and they know that their long-term interests are better served by treating customers fairly and supplying them dependably [7].

"We have to remember that wheat is a variation of a desert grass," said the president of a trade group representing U.S. farmers in 26 wheat states. "Wheat only needs a little water and it can grow just about anywhere in the world. If the price is raised too high, importing countries would find it cheaper to grow their own wheat. You would have to be living a dream world to think that just four countries can get together to establish high wheat prices".

The three major wheat-exporting countries account for about 75 percent of the world wheat trade, but they produce only about 15 percent of the world crop, and thus do not have the same control over wheat production that the OPEC countries have over oil. In 1978, OPEC countries imported about 10 million tons of wheat, including 5.3 million tons from the United States. In 1979, American exports of wheat to OPEC totaled 4.13 million tons.

If one believes that the United States can use wheat to enforce some kind of discipline on other nations, then it must be assumed that those nations are highly dependent on the United States for wheat. This is simply not true of the OPEC countries; said Dale E. Hathaway, under secretary for international affairs and commodity programs for the USDA.

Sixty-four percent of the oil the U.S. imports from OPEC comes from only four countries – Saudi Arabia, Nigeria, Libya, and Algeria. These four countries sold the U.S. about US\$ 17 billion worth of oil in 1978, but they imported only 1.8 million tons of U.S. wheat, at a cost of about US\$ 240.

Even should a wheat cartel be created to include Canada, Australia and Argentina, as well as the United States, this would by no means assure world dominance in that commodity. Their exports represent three-fourths of the world total, but their production accounts for only one-fourth of the world total. Turkey, Greece, Romania and Sweden are countries which export and which possibly could expand wheat export in response to higher world prices”, Hathaway said [15].

Summary and Conclusion

For purposes of this limited discussion, international politics is defined as interactions among nations whose own sovereign interests are enhanced by cooperation or conflict with one or more other nations. We deal only with some limited examples where the grain trade appears to have intersected with diplomatic issues. These are diplomatic retaliation (USSR grain embargo), economic retaliation (grain OPEC).

Diplomatic Retaliation

It becomes more attractive to use grain embargoes to retaliate for diplomatic reasons, the greater the dependence of the target country (or countries) upon external grain supplies. The USSR became increasingly dependent on the world grain market during the 1970s for several reasons: raising incomes, which increased the demand for meat and, therefore, feed grains; the apparent policy decision to maintain consumption levels in the face of production shortfalls; and production instability. Thus, an embargo by the United States in retaliation for Russian aggression in Afghanistan seemed plausible. Economic sanctions have rarely been successful. There are too many middle-men for supplies to be effectively shut off—they can simply be routed through friendly countries. There is no global shortage of grain for those who can afford to buy. The Soviets do not really need wheat. They already produce more than they consume; they contracted to buy U.S. wheat only because it is a cheaper way to supplying some western and northern Soviet cities than transporting grain from central Asia [16]. Such an action against a diplomatic enemy would not

be subject to the usual criticism of food as a diplomatic weapon—namely, that it causes the poor and hungry to suffer rather than the political regime. This measure failed as can be inferred from the preceding discussion largely for two reasons: (1) other exporters were less diligent in cooperating, and (2) the complexity of the international grain trade made enforcement virtually impossible.

Economic Retaliation

The cry, “A bushel for a barrel”, is clearly couched in terms of economic retaliation, in this instance against OPEC. Yet, as this paper stresses, even if a grain exporter cartel could be enforced against OPEC, its impact would be limited because most OPEC countries are sparsely settled and thus import relatively little grain (Table 1). Therefore, the monopoly revenue to be gained would be limited. Beyond this, foreign exchange wealth is not in short supply in OPEC countries. Thus a partial cartel is likely to have less chance for success against OPEC. And if we assume a possibility of a grain embargo, OPEC can turn to other major wheat producers to meet domestic wheat demand as shown in Table 11. The last column shows the percentage production of wheat for other countries. Almost 72% of world wheat production was produced in other countries than the five major producers. If we assume that the

Table 11. Other major wheat producers as a possible alternative of food import, in millions of tons

Year	Latin America	U.S.S.R.	China	Near East	EEC	India	Eastern Europe	Total	% to total W. product
1973	12.1	109.8	36.0	21.4	41.4	24.7	26.7	272.1	73
1974	13.0	83.8	37.0	24.0	45.2	21.8	28.4	253.2	71
1975	14.6	65.0	41.0	27.6	38.1	24.2	25.2	235.7	67
1976	19.3	96.8	45.0	31.3	41.2	28.8	28.6	291.0	70
1977	11.5	92.1	45.0	29.2	39.9	29.0	28.6	275.3	72
1978	14.7	120.8	52.0	30.5	50.0	31.3	30.5	329.8	75
1979	14.9	90.1	60.0	30.2	52.8	34.9	26.4	335.3	76
1980	15.0	89.5	59.2	31.2	52.8	34.6	26.4	308.7	67
1981	15.2	80.0	59.6	32.2	54.4	36.3	26.3	304.0	67
1982	22.7	87.0	68.4	32.3	59.9	37.5	29.7	337.5	70
1983	19.9	78.5	81.4	31.5	59.2	42.8	29.9	343.2	70
1984	21.4	76.0	87.8	31.0	76.3	45.1	36.7	374.3	72
1985	20.2	78.1	85.8	34.0	71.3	44.1	32.3	365.8	72
1986	21.8	92.3	90.3	37.3	72.0	46.9	34.3	394.9	74
1987	21.2	85.0	87.0	37.3	72.5	46.0	34.5	383.5	75
1988									

Source: 1. Commodity review and outlook, FAO, United Nations, Rome. Several issues
 2. FAO Production year book, several issues, 1973-1988.

U.S. will retaliate, the economic retaliation will not be effective since the U.S. produce only 12 percent of total world production and plenty of wheat will be around to satisfy consumption demand in addition to domestic stocks. In addition, the elasticity of export demand for wheat seems to be relatively high. It is estimated that the elasticity of demand for U.S. exports for wheat is quite high, perhaps -5 to -10 [17].

Finally, we can draw some important key point from the paper which could increase our understanding to the food security issue and the effectiveness of a possible future wheat embargo by the major producers.

- 1) Food security may be defined as the ability of food deficit countries, or regions, or households within these countries, to meet target consumption levels on a year-to-year basis. It is said that, countries should raise its level of self-sufficiency and build its own reserve stocks. The justification for such policy is that each nation faces highly unreliable international supplies. There are several strands to this argument [18]. In many of the discussions, there is no distinction made between food aid and commercial supplies. The reliability of each source differs considerably. The general perception, which we fully share, is that food aid is completely unreliable (Table 12). Food aid was in fact cut back in 1973-74. In years of high world prices, some donors were not willing to divert supplies from commercial markets to food aid worse still, in individual cases, donors have used food aid to acquire political concessions from the recipients. It seems that international food policies relying on food aid supplies are highly risky. But are commercial supplies also risky and unreliable?

Table 12. US Agricultural exports to developing countries: commercial exports vs. food aid 1969 to 1977 (%)

Year	L.D.Cs. Share to total US Agric. exports	L.D.Cs Share of total commercial exports	Food Aid as percentage of Agric. exports to LDCs
1969	34.9	21.6	49.4
1970	33.1	21.9	44.1
1971	32.7	22.7	40.4
1972	33.6	24.4	37.4
1973	26.3	20.4	28.5
1974	31.8	29.0	13.0
1975	36.8	33.5	14.1
1976	30.4	27.6	12.7
1977	30.7	27.8	15.1

Source: Asuncion Marticorena; *A Review of Some Contradictions Existing in the International Wheat Market as a Result of the Different Agricultural Policies Carried out by the Main Producers*, Centre for Development Studies, University College of Swansea, Monograph XVII, 1982.

Unreliability here can carry two meanings:

First is that world prices are highly unstable, but supplies are always available for the needs of the small and medium sized countries.

Second is there periods when supplies are unavailable at any price?

The first set of problem is within the framework just discussed. On the issue of sheer availability of supplies we have not seen any documentation of the charge. We do not know of any point in time when it was not possible to obtain supplies of wheat at some price, even though the price may have been considered exorbitant by some less developed countries importers [18].

- 2) There is a strong argument in favour of the idea that food insecurity is ultimately a problem that arises from real income fluctuations that affect the ability of people to command adequate food through legal means. The basic causes of real income fluctuations and individuals' consequent entitlements to food are production and price fluctuations in both the food and nonfood sectors.⁽⁴⁾ For the urban population, fluctuations in staple food prices are usually the major cause of a food-security problem. The price fluctuations arise from year-to-year fluctuations in the domestic or world harvest or from more irregular natural disasters such as floods, chronic droughts, wars as well as from changes in government food policies.

In rural areas, there is an additional important dimension to the food-security problem. Farm household incomes are directly affected as a result of fluctuations in their own production that stem from climatic uncertainty. Further, nonfarm rural households are indirectly affected as a result of fluctuations in farm production and incomes. Rural people will, on occasion, suffer simultaneously from high food prices and low incomes. Historically, food-security policy has been framed in terms of meeting urban food demands. Governments in developing countries appear to have been powerless to provide rural households with adequate income supplements, or purchasing power, at times of crop failure [20].

- 3) Remedies to food security has no simple solution applying uniformly to all countries. In some countries, the prevention of near famine or starvation condi-

(4) Sen (1980) provides an excellent description of the entitlement approach to food security and contrasts it with the more traditional food-availability-decline approach. A sharp reduction in food supply (availability) can be a cause of some people not having enough food to eat to stave off malnutrition or starvation, but it is only one of a number of possible causes. Sen points out that it is even possible for famines in some areas to be caused by boom conditions when the output of good in general, including a country's aggregate food production, is increasing. If the boom takes the form of uneven expansion between sectors, substantial declines in real incomes of some groups within society (some rural groups, for example) may ensue [21].

tions for some segments of the population is the predominating objective. In other countries instability in food prices, in government budget or in the balance of payments is their main problem. Other countries believe that food security is important against future food embargo but they do experience a severe shortages in some inputs such as water resources, fertile soil, and good weather conditions. Thus, we could cautiously conclude that most developing countries could achieve a modest reduction in the instability of their domestic consumption needs by operating a small buffer stock and by permitting nearly free trade. Such policies would benefit in eliminating the fear of future food embargo.

- 4) With a given foreign exchange, the solution to the food insecurity problem must begin at the national level and every country can take important initiatives to reduce food insecurity by mix of stock and trade policies especially in countries where cost of production are extremely high. Although, there is considerable scope in many less developed countries for larger investment in working stocks, one clear generalization that can be made on the basis of past research is that relying mainly on domestic grain reserves to cover year-to-year fluctuation is an expensive solution when trade is a real possibility. Some studies examine the choice between a trade-oriented approach and domestically held reserves, concluding that, contrary to common belief, trade policies can be an efficient stabilization force for most countries [17].
- 5) Stockpiling grain is an important policy alternative because food shortages can lead to catastrophic costs, even loss of life. But decisions about how much grain to put into stocks and when to consume out of stocks turn on the appropriate choice at the margin of indifference between current consumption and carrying more in stocks. Optimal stockpiling requires the efficient use of scarce resources in stockpiling, and thus involves the same kinds of scarce resources in stockpiling, and thus involves the same kinds of calculations as the attainment of optimality in other economic activity. There is no question that stockpiling could be managed to reduce the variability in available supplies and prices of wheat for the country [17].
- 6) Some expect that variability of wheat depends on the level of triopoly inventories, but the same relationship holds for competitive conditions. Thus, inventory behavior provides no discriminatory power with respect to market structure. It is suggested that stock provide market power for the exporters. We are somewhat skeptical of this suggestion and believe that stocks do not necessarily detract from the market power of the importers, especially when stocks are "excessive"; as often the case, stockholding on the part of exporters is usually not used for optimal export pricing but, rather is a result of excess supply. They are seldom used as a weapon against importes, if they were exporters could also hold stock to offset any market power exporters may have. In most years it appears

that the cost of holding stocks is borne by exporters, not importers. Despite some descriptive appeal, the class of oligopoly models fails to explain the pattern of world wheat prices, especially in the 1970s and 1980s.

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اتحاد منتجي الحبوب واقعية تهديد المستوردين

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ملخص البحث. خلال العقد الماضي تزايد اهتمام كل من الدول المنتجة والدول المستهلكة حول التداخل بين أهداف السياسة الخارجية والتجارة الدولية. ولقد كان السبب الرئيس للاقتراح بتكوين كارتل للحبوب يضم الدول الرئيسة المصدرة للحبوب هو الارتفاع الكبير الذي حدث لأسعار البترول خلال فترة السبعينات مما أدى إلى ظهور عبارة «براميل البترول مقابل مكبال الحبوب»، وعلى الرغم من أن فكرة تكوين كارتل للحبوب لممارسة ضغوط خارجية على الدول المصدرة للبترول قد لاقى معارضة داخلية لدى الدول المصدرة للحبوب إلا أنه ما زال هناك إصرار على تطبيقه لتحقيق العديد من الأهداف.

إن الهدف الرئيس من هذه الورقة هو محاولة لمناقشة موضوع كارتل الحبوب وحقيقة خطورته وتقديم بعض الحجج لتوضيح ضعف قدرة كارتل الحبوب في السيطرة على الأسواق وبالتالي عدم قدرته على تهديد الأمن الغذائي للدول المستوردة كما تشير الورقة أيضاً إلى أن الدول المستوردة قد تكون لها الكفة الراجحة في التجارة الدولية للحبوب.