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Preface

In recent years the U.S. share of world grain exports has declined and as a result the competitiveness of the U.S. in international markets has come into question. Recent discussions on U.S. farm policy has also induced tremendous debate on this topic. The NC-160 regional research committee on "Performance of the U.S. Grain Marketing System in a Changing Economic and Policy Environment" has been involved in several studies on international trade and competition and presented a symposium on the topic at the annual meetings of the American Agricultural Economics Association in Ames, Iowa in August 1985. The papers presented in this report were presented at that symposium entitled "Competitiveness of U.S. Grains in International Markets."

THE COMPETITIVENESS OF U.S. GRAIN IN INTERNATIONAL MARKETS: AN INTRODUCTION

Paul Gallagher*

After a decade of spectacular growth, U.S. foreign sales of grain began declining in the early 1980s (Figure 1). The U.S. share of the world grain trade has also eroded. In the wheat trade the share fell to 37 percent in 1984 after reaching a peak of 48 percent in 1981. Similarly, the U.S. share of the coarse grain trade fell from 72 percent in 1979 to 57 percent in 1984. Recent declines in trade volume should not be surprising, as worldwide income growth has been erratic. However, the loss in market share has aroused the concern that the U.S. is no longer competitive in the world grain trade. Competition is a concept that is fundamental to much of economic analysis. However, several interpretations of this comment have appeared in the recent dialogue. At the outset then, a review is in order.

In manufacturing sectors, competitiveness sometimes refers to an industry's entry and exit from international trade as production costs and exchange rates adjust. For instance, the competitive margin for an industry has been defined as the point where unit labor costs for domestic and foreign producers are equal when expressed in common currency units (Dornbush):

$$W/Y_j = e\ (W^*/Y_j^*).^1$$

On the competitive margin both countries participate in the sector's international trade. However, production costs in both countries are rigid because wages and productivity do not adjust in the short run, and exchange rates are determined by forces which are external to the sector. Consequently, the domestic sector is not competitive when wages are high, productivity is low, or the domestic currency is strong on the international market--these adjustments take place because production is priced near costs, and exports go the low cost country.

Turning to the agricultural sector, production costs for representative producers in the U.S. and major competing countries have been presented in the dialogue (Daniels). However, Paarlberg et al. disagree sharply with the view that grain production costs are high in the U.S. or rigid, noting the similarity of prices paid for production inputs in the U.S. and competing countries, and recent flexibility in U.S. agricultural asset values.

Provided that price changes on international markets are transmitted to domestic producers, marginal costs in exporting countries should adjust to external changes in market conditions in the intermediate and long run.

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[1]In the domestic economy, nominal wages for homogenous labor and labor productivity are represented by W and Y, respectively. Corresponding variables in a foreign competing sector are W* and Y*. The variable e represents the exchange rate.

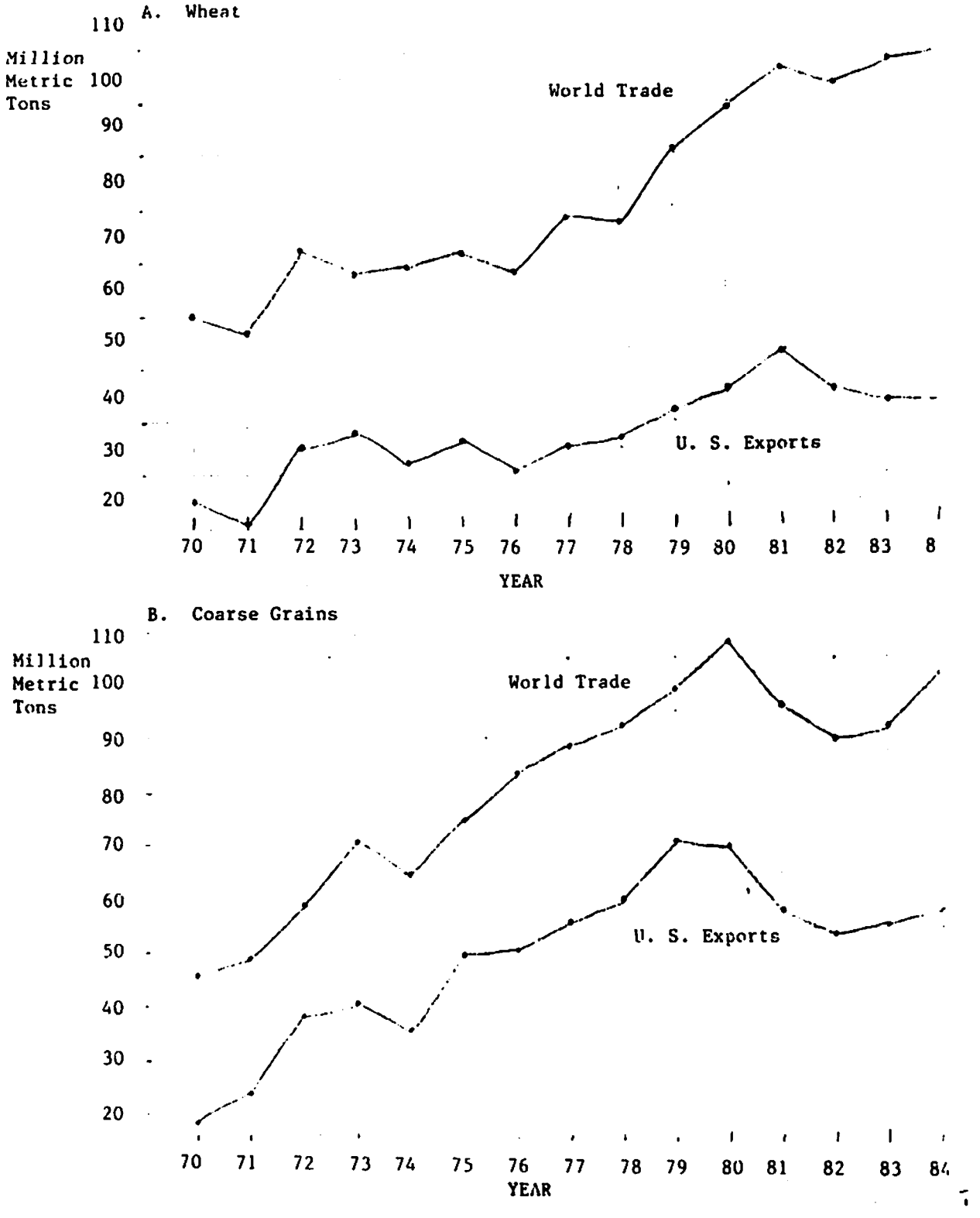


Figure 1. U.S. and World Grain Trade: 1970-1984[1]

[1]SOURCE: FAS.

Diseconomies of scale and adverse productivity adjustments associated with output expansions are potential sources for flexibility in costs (or inelastic grain supplies). Price flexibility in specialized input markets for the grain sector is a second source of potential cost flexibility. Because there is extensive international trade in many of the crop sector's specialized inputs (Table 1), it is plausible that U.S. producers and their competitors pay roughly

TABLE 1. U.S. EXPORTS OF GRAINS AND SELECTED INPUTS TO THE GRAIN SECTOR

	1980	1981	1982	1983
	billion dollars			
Cereals and preparations	18.1	19.5	14.8	15.2
Fertilizers	2.3	1.7	1.4	1.3
Machinery	2.0	2.3	1.8	1.3
Chemicals	0.5	0.5	0.5	0.6
Total inputs	4.8	4.0	3.7	3.2

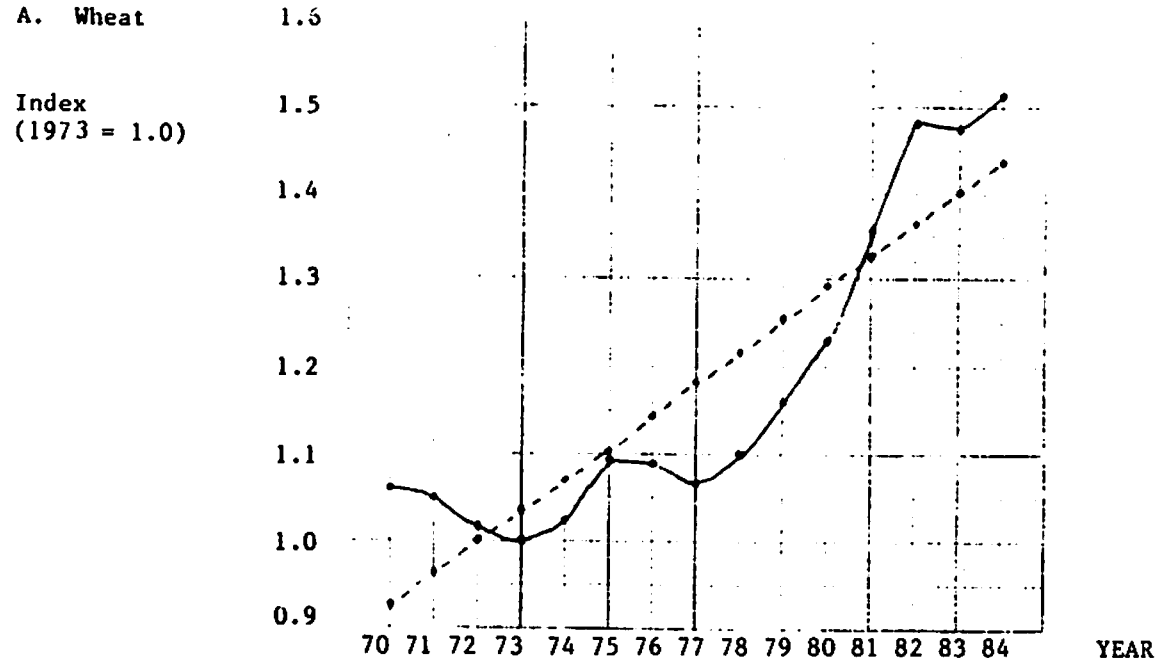
SOURCE: U.S. Department of Commerce, U.S. Exports, Schedule E, Commodity by country.

the same currency adjusted price for these inputs. In contrast, the specialized land input is not internationally traded. Cost flexibility associated with inelastic supplies of the land input may be painful. Nonetheless, the potential exists.

The cost-of-production issue is elusive in the presence of variable factor proportions and flexible input prices. Nonetheless, it may be relevent. The U.S. export boom of the seventies was filled, in part, by land with lower and more variable yields than the land used for grain production in the sixties. Thus, the U.S. may have some high-cost land which would exit from the grain industry if current low international prices were transmitted to domestic producers. Other exporting countries may face a similar dilemna.

Clearly, exchange rate adjustments of recent years have adversely affected the competitive position of the U.S. grain sector. Indices of real exchange rates for U.S. wheat and corn importers show increases of 25 to 30 percent since the late seventies (Figure 2). In isolation, increases in the value of the dollar reduce U.S. prices and exports, while increasing prices received by competing suppliers, and therefore, their trade.

Because several governments intervene in international grain markets, institutional concepts of competitiveness have also been crucial. For example, U.S. loan rates place an approximate floor on world prices. Given recent



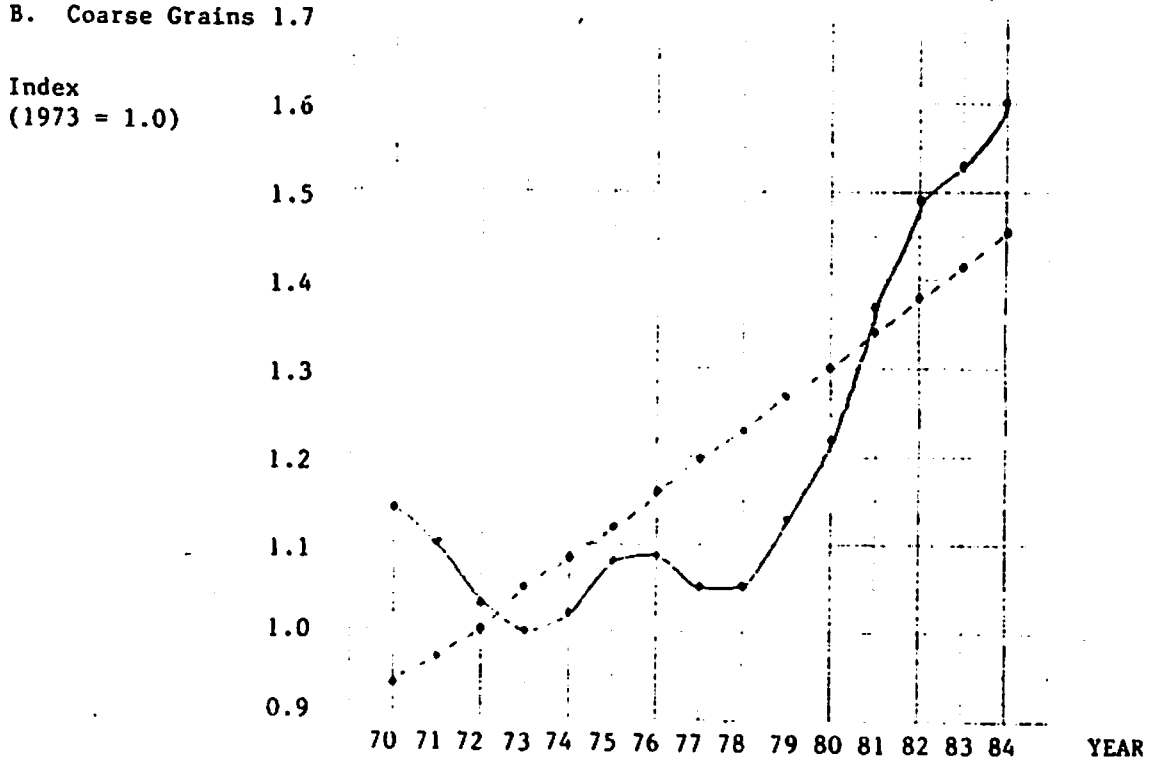


Figure 2. Real Exchange Rates for U.S. Grain Importing Countries[1]

[1]Relative consumer price indices for U.S. and grain importing countries multiplied by the nominal exchange rates. These indices are weighted averages for wheat and coarse grain importers. Source: Roberson/FAS.

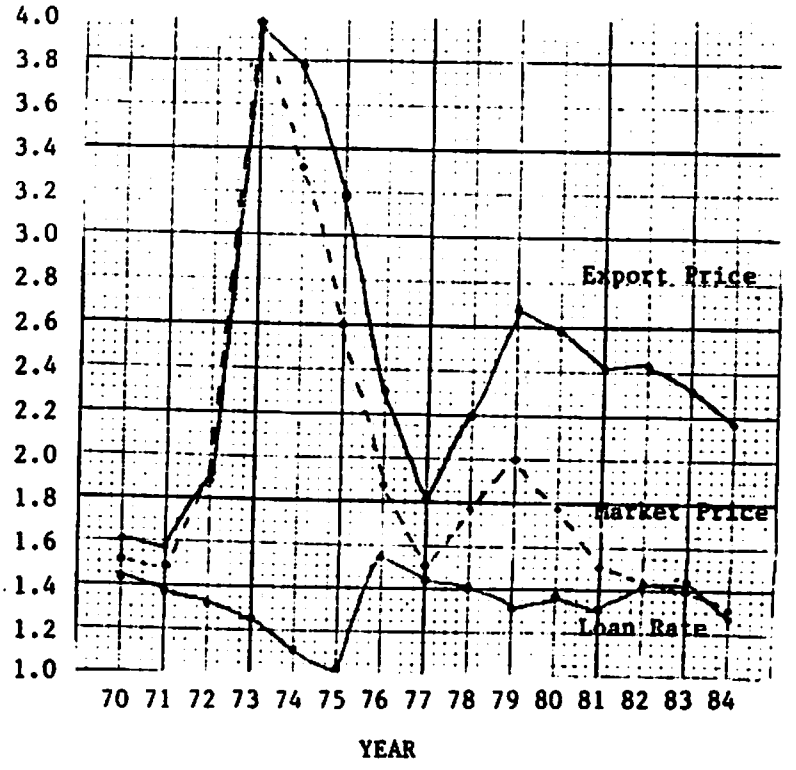
conditions of steady worldwide supply growth and erratic demand growth season average prices for wheat and coarse grains have been at loan rate floors (Figure 3). Events which tend to reduce U.S. exports are magnified when markets clear at the loan rate, as contractions in demand are not partially offset by price reductions (Gallagher et al., p. 112). Furthermore, appreciation of the dollar raises the floor under world markets. Thus, the poor performance of the U.S. grain trade and loss of competitiveness has been attributed to U.S. loan rates (Goodman).

The history of price formation on international grain markets also includes subsidies in the Common Market and the United States, exports on concessional credit, and active marketing agencies in Canada and Australia. Further, there is an alternating record of agreements which establish wheat prices and market shares, and "competition" among the various institutions for a larger share of the world wheat market (Hadwiger, McCalla, and Josling). Drawing on this view of the world grain trade, lost U.S. competitiveness stems from the failure to adopt trade programs and policies which keep pace with agencies of competing countries (Denlinger).

Issues regarding the direction and extent of international specialization have indirect relevance. The comparative advantage principle holds that a country will specialize in the production and export of a particular good if, in isolation, the opportunity cost of foregone production of other goods is less than the corresponding sacrifice of a potential trading partner. Comparative advantage depends on factor supplies (capital, labor and land) and characteristics of production processes in trading countries (Caves and Jones, Houck and Pollak). It is true that free trade will reflect comparative advantage provided that market allocations of resources have been suitable, commodity policies have been appropriate, and foreign currency markets have been correctly aligned. Thus, studies of changes in the technical conditions of production, international accumulation of agricultural capital, and the rate of technology transfer should complement the present discussion, which emphasizes the market and policy-related events leading to the current circumstances.

Each of subsequent presentations focuses on one aspect of competitiveness. The first section reviews the causes of fluctuations in the foreign exchange value of the dollar and discusses the potential for diverse responses in grain markets when one probes beyond aggregative measures of the dollar's value. Thereafter, export practices of the U.S. and some of the major competitors in the world wheat market are considered in detail. The third presentation addresses the notion that a gain or loss in competitiveness in the coarse grain market is synonymous with increased or reduced market share.

A. Wheat



B. Corn

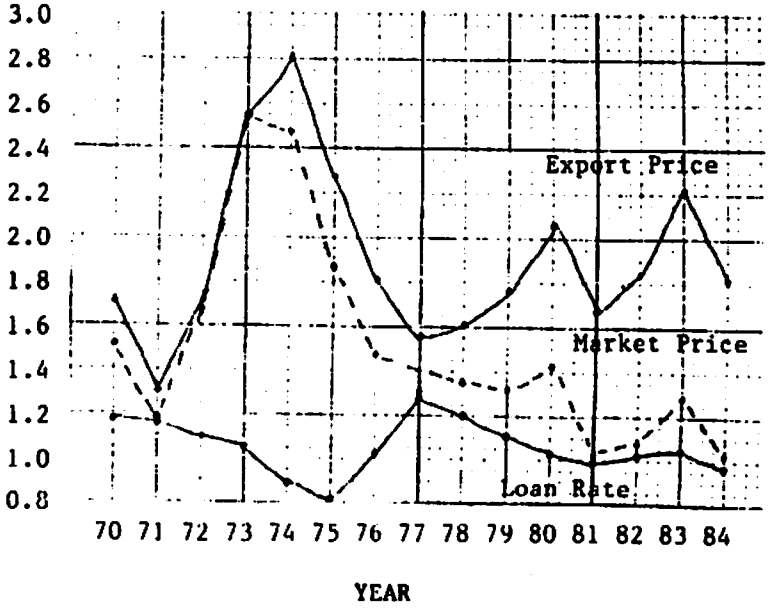


Figure 3. Real Grain Prices[1]

[1]Based on wholesale price index deflator.

[2]Export Price = Market Price x Real Exchange Rate.

References

Caves, R.E. and R.W. Jones. World Trade and Payments Theory, Little, Brown, and Company, Toronto, 1981.

Daniels, Ray. 1985. "U.S. Agricultural Export Issues and Competitiveness of U.S. Farmers in World Markets." Presentation to House Agriculture Subcommittee on Department Operations, Research, and Foreign Agriculture, April 16, 1985, Washington, D.C.

Denlinger, Nelson. 1985. Statement of U.S. Wheat Associates before the House Agriculture Subcommittee on Department Operations, Research, and Foreign Agriculture, April 16, 1985, Washington, D.C.

Dornbush, Rudiger. 1980. Open Market Macroeconomics. New York: Basic Books.

Gallagher, P., M. Lancaster, M. Bredahl, and T.J. Ryan. The U.S. Wheat Economy in an International Setting: An Econometric Investigation, Technical Bulletin No. 1644, ESS/USDA, March 1981.

Goodman, Richard. 1985. "Statement of National Grain and Feed Association," before the House Agriculture Subcommittee on Department Operations, Research, and Foreign Agriculture, April 16, 1985, Washington, D.C.

Goolsby, D.H. and R.R. Roberson. "Exchange Rate Developments and Their Impact on U.S. Agricultural Exports: 1970-84, USDA, FAS Staff Report No. 5, May 1985.

Hadwiger, Don F. 1970. Federal Wheat Commodity Programs. Ames: Iowa State University Press.

Houck, James P., and Peter K. Pollak. 1978. "Basic Concepts of Trade." In Speaking of Trade: Its Effect on Agriculture. Special Report No. 72. Minneapolis: University of Minnesota, Agricultural Extension Service.

McCalla, Alex F., and Timothy E. Josling, eds. 1981. Imperfect Markets Agricultural Trade. Montclair, New Jersey: Allanheld & Osmun.

Paarlberg, Phillip L., Allan J. Webb, John C. Dunmore, and J. Larry Deaton. 1985. "The U.S. Competitive Position in World Commodity Trade." Agricultural and Food Policy Review. Washington, D.C.: USDA, ERS, July.

ADJUSTMENTS OF THE U.S. GRAIN SECTOR TO THE CHANGING VALUE OF THE DOLLAR*

Nancy E. Schwartz**

The purpose of this paper is to consider the role of the U.S. exchange rate and the policies which influence it on U.S. agricultural exports and to discuss the prospects for higher exports as the dollar falls. We have lived now for over a decade with flexible exchange rates and for the last four years with a highly valued dollar, which most economists believe has been a major contributing factor to the sharp decline in U.S. agricultural exports and the U.S. share of world exports. Since 1981, U.S. wheat exports have fallen from 48 million metric tons (MMT) to less than 40 MMT in 1984, and U.S. share of the world market has also fallen over the same period from 45 percent to 35 percent. At the same time, world wheat trade rose from 108 to 113 MMT. For coarse grains, world demand has been more variable, falling from 117 MMT in 1980 to around 100 MMT in 1982 and 1983 and rising back to 110 MMT in 1984. Over the same period U.S. exports fell from 71 MMT to around 55 MMT and recovered to 60 MMT in 1984. U.S. share of the world coarse grains market fell from its 1979 high of 66 percent to 60 percent in 1980, and hovered around 55 percent through 1984. The causes behind these declines in the 1980s (as well as for the peaks in 1979 to 1981) are not well understood.

In this paper, I consider three different issues which relate to the decline in exports: the exchange rate controversy and competitiveness, foreign price and policy-related factors which affect U.S. exports, and U.S. policy issues. Because of the time constraint, I will limit the discussion to some brief comments about each of these topics and I will raise some questions about the relationships between exchange rates, foreign and domestic policies which affect exports, and U.S. trade.

U.S. Exchange Rates and Competitiveness

One discomforting fact about international finance theory in recent years is that there is relatively little agreement about the causes of exchange rate movements. Economists argue about whether the dollar is overvalued or simply strong, whether any future decline in the value of the

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dollar will be slow and smooth or precipitous, or indeed whether the dollar's recent decline (about 10 percent against the major trading currencies between March and July of 1985) will be short-lived. We are also uncertain about how different macroeconomic policies affect exchange rates, and in turn, U.S. exports.

The policy implications of the "strong" versus "overvalued" dollar are significant, since under the strong dollar hypothesis, failing industries are simply not competitive enough to survive the high dollar. But if the dollar is overvalued, then the distortions which have led to the overvaluation need to be corrected so that the dollar can return to a more appropriate value. If such corrections are not possible, an argument can be made for some form of government assistance to affected industries so that they can compete effectively.

To date there is no theory which satisfactorily integrates the impact of the real goods and asset markets on exchange rate determination. There is a growing belief, however, that the main determinant of the exchange rate in the short-run appears to be the asset market while in the long-run the real goods market and purchasing-power parity play an important role.[1] Between 1980 and 1984 the real effective exchange rate of the dollar (using IMF definitions) rose by 40 percent. No circumstances in the real goods market would tend to lead to this result. This was a period during which U.S. current account balances fell from a surplus of just under $2 billion to a deficit of over $100 billion in 1984. However, there is general agreement that the rise in the value of dollar is due to an increased desire by foreigners to hold dollar-denominated assets. There is also fairly wide agreement that a major factor contributing to the increased attractiveness of U.S. assets has been the real interest rate differential between U.S. and other major trading countries.

There are two basic reasons why I favor arguments that the dollar is overvalued rather than just strong. First, most economists would agree that the structural deficit of the U.S., which has been hovering around $150 billion, is unwieldy. So long as the Federal Reserve chooses to maintain a relatively tight monetary policy, our expansionary fiscal policy puts tremendous pressure on credit markets and raises real interest rates. This

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[1]The distinction is made according to the following reasoning: in the short-run, the foreign exchange rate is determined largely through the value of the foreign currency as an asset which can be held in portfolios along with foreign bonds and domestic bonds and currency. Its short-run price is therefore influenced by the same factors which determine other assets' prices, e.g., foreign and domestic interest rates. In the long-run, however, the exchange rate reflects the relative prices of goods and services produced in each country and the relative resource costs of producing this output. Under perfect competition, the long-run equilibrium exchange rate would reflect the "law of one price" where a fixed basket of goods translated at the equilibrium exchange rate into foreign prices costs the same in each country. In other words, the equilibrium long-run exchange rate would reflect purchasing-power parity of each currency.

effect has been compounded by tax credits which have stimulated investment without a concomitant rise in private savings and thus have added to overall credit demand. The current weakening of nominal interest rates--and to a lesser extent real interest rates--is the result of looser monetary policy in the face of persistent high unemployment and weaker domestic demand. Long-term interest rates are still more than 3 percent higher than short-term rates, which suggests that the market is either anticipating that the Federal Reserve will have to inflate its way out of the deficit (by monetizing the debt) or will keep a fairly tight rein on monetary growth as the economy begins to recover from its current low growth rates, forcing real rates higher.

While the argument that this distorted policy mix has given rise to the overvalued dollar is heard quite often, it is worth noting that it alone is not sufficient to cause the dollar to rise. The proper statement of this argument is that the dollar is overvalued primarily due to distorted U.S. policy mix (viz., tight monetary and loose fiscal policy) given economic conditions in other countries. In other words, it is not the high real interest rate in the U.S. which has attracted foreign capital, but rather the high real interest rate differential, which has risen largely because the policy mixes of the other key currency nations such as West Germany have differed from ours. It is that differential and, more important, expectations about the likelihood that the differential will be sustained which have led to continued high levels of foreign capital inflows (particularly short-term) into the U.S.

Second, despite theoretical conflicts over exchange-rate determination, there is one essential fact on which most economists agree. That is, one can argue that the dollar is overvalued since our large and persistent current account deficits cannot be sustained indefinitely. The dollar, therefore, must eventually fall in value. To the extent that U.S. investors are currently taking resources away from export industries which will expand production when the dollar falls, the current exchange rate may be said to be causing a misallocation of resources. The implication of this first section of the paper is that the dollar is at an overvalued level, which theoretically may justify some government intervention to help export industries compete. I will return to this issue in the third section.

Foreign Trade Responses

Even if the dollar were to fall back to its late 1970s value, there are several reasons why the fall might not necessarily restore U.S. agricultural exports and market shares to their earlier levels. In particular, the behavior of importing and exporting countries is likely to limit the ability of the U.S. to recapture these levels. I will restrict my comments to price, macroeconomic, trade and farm policy effects which are related to the exchange rate.

Importer Price and Policy Responses

The overall level of U.S. exports and world exports will remain dampened by the world debt crisis for at least the medium-term. Most heavily-indebted countries have consciously lowered the overall level of their imports, including, in some cases, agricultural goods. These countries are not likely to raise their imports substantially, barring crop failures, even if the dollar falls. To a large extent, these countries' purchases are now being made on credit, and until the debt crisis attenuates significantly, decisions to import food are likely to be made on the basis of who has the best credit terms rather than who has the cheapest market price. The falling dollar will also mean that as debtors' currencies are appreciating against the dollar, their exports prices will rise in dollars. These higher export prices will tend to reduce exports and foreign exchange earnings which debtor countries use to buy food imports.[2]

Low and weakening oil prices have also reduced the foreign exchange earnings of the less-indebted oil exporting countries. This, in turn, dampens both then current and future import demand, as these countries face rising unemployment and budget deficits.

Foreign incomes have been depressed in most countries due to the high dollar and the transmission of high U.S. interest rates abroad. Much of the recent growth abroad has been generated in the export sector in response to expanded U.S. demand for imports. The fall of the dollar, therefore, will be accompanied by a tradeoff of income losses in the export sector against income gains in the domestic nontraded goods' sector. The new growth generated will not necessarily outstrip the export losses enough to generate major increases in food import demand.

It is likely that the appreciation of the dollar will generate increased protection abroad which will restrict import growth. As the U.S. has seen in its automobile, steel, and other import-competing industries, domestic pressures for protection increase as a country's currency appreciates. As indicated by Congressional legislative threats, the U.S. is closer than ever to a large-scale protectionist trade war with Japan and the European Community among others. As the dollar falls and other countries' currencies begin to appreciate, it is to be expected that they will also experience increased protectionist pressures. The protective measures imposed in response to these pressures will, in turn, lower import demand through their effects on both price and income. The effects may be more pronounced in nonfood sectors; however, to the extent that four years of the high dollar has made foreign agriculture more profitable, farmers abroad are likely to try to obtain import protection. In fact, in several LDCs, support of domestic agricultural production has become a crucial element of the development strategies promulgated by the IMF, World Bank, and AID. The progress made in foreign production while the dollar was high is not likely to be ceded as the dollar falls.

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[2]Several of the major debtor countries have fixed exchange rates which means that the fall of the dollar against major Western currencies will not immediately affect the debtors' dollar exchange rates.

The last factor which will affect importers is related to the generally recognized J-curve effect. Fixed foreign import contracts with non-U.S. exporters will limit short-term switching toward U.S. grain purchases. Moreover, some buyers may be reticient to make large contracts for U.S. grain in the short-run if they believe that the dollar will fall even further over the next several months.

Exporter Price and Policy Responses

While importer behavior will affect the level of world and U.S. exports, the price and policy responses of the U.S.' competitors will have a direct effect on the U.S. share of the world grain market. It is clear that the grain production and exports of our major competitors have gone up substantially in the last four years, especially in Argentina, Canada, and the European Community. Whether or not these expansions have been directly linked to the rise of the dollar or are merely coincidental is a topic I am currently researching. The question I would like to address here is the prospect for the decline in market shares of these competitors as the dollar falls. That prospect depends on several factors.

First, the extent of the shift toward U.S. purchases depends on how much foreign competitors can lower their prices before becoming unprofitable as the dollar falls. Because the U.S. is the major exporter of grain, the rise of the dollar has raised the foreign price of wheat when translated into foreign currencies. This price increase gives foreign farmers the incentive to expand production, and gives more efficient farmers a higher margin of profit. As a result, there is a margin by which many competitors can lower their prices in step with the depreciation of the dollar in order to maintain their export markets.

Second, to some extent, the decline of the dollar and the decline in world interest rates which accompanies it act to lower the cost of foreign production: the decline reduces the cost of imported inputs abroad, oil and oil-based products in particular. In addition to lowering the cost of imported inputs, currency appreciation abroad will help to reduce inflationary pressures (as the U.S. has witnessed in recent years). The transmission of lower interest rates from the U.S. abroad will also help keep foreign costs down. As a result, the appreciation of foreign currencies against the dollar will result in a tradeoff between the lower cost of inputs and the rise in (dollar-denominated) foreign export prices. The extent of this tradeoff is an important "unknown," since foreign agriculture is often highly dependent upon imported inputs.

Third, as foreign currencies appreciate against the dollar, the U.S.' competitors are likely to seek government protection to maintain their export shares. Non-U.S. exporters, like importers, have experienced much lower growth rates and much higher unemployment rates than the U.S. in recent years, and much of their growth has come from exports. It would not be surprising to see a rise in European Community export subsidies or Canadian price cuts (tacit or explicit) in response to the dollar's fall. The European Community may still be able to tolerate higher subsidies more easily than it can tolerate the political consequences of lowering internal price supports. The recent flak over a proposed 1.8 percent reduction in grain intervention prices (vetoed by West Germany) suggests that the Community cannot yet control its

production gluts despite its weaker currency and export subsidies. Argentina, by contrast, is dependent on its export tax revenues to help repay its massive foreign debt. If the Argentinians decide to devalue further against the dollar,[3] the impact on its grain exports is unclear. Argentina may keep export taxes at their current levels and reduce exports or it may reduce taxes and maintain or expand its exports. (The revenue-maximizing policy if, of course, a matter of elasticities.)

Fourth, it is generally recognized that there are lags in the adjustment of production to price changes. Foreign output will not tend to adjust quickly to currency-price changes, in part because of physical and policy constraints. Support and stabilization policies abroad typically do not send market signals immediately to producers. Moreover, once land has been placed into production, it tends to take awhile before it is switched out of production or into substitute crops.

U.S. Policy

Given the above price and policy considerations, we come back to the question I alluded to at the outset, viz., what set of policies should the U.S. use to counteract the loss of competitiveness due to the overvalued dollar. In this forum, I simply want to raise some general issues.

I said at the outset of the paper that if the dollar is overvalued due to distortions affecting the foreign exchange market, then there is some justification on second-best welfare grounds to intervene. It is worth mentioning here that second-best has a very precise meaning which is not always apparent in discussions of its application to U.S. agricultural exports and U.S. farm policy. First, the essence of the theory of the second best is that, if all the conditions of a perfectly competitive market are not met and if all the distortions in the market cannot be removed, welfare will not necessarily be improved by removing only one of the remaining distortions. In fact, welfare may actually be improved by adding new distortions. However, the welfare-maximizing mix of possible policies must be decided on a case-by-case basis. Second, in order to impose a second-best solution, the desired outcome (social welfare function) must be specified. The second-best analyst then looks for the set of policies which attain the desired social welfare gain under the current set of constraints. This may entail either adding or removing distortions. Third, there is a rule-of-thumb in designing second-best solutions which is that the cheapest method of attaining a specified social welfare gain is to impose any policy changes as close as possible to the source of problem. (Thus, if increased steel output is the desired goal for the economy, a tariff on steel is inappropriate since it taxes consumers, while a production subsidy accomplishes the same goal at a lower cost because it affects producers but not consumers.) Using these general principles, some broad statements can be made about appropriate U.S. policy in light of the overvaluation of the dollar.

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[3]Argentina has a fixed exchange rate with the dollar which is adjusted according to balance-of-payments objectives and relative price movements.

First, the appropriate second-best policy for the overvalued dollar suggested by these criteria is to either (1) lower the structural deficit which has given rise to high real interest rate differentials between the U.S. and other major currency countries (and the expectation that the differential will be sustained), or (2) coordinate macroeconomic policies across major currency nations in order to keep interest rate differentials and exchange rates more in line with long-run equilibrium rates, or (3) monetize the U.S. deficit to eliminate the high interest rate differential, i.e., reverse the restrictive monetary policy of the early 1980s in order to inflate the dollar until it falls in the world market. It appears that the Federal Reserve has been following this third course during the past year.

Second, if none of the above policies which come closest to the source of the distortion (viz., the interest-rate differential and expectations of its continuation) can be pursued, then choose a policy which lowers the attractiveness of U.S. dollar-denominated short-term assets to discourage the short-term capital inflows that have buoyed up demand for the dollar in foreign exchange markets. Tobin has suggested a policy of taxing short-term capital flows, and more recently, Dornbusch, in an apparent reversal of his earlier stance, has also endorsed an interest-equalization tax.

Third, sectoral policies to protect particular industries given the high dollar are generally very difficult to justify on a second-best basis. As we have seen in the case of steel and automobiles, protection of these sectors has not increased national welfare. In fact, it has actually penalized all U.S. export sectors, including agriculture, by further appreciating the currency and by raising costs to industries in which such products are inputs (or indirectly affect input costs in that they are factored into cost-of-living adjustments of workers).

In a somewhat different vein, the current discussion of a more market-oriented agricultural policy should be analyzed from the perspective of second-best theory. The current trend is to suggest that U.S. agriculture will benefit from moving toward free market pricing because the market will transmit price signals to producers which are needed to make correct production decisions. If the world market were free and only U.S. policy were price-distorting, this might be a correct statement. However, moving to a more market-oriented agriculture will not necessarily improve U.S. agriculture or correct our current export situation, since our trading competitors all have policies which distort their production and exports. According to second-best theory, moving closer to the free-market solution in the midst of other distortions will not necessarily improve national welfare, or for that matter, sectoral welfare. It may, in fact, worsen welfare.

By the same token, the frequently suggested "market-oriented" policies may not actually send the correct market signals to producers. For example, a three-year moving average loan rate or deficiency payment may result in an exaggerated cobweb since it removes some current market information from producers. It might protect farm incomes but lead to greater price instability on the world market, which, in turn, might actually backfire and raise program outlays rather than reduce them.

Sectoral solutions which might benefit agriculture are difficult to specify until the objectives of the policy changes are stipulated. To classify a policy as second-best, or even tenth-best (since we are to a large extent talking about policies which correct for the high dollar, which sectoral policies do not do, they are far from second-best), we need to analyze the gains versus the costs of each policy. For this reason, recent suggestions such as a uniform rate of effective protection across all industries also do not guarantee to pass any a priori second-best criteria. Most important, the suggestion fails to take into account the policies of our trading competitors which may thwart the intended aim of that policy to "level the playing field" for agricultural exports. It does not guarantee any maximum efficiency of resource use or improved alignment of exchange rates.

Finally, I cannot end this paper without making some comments about the loan rate. I have heard the argument made frequently that the way out of the U.S. export problems is to lower the loan rate. In the short-run, it can be shown easily that lowering the loan rate will have relatively little impact on the level of exports and will lower export revenues. A simple analysis of the short-run elasticities of export supply and foreign demand produces this result. The immediate problem of the agricultural sector is not that the loan rate is too high per se; it is that the dollar is too high. In real terms the dollar value of the loan rate has stayed fairly constant since 1976; however, as the dollar has appreciated the loan rate appears sharply higher when measured in foreign currencies. In the long run, however, lowering or eliminating the loan rate (and substituting some other form of income support) would force the burden of low world prices to be shared by our competitors; whereas at present low prices result in high U.S. stocks. This shared burden will either bring our competitors to the negotiating table or start a trade war or both. However, it will not necessarily reduce the instability which U.S. farmers face or prevent the U.S. from being the residual supplier to the world market. That will depend on the overall strategy that U.S. policymakers take toward not only domestic policy, but also trade policy in agriculture.

References

Dornbusch, Rudiger. 1985. Discussion Paper for Symposium on the Exchange Rate, Brookings Paper on Economic Activity, #1, pp. 250-4.

Tobin, James. 1978. "A Proposal for International Monetary Reform," Eastern Economic Journal 4 (July/October):153-9.

STRUCTURAL CHARACTERISTICS OF THE INTERNATIONAL WHEAT MARKET

William W. Wilson*

World trade in wheat increased rapidly during the 1970s (especially during the latter 1970s) reaching 101.3 million metric tonnes (MMT) in 1981. Since then trade was stable and reached another peak in 1984/85 at 105.6 MMT, largely due to record purchases by the USSR (Figure 1, Table 1). World trade in 1985/86 is estimated to decrease by 5.7 percent to 99.6 MMT. U.S. exports reached their peak in 1981/82 at 47 MMT and have since decreased by 33 percent to 32.7 MMT in 1985/86 (estimate). The U.S. market share has decreased from a recent peak in 1981 at 48 percent to an estimated 36 percent in 1985/86 (Table 2). The increase in the world wheat trade since 1981 was shared by each of the major competitors: Canada, Australia, Argentina, and France (Figure 2). During most of the 1970s the U.S. loan rate was significantly below world prices and did not play an important role in the price structure for world wheat. However, in the 1980s the U.S. loan rate began to escalate, world prices decreased, and the U.S. loan rate has set a floor for U.S. prices, and an effective ceiling for competition prices (Figure 3, Table 3).[1]

The important trends are that: world trade has increased since 1981/82, but U.S. exports have not; growth in exports was generally shared by each of the competitors; and the U.S. loan rate has increasingly become an important factor in the structure of international wheat prices. The purpose of this paper is to briefly describe the structural characteristics of the international wheat market in the 1980s. The U.S. is posed as the price leader, the loan rate and futures prices being the reference price for world trade. All other exporting countries are price-takers and produce and export along their export supply function.

Structural Characteristics

Traditional Concepts

The structure of international competition between exporters[2] has evolved since the 1950s. Initially the market structure was described as a cooperative duopoly with Canada being the price leader (McCalla, 1966). In the mid-1970s a triopoly was posed between Canada, U.S., and Australia (Alaouze, Watson, and Stugess). More recently it appears that a price

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[1]Figure 3 is a fairly gross comparison being transport and handling costs are not included and the qualities of marginally different.

[2]This paper is concerned primarily with the structural characteristics of exporter competition. Thus, market power by importers is not incorporated in the discussion or analysis.

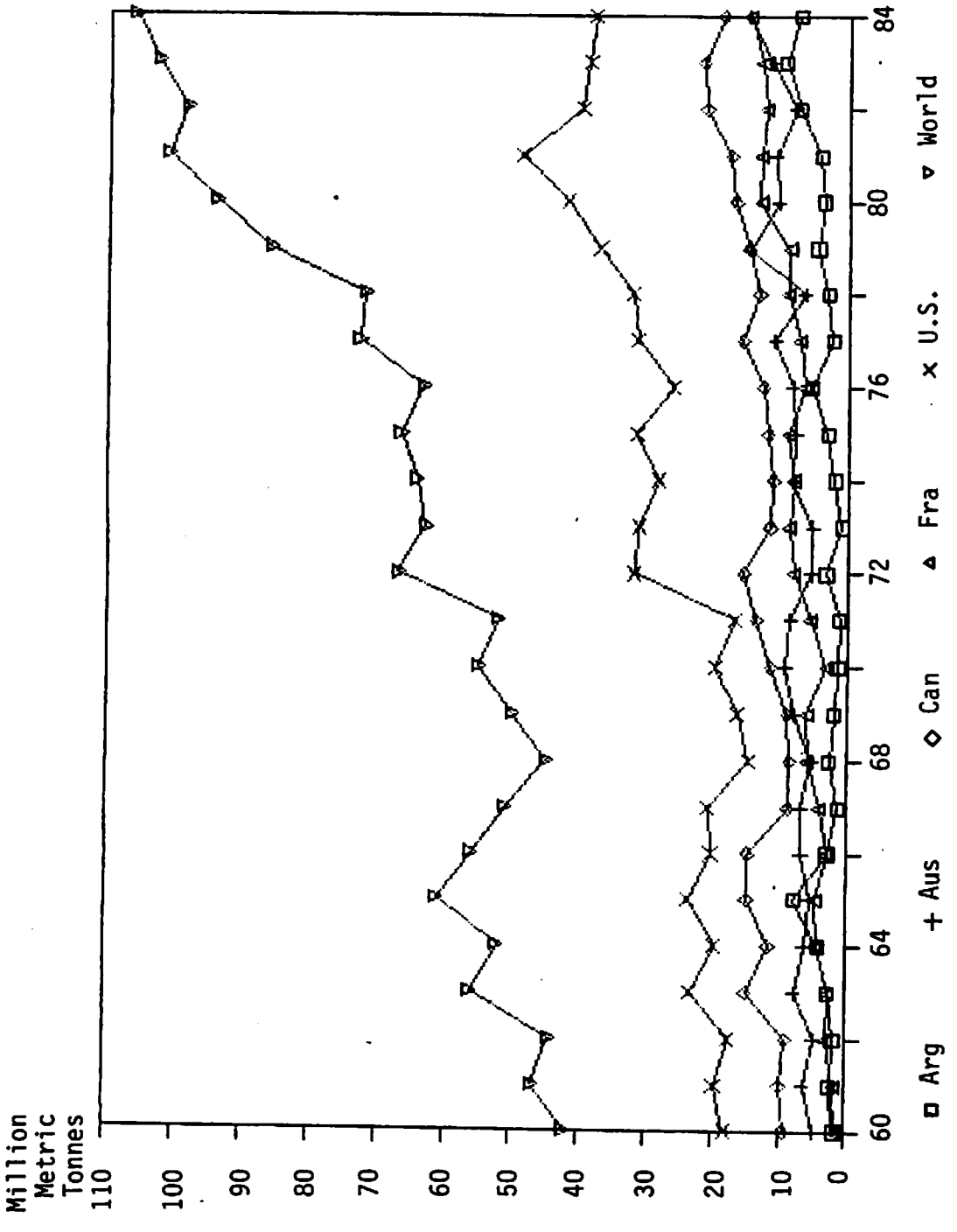

Figure 1. Wheat Exports by Major Exporters, 1960-1984.

TABLE 1. EXPORTS OF WHEAT FROM MAJOR EXPORTERS (ARGENTINA, AUSTRALIA, CANADA, FRANCE, UNITED STATES) AND WORLD TOTAL, 1960-84

Year	Argentina	Australia	Canada	France	U.S.	World
1960	1.9	5.0	9.3	1.5	18.0	41.9
1961	2.4	6.3	9.9	1.8	19.6	46.8
1962	1.8	4.8	9.0	3.0	17.5	44.3
1963	2.8	7.8	15.0	2.7	23.3	56.0
1964	4.3	6.4	11.7	4.6	19.7	52.0
1965	7.9	5.7	14.9	4.8	23.6	61.0
1966	3.1	7.0	14.8	3.0	20.3	56.0
1967	1.4	7.0	8.9	4.2	20.7	51.0
1968	2.7	5.4	8.7	6.0	14.8	45.0
1969	2.1	7.9	9.0	6.1	16.5	50.0
1970	1.6	9.5	11.5	3.2	19.9	55.0
1971	1.3	8.7	13.7	5.6	16.9	52.0
1972	3.4	5.6	15.6	8.1	31.8	67.0
1973	1.1	5.4	11.7	8.9	31.3	63.0
1974	2.2	8.3	11.2	8.1	28.3	64.3
1975	3.2	7.9	12.1	9.1	31.7	66.7
1976	5.6	8.5	12.9	6.8	26.1	63.3
1977	2.6	11.1	15.9	7.5	31.5	72.8
1978	3.3	6.7	13.5	9.2	32.3	72.0
1979	4.8	15.0	15.0	9.0	37.2	86.0
1980	3.9	10.6	17.0	13.4	41.9	94.1
1981	4.3	11.0	17.6	13.2	48.8	101.3
1982	7.5	8.1	21.4	12.5	39.9	98.6
1983	9.6	11.6	21.8	13.1	38.9	102.9
1984	7.6	15.1	19.0	15.0	38.0	105.6

SOURCE: Foreign Agricultural Circular, Grains World Grain Situation and Outlook, Various Issues.

leadership market structure is more appropriate with the U.S. being the price leader. Essential features of each of these are discussed presently and in the section below the price leadership model is developed fully.

In his seminal article McCalla described the international wheat market during the 1950s and 60s as a cooperative duopoly with Canada the price leader, the U.S. a price follower and a fringe of other competitors acting as price-takers. Market power was defined as the willingness and ability to hold stocks. Both the U.S. and Canada had relatively large storage capabilities and did undertake extensive storage, thereby giving these countries market power. Both countries had an objective to maximize exports subject to the implied duopoly relationship. Canada set prices with the U.S. adjusting prices within a zone of cooperation. The market structure yielded a deterministic solution for prices and exports. However, the duopolists' demand function was the residual from the aggregate demand and supply

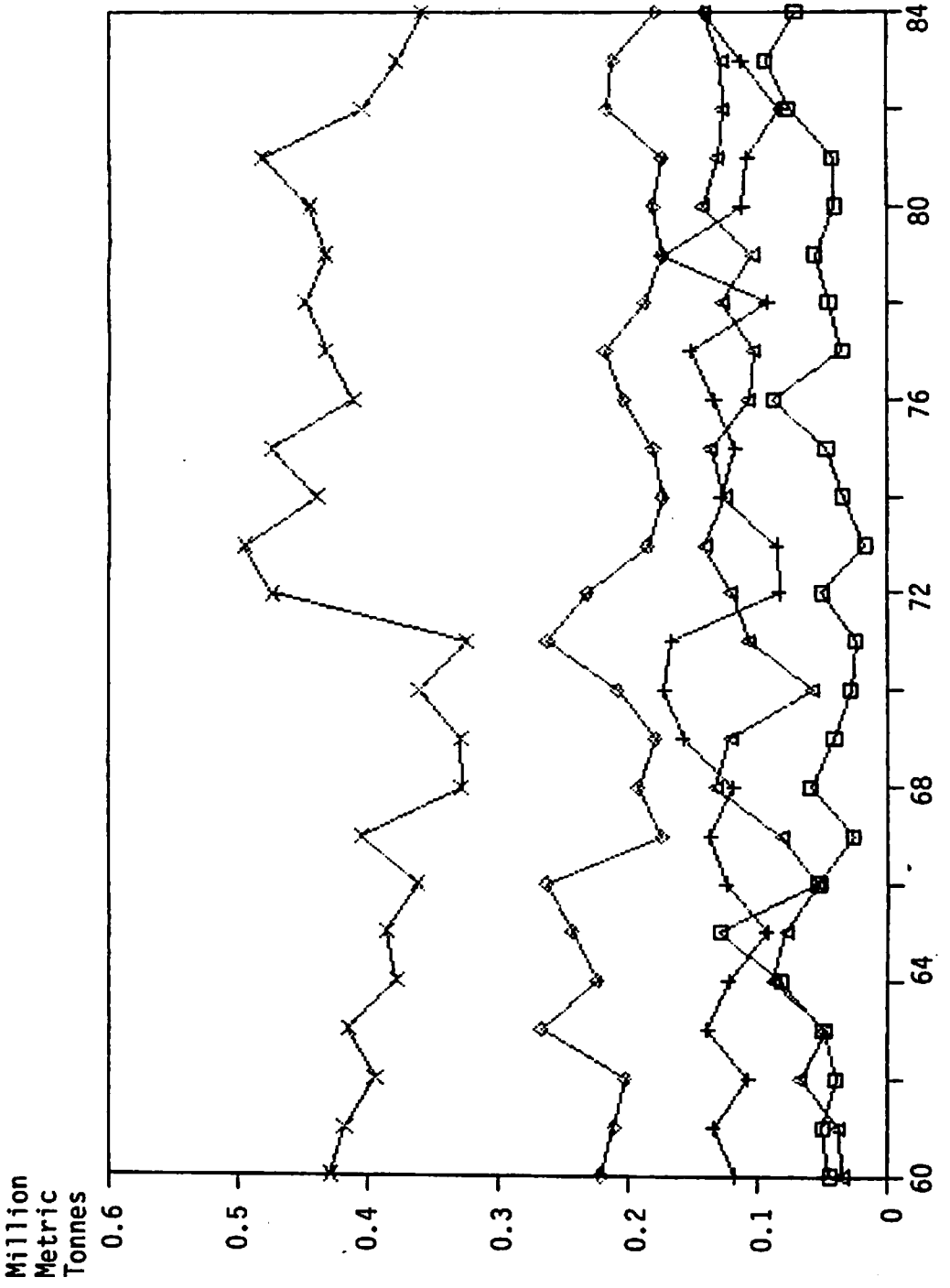

Figure 2. Market Share of Wheat Exports (of Major Exporters), 1960-1984.

TABLE 2. MARKET SHARE OF MAJOR EXPORTERS OF WHEAT, 1960-84

Year	Argentina	Australia	Canada	France	U.S.
	percent				
1960	5	12	22	4	43
1961	5	13	21	4	42
1962	4	11	20	7	40
1963	5	14	27	5	42
1964	8	12	23	9	38
1965	13	9	24	8	39
1966	6	13	26	5	36
1967	3	14	17	8	41
1968	6	12	19	13	33
1969	4	16	18	12	33
1970	3	17	21	6	36
1971	3	17	26	11	33
1972	5	8	23	12	47
1973	2	9	19	14	50
1974	3	13	17	13	44
1975	5	12	18	14	48
1976	9	13	20	11	41
1977	4	15	22	10	43
1978	5	9	19	13	45
1979	6	17	17	10	43
1980	4	11	18	14	45
1981	4	11	17	13	48
1982	8	8	22	13	40
1983	9	11	21	13	38
1984	7	14	18	14	36

SOURCE: Foreign Agricultural Circular, Grains World Grain Situation and Outlook, Various Issues.

function of the fringe, and increases in the later had a destabilizing influence.

This market structure was facilitated by a very active International Wheat Agreement (IWA) which established price ranges and values. In addition the U.S. actively used export subsidies to establish export values relative to Canadian, for hard red spring and for the other classes of U.S. wheat. Being the IWA reference price was for No. 1 Northern (Canada), effectively Canada set the daily price for high protein wheat and the U.S. established prices for other classes. The fringe acted as price-takers selling all their exportable supplies. Thus, Canada was viewed as the price leader.

Ten years later Alaouze et al. postulated the international wheat market as a triopoly with Canada the price leader. Three pieces of evidence supported this market structure. First, the storage capability of Australia was increased in the post 1966-67 period. Increased storage capacity was

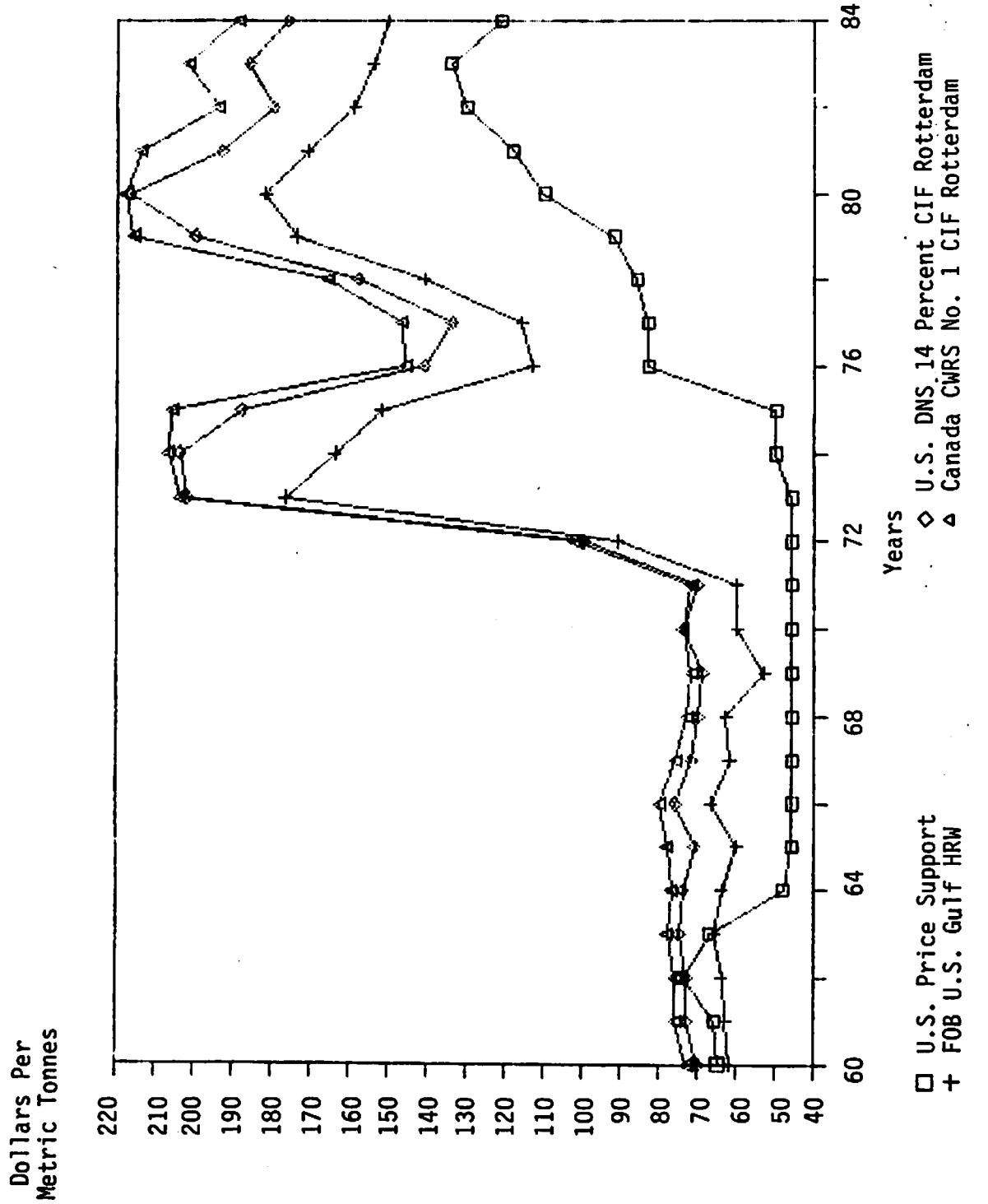

Figure 3. Selected World Wheat Prices, 1960-1984.

TABLE 3. SELECTED WORLD WHEAT PRICES

Marketing Years[1]	Price Support	FOB U.S. Gulf HR Wheat	CIF Rotterdam U.S. DNS 14%	CIF Rotterdam Canada CWRS No. 1
	$/MT			
1960	65	62	--	73
1961	66	63	--	76
1962	74	64	--	76
1963	67	66	75	78
1964	48	64	74	77
1965	46	60	71	78
1966	46	67	76	80
1967	46	62	--	76
1968	46	63	70	73
1969	46	53	69	72
1970	46	60	74	74
1971	46	60	70	72
1972	46	91	100	102
1973	46	177	202	--
1974	50	164	204	207
1975	50	152	188	206
1976	83	113	141	146
1977	83	116	134	147
1978	86	141	158	166
1979	92	174	200	216
1980	110	182	217	218
1981	118	171	193	214
1982	130	159	180	194
1983	134	154	186	202
1984	121	150*	176*	189*

*Preliminary.

[1]July/June until 1976, July, May thereafter.

SOURCE: International Wheat Council, Various Reports.

viewed as a prerequisite to market power. Second, it appeared that Australia had adopted a policy to not liquidate their exportable stocks in each marketing year. This was especially apparent during 1968-69 when they increased carryover stocks to prevent a price war. Third, informal quarterly meetings between Canada and the U.S. regarding price and market shares now included Australia.

The model was deterministic by assuming that Canada was the price leader with an objective of maximizing revenue. In the period after 1972 the triopoly no longer functioned for a number of reasons. Of primary importance

was that the large surpluses were nearly eliminated due to the large grain purchases of the USSR. Market power required stockholding and being all stocks were drastically reduced, prices and exports were thereafter determined by competition.

More recently, Oleson examined the structural characteristics of the intentional wheat market and split it into three periods: 1953-62, 1963-72, and 1972-current. Unlike the others he placed a great deal of importance on the role of heterogenous wheat quality in the establishment and maintenance of market power. All of the other studies recognized the potential substitutability of wheat by class and origin but ultimately assumed them to be homogenous.

In the 1953-62 period, Canada's predominance in high protein wheat allowed them a greater ability to exercise market power. Price ranges were established via the IWA with No. 1 Northern being the reference class. Canada was the price leader setting and publishing daily prices. During this period most of their sales were to international traders and thus the daily "card price" was an accurate indicator of transaction prices. The U.S. having limited supply of higher protein wheats, accepted Canadas' price leadership, and established export prices for other classes using an active day-to-day export subsidy scheme. Fringe competitors had limited storage and followed a policy of minimizing year-end stocks (Oleson p. 100). During this period the demand for higher protein wheat was inelastic and supplies from sources other than Canada were limited.

From 1963-72 the structure of the international wheat market was in transition. Canada's role as price leader eroded due to both supply and demand factors related to the higher protein wheat market. The U.S., and to a lesser extent Australia, increased their capability of producing higher protein wheat. In addition, the Chorleywood process was introduced in the baking industry in the UK in the early 1960s and adopted elsewhere in ensuing years. This technological change resulted in reduced demand for higher protein wheats. The combination of these meant a gradual reduction in the market power previously maintained by Canada. In addition a price war evolved during the mid-1960s and the International Wheat Agreement eventually broke down. Meanwhile the U.S. became dissatisfied with their market share and made a very significant policy change decreasing its loan rate to 130¢/bushel. U.S. domestic prices were now closer to world prices requiring less of an export subsidy, and in some years none (see Figure 3). Canada tried to retain its role as a price leader during this period but her efforts were increasingly futile. The most recent period, from 1972 to current, was a transition from market determination of prices and exports to the U.S. becoming the recognized price leader in recent years. Several factors contributed to this transition. First, there was a tremendous expansion in export demand due to grain purchases by the USSR which were absorbed mostly by the U.S. Second, the mechanism for administering export subsidies in the U.S. was suspended in 1972. Thus, this marked an end to the day-to-day interaction between U.S. and Canadian agencies in price establishment. The U.S. policy was for open market pricing subject to the effects of loan rates, target prices, supply control, and storage payments. In this action the U.S. became the price leader with prices determined in cash and futures markets, subject to the operation of government programs, which became world reference prices for different classes. The third important factor was that during the early

1970s, Canada's exports were restricted due to logistics and transportation problems which served as constraints and had an overriding influence on their stockholding decisions. Decisions were made in the mid-1970s to solve these problems and thereafter the apparent Canadian strategy was to export according to their transportation capabilities, as opposed to stockholding. This was an indication of their perceived reduction in market power and Canada essentially became a part of the competitive fringe. It was during this period that Canada, as part of their strategy, expanded their use of long-term bilateral agreements. The "card price" no longer played a central role in pricing since an increasing majority of the transactions were made in government-to-government negotiations. The Canadian Wheat Board (CWB) recognized this as an advantage given that the main competitor set their prices openly through the market. The CWB could now move their target quantities by slightly undercutting visible open market prices which are obviously an important part of all negotiations (Oleson).

In summary, international competition in the wheat market has evolved from a duopoly between Canada and the U.S. with the former the price leader, to what appears now the U.S. being the price leader. A number of important factors contributed to this evolution. One was that the earlier International Wheat Agreements played important roles in pricing and exports and was a main facilitator of Canada's price leadership. More recent Wheat Agreements have been of minimal influence with the exception of informational exchange. Concurrently, the market condition for higher protein wheat was changing in such a way that Canada's market power was eroded. Indeed, premiums traditionally received from Canadian wheat have gradually reduced.[3] Another important factor contributing to the evolution was that use of the daily export subsidy in the U.S. was suspended in 1972. In the ensuing years the U.S. loan rate became an increasingly important factor in the international price structure for wheat, even though its purpose was not primarily related to export competition.

Structural Characteristics of the Current Market

In the current market (during the last four years) the U.S. is viewed as the price leader, albeit in a passive role, whereby the interaction of cash and futures markets subject to the loan rate program determine transaction prices. The purpose here is to describe price and quantity determination in a market structure with the U.S. being the price leader, all other exporters being the competitive fringe. The model is described briefly first, and then several important comparative static effects are discussed. In the next section evidence is discussed which supports this type of market structure.

The structural characteristics are based on the dominant firms' price leadership model (see Scherer for a more general description). In any oligopolistic market structure it is necessary to have some mechanism for communication. In this case the U.S. is posed as the price leader and prices

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[3]In the period 1964-72 Canadian wheat commanded a 5.1 percent premium over the world average; this decreased to 2.4 percent during 1973-80 (Canadian Grain Council, p. 117).

are determined through the operation of the market subject to the effects of loan rates. However, due to the somewhat rigid nature of the loan rate, certainly within a year and to some extent between years, the U.S. plays a passive role in pricing in the export market. The competitive fringe includes all other exporters who export along their excess supply function acting as price-takers. Each member of the competitive fringe acts independently and is individually too small to have a perceptible influence on price through their output decisions. Price differentials do evolve in this market structure due to product heterogeneity.

Graphical solution to the model is shown in Figure PL1. S_{cf} is the aggregate supply function for the competitive fringe. In particular it is the aggregation of the excess supply function for each of the competing exporters. D^A is the aggregate export demand function for wheat, drawn to be relatively inelastic. The effective demand function for the U.S., the price leader is the residual of D^A and S_{cf}, and represented by ABD^A. If the U.S. aggressively pursued an objective of maximize export revenue, prices would be at the point of unitary elasticity on the effective demand function ABD^A. In addition, optimal prices would vary with shifts in either the competitive fringe supply, S_{cf}, or aggregate export demand, D^A.

Given prices at P_{1r} which are determined via the U.S. loan rate mechanisms, equilibrium is achieved. The demand function for the competitive fringe is perfectly elastic at P_{1r} and they export OQ_{cf}. U.S. exports are at OQ_{us} with aggregate exports at $OQ_A = OQ_{us} + OQ_{cf}$. Prices are determined by the interaction of U.S. supply and demand subject to the effects of the loan program. If equilibrium prices in the U.S. exceed P_{1r}, then prices and exports are determined through competition. Figure PL2 shows this case where equilibrium prices $P_1 > P_{1r}$ and exports are OQ_{us1} and OQ_{cf1} for the U.S. and competitive fringe, respectively. On the other hand with a larger U.S. supply, S^{us2}, P_{1r} becomes the world price. Exports from the competitive fringe are reduced (a movement along their supply function) and those from the U.S. increase. Equilibrium price is P_{1r} and the U.S. accumulates stocks. Thus, the model allows for equilibrium prices greater than or equal to the U.S. loan rate, but in both cases members of the competitive fringe act as price takers.

An important factor influencing changes in exports in the assumed price leadership model is that of exogenous changes in aggregate exports. D^{A1} in Figure PL3 represents an increase in aggregate demand relative to D^A. As a result the effective demand for the U.S. becomes $A^1 B^1 D^{A1}$. With price at P_{1r}, U.S. exports increase to $Q_{us}{}^2$, but exports for the competitive fringe would be unchanged. All of the increase in aggregate demand is realized by the U.S. Of course if demand increases far enough, prices would exceed P_{1r} and equilibrium would be the same as that in Figure PL2. Similarly, if aggregate demand shifts towards the price axis, all of the decrease would be absorbed by the U.S. Changes in aggregate demand are absorbed by the U.S. when prices are determined by the U.S. loan rate mechanisms; i.e. the proportion of the change in aggregate demand absorbed by the U.S. exceeds that of the competitive fringe in the dominant country price leadership model with "sticky prices." This is primarily due to the rigidity of the loan rate as a pricing mechanism in export competition.

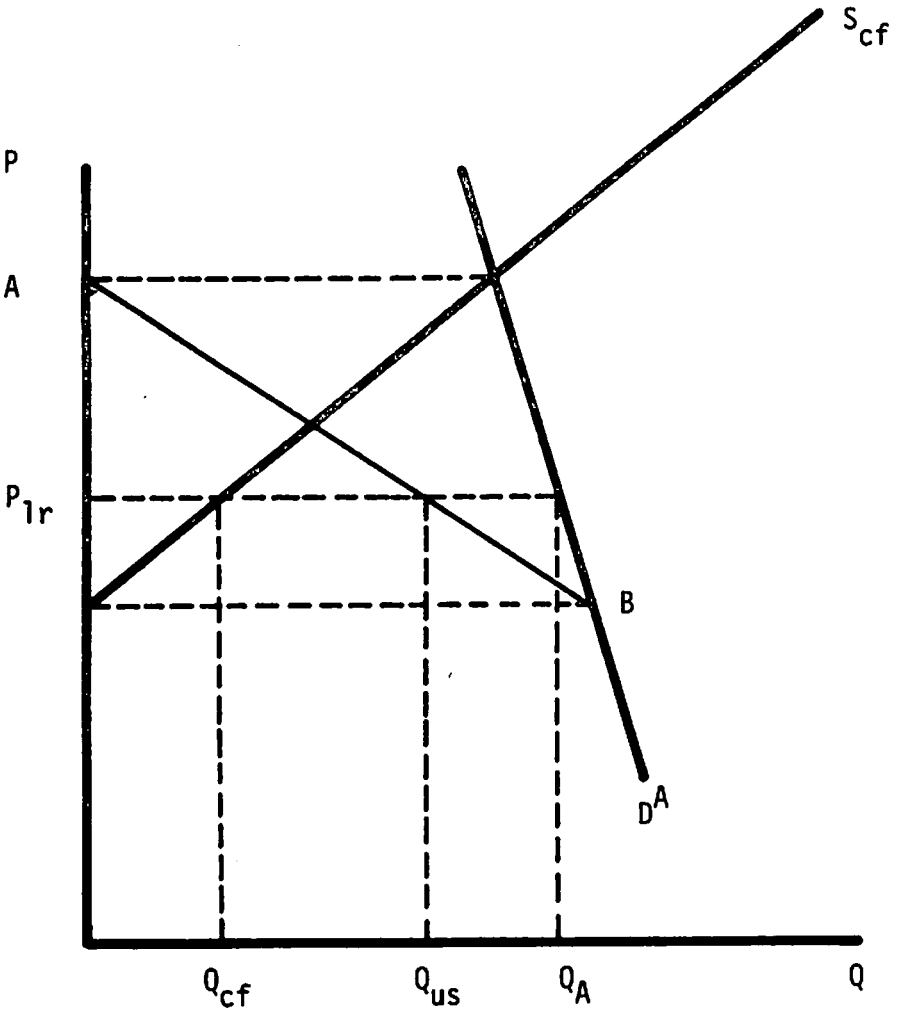

Figure PL1. Price and Determination of Exports Under U.S. Price Leadership.

Where S_{cf} = supply for competitive fringe

D^A = aggregate export demand

$D_{us} = ABD^A = D^A - S_{cf}$

Q_{cf} = quantity exported from competitive fringe

Q_{us} = quantity exported from U.S.

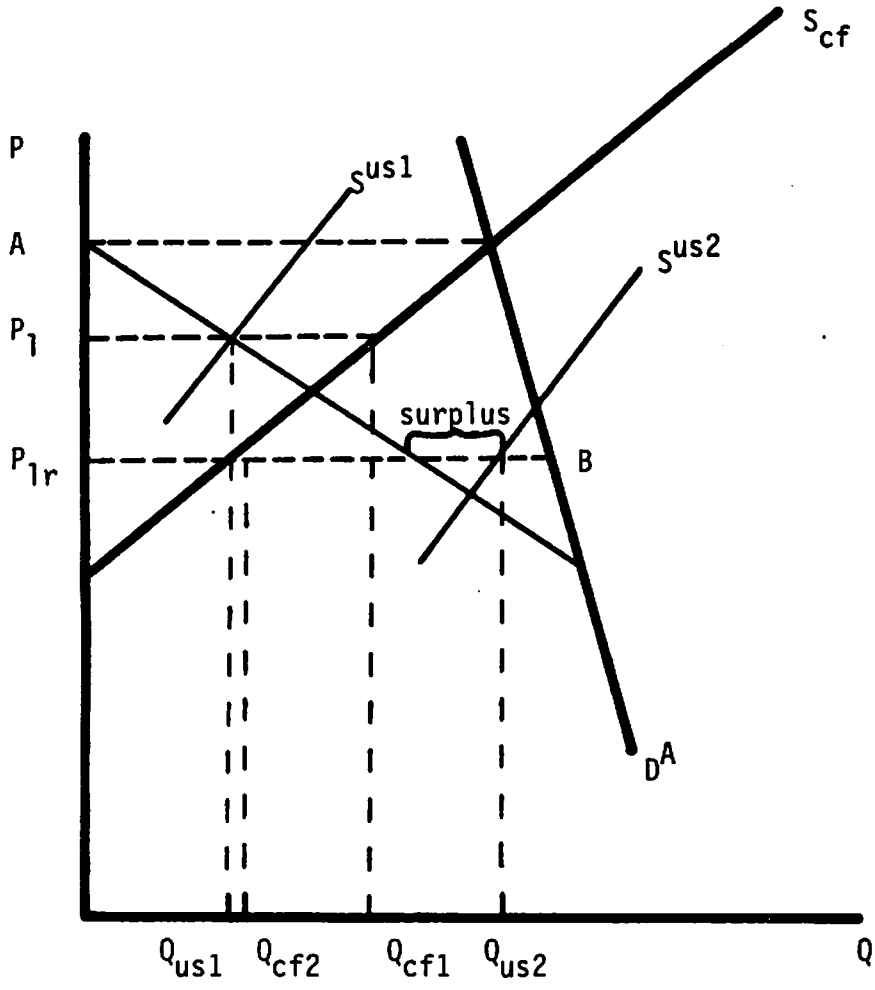

Figure PL2. Price and Determination of Exports Under U.S. Price Leadership: With Different Supply Functions for U.S.

Where S_{cf} = supply for competitive fringe

D^A = aggregate export demand

$D_{us} = ABD^A = D^A - S_{cf}$

Q_{cf} = quantity exported from competitive fringe

Q_{us} = quantity exported from U.S.

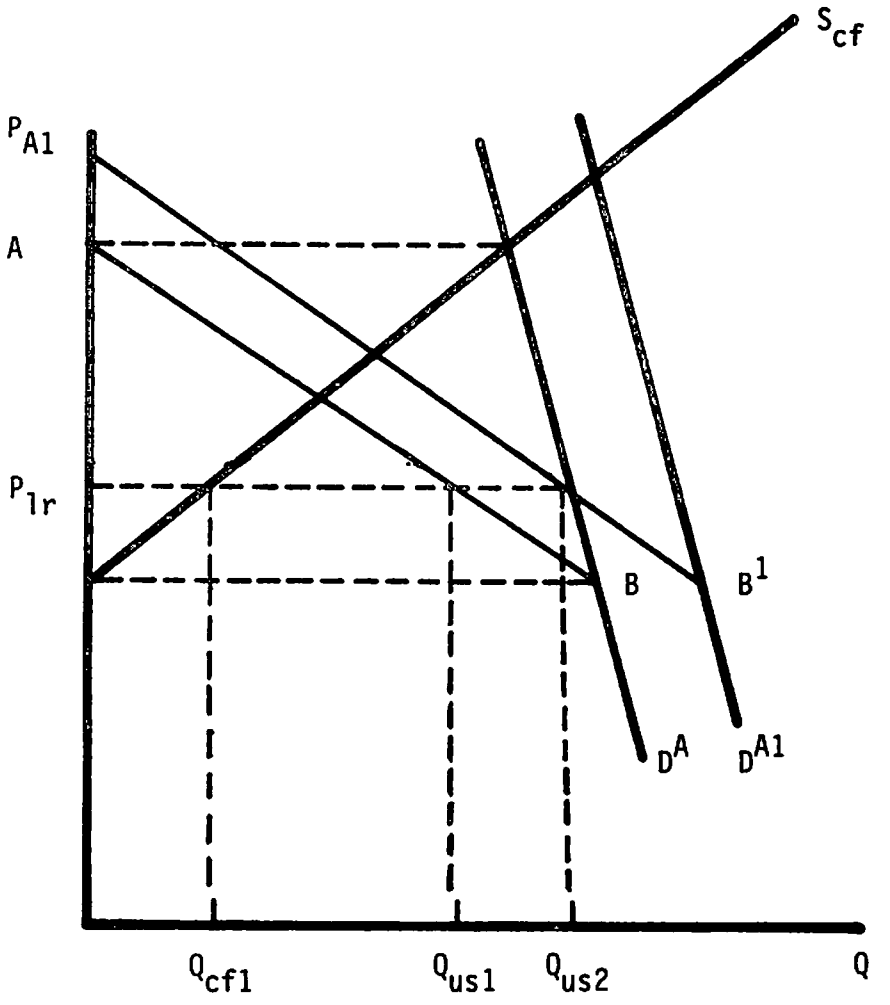

Figure PL3. Price and Determination of Exports Under U.S. Price Leadership: Changes in Aggregate Demand.

Where S_{cf} = supply for competitive fringe

D^A = aggregate export demand

$D_{us} = ABD^A = D^A - S_{cf}$

Q_{cf} = quantity exported from competitive fringe

Q_{us} = quantity exported from U.S.

Another important aspect of the dominant country price leadership model is the behavior of the supply function of the competitive fringe. A crucial determinant of the market power of the U.S. is the slope of S_{cf} assuming the price transmission elasticity exceeds zero. A more price elastic (inelastic) S^{cf} implies a more elastic (inelastic) effective demand function for the U.S. Likewise, a more price inelastic (elastic) D^A implies a more inelastic (elastic) effective demand for the U.S. Similarly shifts in S^{cf} result in shifts in the U.S. effective demand function. Technological improvements, government programs, changes in input prices all result in rightward shifts in S^{cf} and decreases in the U.S. effective demand function. Thus, U.S. market power depends on supply conditions of the competitive fringe, which is the appropriate interpretation of recent allegations that the U.S. is the "residual supplier."

Constraints in the logistics and transportation system of some exporters in the competitive fringe have played an important role in the international wheat market. Both Argentina and Canada have had constraints in their grain handling and transportation systems. Decisions were made in the mid-1970s to expand the capacity of the Canadian grain handling system, and by the early 1980s their objectives were met. Argentina continues to have seasonal problems, but the capacity has increased and efficiency improved significantly since 1979. Constraints in the logistical system for exports implies that at some point the excess supply function of the competitive fringe becomes very inelastic, or perfectly inelastic as shown in Figure PL4. The effect of logistical restrictions in the competitive fringe is for a relatively more inelastic effective demand function for the U.S. at higher prices (A^1BD^A in Figure PL4). Expansion of export capacity and increased efficiency means the perfectly inelastic portion of the export supply function shifts rightward (or is eliminated), which has the effect of mitigating the relatively inelastic portion of the effective demand function at higher prices.[4] Thus, market power for the U.S. which may have been apparent when some members of the competitive fringe had logistical constraints, has been reduced or eliminated in recent years as those problems have been solved.

The value of the U.S. dollar has an important influence on export competition. Throughout much of the 1970s the U.S. dollar was undervalued, and has become allegedly over-valued in the 1980s. Longmire and Morey incorporated the changing value of the dollar in a spatial equilibrium model assuming competitive conditions. Appreciation of the dollar was viewed as an effective ad valorem tax on U.S. exports, and was introduced as a rotation of the export demand function toward the price axis. The distinguishing feature of dollar valuation in the context of the price leadership model is that the U.S. export demand function itself is a residual. Thus, in deriving the effective U.S. demand function, the effect of the dollar on both aggregate demand and the competitive fringe supply must be captured (Figure PL5). Real appreciation of the dollar not only serves as a tax on the aggregate demand function (i.e., leftward shift), but also gives incentives to expand

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[4]These results differ if the dominant country has logistical constraints. In that case prices for the competitive fringe increase relative to that of the price leader.

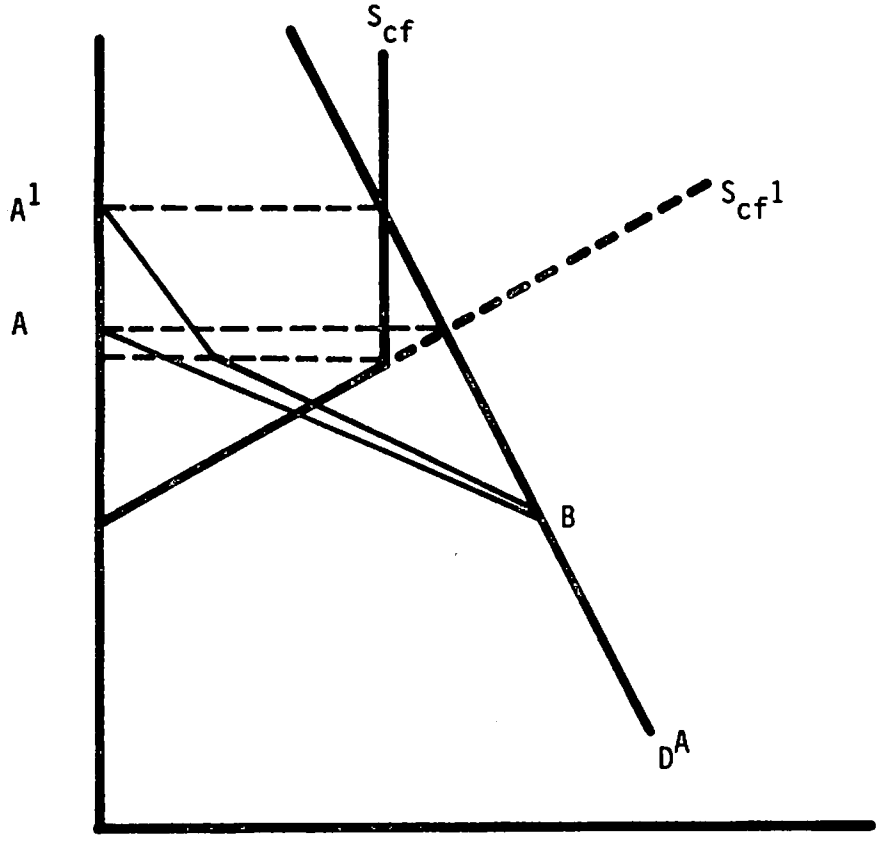

Figure PL4. Price and Determination of Exports Under U.S. Price Leadership: With Logistical Constraints in Competitive Fringe.

Where S_{cf} = supply for competitive fringe

D^A = aggregate export demand

$D_{us} = ABD^A = D^A - S_{cf}$

Q_{cf} = quantity exported from competitive fringe

Q_{us} = quantity exported from U.S.

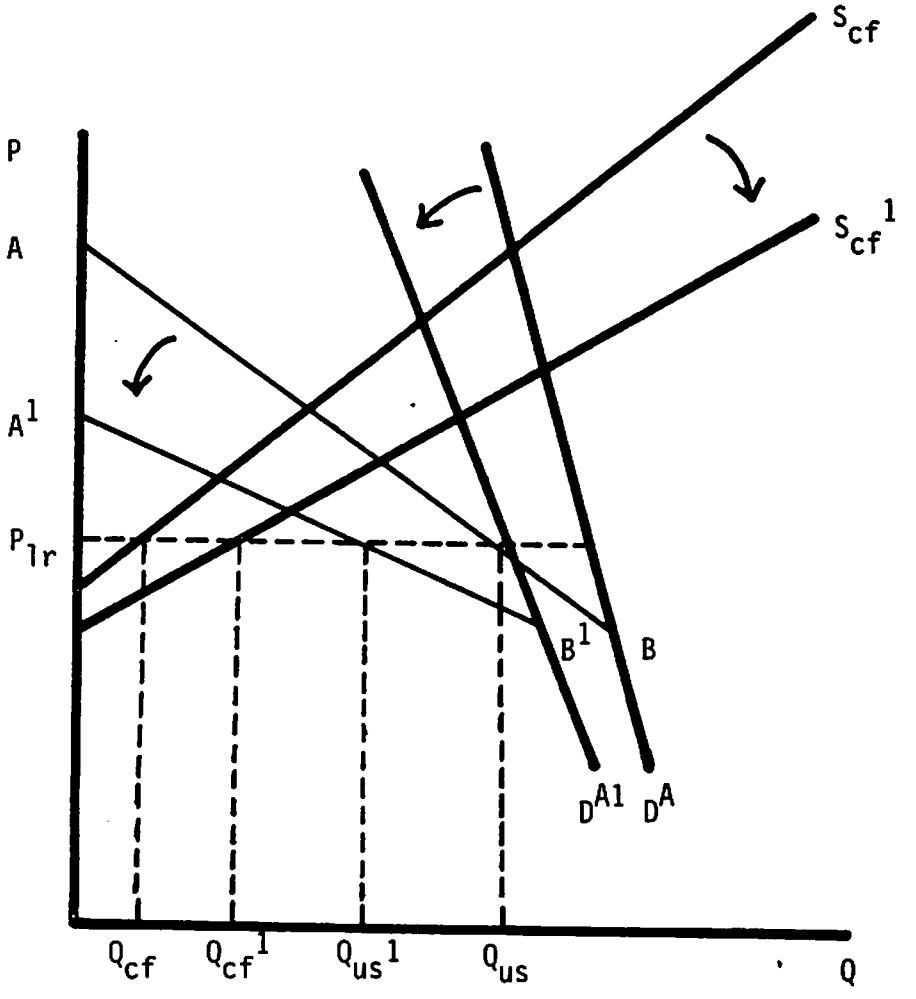

Figure PL5. Price and Determination of Exports Under U.S. Price Leadership: With An Appreciating U.S. Dollar.

Where S_{cf} = supply for competitive fringe

D^{A} = aggregate export demand

$D_{us} = ABD^{A} = D^{A} - S_{cf}$

Q_{cf} = quantity exported from competitive fringe

Q_{us} = quantity exported from U.S.

production in the competitive fringe.[5] The results are that the effective demand function for U.S. exports becomes more elastic. For a given price level (i.e., loan rate) in U.S. dollars the quantity produced and exported by the competitive fringe increases, and that exported from the U.S. decreases. Real appreciation of the dollar is equivalent to an ad valorem subsidy to foreign competition, rotating their supply function rightward. Of course real depreciation of the dollar would have opposite effects and the dynamics of adjustments including the likely irreversibilities would be of critical importance.

So long as members of the competition fringe act as price-takers and have positively sloped supply functions, the U.S. export price is critical. The above analysis is short-run static equilibrium. Long-run equilibrium depends on the cost characteristics of both the U.S. and members of the competitive fringe, and on price policies of the price leader. If prices transmitted to the competitive fringes are high enough to allow positive economic profits, their capacity and exports will increase. Several members of the competitive fringe in international wheat have taken measures to increase export capacity and logistical efficiency, increase productivity, and brought new land under cultivation, and some of these are undoubtedly irreversible. The ultimate result is that the dominant country will have a tendency to lose market share through time (Worcester). In the long run the dominant country price leadership model has a tendency to break down in the absence of aggressive pricing on the part of the leader to deter expanded production by the competitive fringe and other potential rivals. Therefore, the price leader cannot act passively in pricing policies (Malchup). The dominant country price leadership model is inherently unstable and will normally break up and become either a competitive, oligopolistic, or monopolistic market in the longer term.

Exporting Country Behavior and Competitive Strategies

The current wheat market is operating without an International Wheat Agreement and a U.S. loan rate program in the absence of an active export subsidy mechanism, both of which facilitated previous oligopolistic arrangements. It appears that the structure of competition in the international market for wheat is evolving to one characteristic of price leadership with the U.S. assuming that role, and a price-taking competitive fringe composed of all other exporters. This section provides evidence which would support this market structure.

Competitive Strategies

First the recent competitive strategy of each exporter is discussed. Each is discussed briefly with the exception of Canada and Argentina because it appears their role and/or policies have changed the greatest since the early 1970s.

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[5]The price transmission elasticity to producers in the competitive fringe is assumed ≥ 0 in this analysis.

United States

The United States has not pursued policies that directly affect market prices or exports since the late 1960s. In recent years loan rates have increased to equal or exceed world prices having the effect of decreasing U.S. exports despite increases in world trade. Thus, the U.S. policy towards exports has been fairly passive even though several attempts have been made to use short-term solutions (e.g., export PFK).

The implied competitive strategy of the U.S. has had several important components. First, the U.S. policy has had limited use of long-term bilateral agreements (LTA's). These have not been pursued as part of an export strategy though LTA's have been maintained with both the USSR and China. The use of credit for export sales, however, has been an important component of the competitive strategy. Traditionally PL-480 sales were concessional sales because of their repayment terms. In 1979 with the introduction of the GSM-102 program the U.S. policy toward credit changed from a system of government credit, to credit guarantees. In 1982 the "blended credit" program was introduced as a combination of GSM-102 and GSM-5, the latter being interest-free direct government credits (IWC). Under this program the commercial rates under GSM-102 were blended with the direct government credits under GSM-5. The proportion of sales under these credit programs increased from 14 percent of U.S. wheat and wheat exports in 1981/82 to 40 percent in 1982/83 and 37 percent in 1983/84. In recent years the U.S. has become the largest user of export credit measured in total and relative sales and are likely used to partly offset the relative value of U.S. prices in selected markets. Finally, the U.S. has periodically used or attempted to use other enhancement programs such as export PIK. The $2 billion BICEP program with selected offers to Algeria and Egypt are efforts at either offsetting unfair trade practices of other countries, or the relative uncompetitive position of the U.S.

Canada

As opposed to the U.S., Canada has explicitly pursued policies with the objective of expandng export sales. An interpretation of one of the objectives of the Canadian Wheat Board Act is to market as much grain as possible at prices it considers reasonable. McCalla (1979) interpretted their objective as to maximize producer revenue. In the 1950s-60s this was implemented subject to their perceived market power for high protein wheat and entailed holding stocks to support prices. More recently, however, it appears that their market power has diminished and their current strategy is to produce and market grains to fully utilize their grain handling and transportation system (Canadian Grain Council; Oleson; Canadian Wheat Board).

An important part of their competitive strategy in the 1970s was to increase the capacity of efficiency of the grain handling and transportation system. In the 1900s they held stocks as an exercise of market power. In the 1970s there was a tremendous expansion in aggregate demand, most of which was garnered by the U.S. allegedly because of the lack of and inefficient use of Canadian grain export capacity. Thus, the strategy in the 1970s was to expand capacity and increase the efficiency of the grain handling and transportation system. Interestingly these decisions were made in the 1970s based upon

studies or commissions initiated as early as 1969. In 1970 the Grain Transportation Technical committee recommended improvements in the grain handling system and increases in throughput capacity. The Block Shipping System was introduced in 1971 and played a major role in subsequent increases in logistical efficiency. In 1979 the Canadian Wheat Board purchased 2,000 covered hopper rail cars in a controversial decision, and export capacity has expanded with Prince Rupert and at other West Coast terminals. In 1976 our export target was set for 30 MMT of all grains and oilseeds by 1985, but this was met two years early. Another goal has been set to expand exports to 36 MMT by 1990 (IWC 6:4). The important point is that the capacity of the grain handling and transportation system was expanded to increase exports, recognizing that this had been a constraint, and that these decisions are irreversible and were based on decisions when the dollar was under-valued.

Credit sales of Canadian wheat have been limited relative to those of the U.S. comprising only 13 percent of wheat and wheat flour exports in 1983/84 (IWC). Credit is offered at commercial interest rate available to the Board from financial institutions in Canada. The most common repayment terms is for 10 percent down and payback in three annual installations. In order to meet competition the Board can revise some of the terms.

More important to the Canadian sales strategies is the increase in the use of LTAs since the 1970s. Canada has had LTAs with China and the USSR since 1961 and 1963, respectively. However, since the early 1970s the quantity sold under LTAs has increased tremendously. Following illustrates the use of LTAs for all grains (wheat, flour, durum, barley, and oats):

	Total LTA Committment Million MT	Excluding USSR and China
Pre-1970	15.0	0
1970-74	1.7	1.7
1975-79	7.0	3.6
1980-84	14.2	5.4

In addition the diversity of countries with LTAs has increased and now includes a number of smaller markets (e.g., Norway, Jamacia, East Germany). Related to administration of an LTA sale is the increased use of direct state-to-state negotiation over price, quality, and other delivery terms. Recently it has been estimated that as much as 80 percent of Canadian sales come under this type of arrangement. The purpose of increasing LTA sales has been to create "brand loaylty" in the Telser context, which is particularly important in declining markets. The effect is that increasingly prices are negotiated privately, obviously using U.S. prices for reference, and the daily "card price" of export offers has become increasingly of lesser importance (Oleson).

An important characteristic of the international competition was the dominance of Canada in markets for higher quality wheat. Indeed this is what allowed Canada to exercise market power and be the price leader in the 1960s.

Quality has two dimensions of importance in international market competition. One is the supply of high protein wheat which is used for blending. The other the preservation of quality throughout the marketing system. Due to strict licensing, cleaning, grading, blending, and other restrictions, Canada's wheat has gained the reputation as being superior in quality to the U.S. (Canadian Wheat Board). In recent years, there has been much discussion, although controversial and nonconclusive, related to the development of lower protein wheat specifically to compete with lower protein U.S. wheat (Canada Grains Council; Lloyns et al.). The purpose of introducing additional varieties would be to take advantage of growth markets which are perceived to be for lower protein wheats, and due to Canada's strict grading and handling system development of these varieties (e.g., Hy 320) would allow the CWB to penetrate these markets.

France

The export objective of France is difficult to discern because they are part of the EC and subject to provisions of the Common Agricultural Policy. Through the use of export subsidies it appears their objective is to dispose of exportable supplies at minimum cost (McCalla, 1979). Their strategy involves using subsidies to bring down the level of their domestic price to be competitive with world prices.

Though the EC does not grant credit for exports of grain, France does use credit as part of their competitive strategy. Recently about 30 percent of their sales were under credit arrangements. Credit has been granted to traditional markets (e.g., Egypt, Tunisia, and Morocco) to match credit offered by competing suppliers (IWC 3:9). Repayment is for 2-3 years with a COFACE (France Export Guarante Agency) guarantee of 95 percent and are at market rates of interest. France makes limited use of supply agreements.

Australia

Exports of wheat are marketed through the Australian wheat Board (AWB) which operates very similar to that of Canada. Their objective is traditionally stated as to maximize producer revenue (McCalla, 1979). Variable levels of supply and export logistical constraints have played an important role in the Australian export strategy. It appears that they undercut prices to the extent necessary to export sufficient amounts to minimize ending stocks. Thus, a minimal level of pipeline stocks are stored at year-end being dictated somewhat by export capacity, which has recently been expanded. As opposed to other countries, Australia makes limited use of export credit and LTA's account for only about 30 percent of export sales.

Argentina

Given the financial dilemma of Argentina it is fairly clear their export objective is to maximize export revenue. To do so exports are priced to minimize year-end stocks, and to make storage space available for soybeans, corn, and other fall harvested grains and oilseeds.

The agricultural policy in Argentina was relatively constraining in Argentina until 1976 when the military junta took over and gradually returned control to the private sector. Since then the agricultural policy has become much more export-oriented. Two major components of policy affecting agriculture include taxes on imports and exports, as revenue raising measures. This is in addition to use of a loan rate policy on wheat, though it is generally ineffective being it changes daily and in response to export market conditions. Prior to 1976 import taxes on most agricultural inputs exceeded 80 percent. The result was limited use of more productive technology, chemicals, seed, and fertilizer, thereby having a depressing effect on yields. Since then these taxes were gradually reduced and more recently are about 20 percent (Mielke). As a result yields have been increasing and are expected to accelerate in the future as technology is adopted. Export taxes are also used to raise revenue and are currently about 25 percent. These vary through time and in response to market conditions and in what appears to be an objective to maximize tax revenue. In addition to reducing import taxes, another pro-export decision was made in 1979 which would allow private sector ownership and/or leasing of export facilities. Prior to that time the capacity was limited and was inefficiently utilized and managed, thereby constraining exports. Though there are still logistical problems, primarily due to the lack of incentives to storage, there have been significant improvements in the efficiency of the exporting system.[6]

The export strategy in Argentina is primarily to price cheap enough to liquidate stocks. Most of the sales are priced to be shipped within the first half of the marketing year to allow room for subsequent harvested crops. There are no credit sales, however, LTAs have been used to comprise about 50 percent of sales. Recently there has been a thrust toward increased supply agreements and exchange arrangements among Latin countries.

Recent Competitive Fringe Behavior

Argentina, France, and to a lesser extent, Australia, have always been considered part of the price-taking competitive fringe. The discussion above and evidence presented below supports this alledged behavior. The actions of Canada, on the other hand, suggests that they no longer are in a position of exercising market power and do in fact act as a price-taker and are now part of the competitive fringe. The implication of this would suggest that the U.S., likely by default, has assumed the role of price leader with all other countries effectively matching the comparable CIF price which is determined through the interaction of cash and futures markets subject to provision of government program variables, primarily the loan rate. The following statements support the existence of the current market structure:

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[6]Despite the explosion at Bahia Blanca in March 1985, there were record shipments in April and May from the Argentina ports.

·The U.S. loan rate acts as a price floor, which raises the world price. Importing nations buy less because of the higher prices. Farmers in other exporting countries respond to the higher price by increasing production. It does not pay these nations to absorb the additional production by holding stocks, but instead they export it at a price just below the U.S. price umbrella (Paarlberg et al.)

The unique rule of the United States, which derives from its share of world wheat trade means it is both the "price setter" and also the "price-taker" in the sense that American exporters have to price their wheat more or less in line with the market. Most other grain exporting countries set their wheat export prices with reference to U.S. grain markets (International Wheat Council).

In the discussion which follows, selected data are presented which tentatively support the existence of a dominant country price leadership model with the U.S. the price leader, and all others being a part of the competitive fringe and are price takers.

When U.S. and world stocks become burdensome the U.S. has traditionally introduced supply control programs to reduce stocks and raise or maintain prices. In the past much of this burden of adjustment was by the U.S. and both Canada and Australia cooperated in attempted to reduce supply. Most notable were the supply control measures in 1970 (see Figure 4, Table 4). In more recent attempts at supply control and stock-reduction, the U.S. has not had cooperation from other major exporters. In particular, extensive acreage reductions programs affected the 1982, 1983, and 1984 crops in the U.S. However, no explicit steps were taken during those years to attempt to control supply. Canada, in fact, increased area planted in each of these years to wheat, and all other crops, through a reduction in summerfallow. Thus, it appears that the main competitors who have shared the burden of stock adjustment, are no longer willing to do so.

All of the competitors have had slightly positively trending yields since the 1970s indicating constant productivity growth (Table 5 and Figure 5). However, yields in France and Argentina appear to have accelerated in the most recent five years. Following is the average percentage increase in yields for the five-year period before and after 1980:

	Argentina	Australia	Canada	France	U.S.
	percent				
1975/1979	4.40	7.58	2.56	2.00	4.80
1980/1984	8.20	6.67	1.79	8.20	2.67

The reason for the phenomenal growth in productivity in France is likely related to more intensive fertilization responding to favorable price ratios (i.e., wheat to fertilizer). That in Argentina would be due at least in part to the policy changes in the mid-1970s reducing import taxes and encouraging increases in productivity.

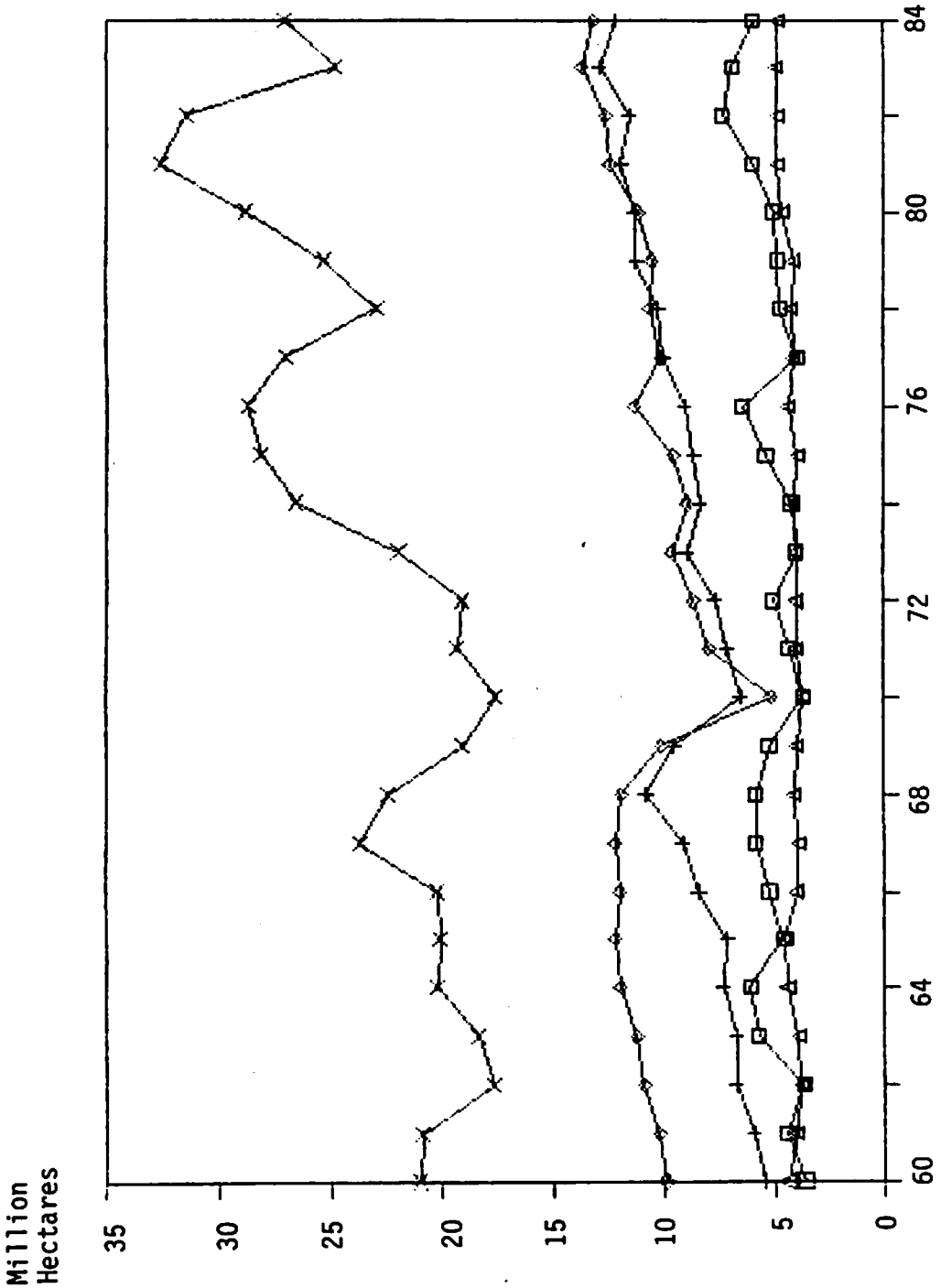

Figure 4. Area Harvested by Major Wheat Exporters, 1960-1984.

TABLE 4. AREA HARVESTED FROM MAJOR EXPORTERS OF WHEAT, 1960-84

Year	Argentina	Australia	Canada	France	U.S.	World
	Million Hectares					
1960	3.6	5.4	9.9	4.4	21.0	202.2
1961	4.4	5.9	10.2	4.0	20.9	203.4
1962	3.7	6.7	10.9	3.8	17.7	206.9
1963	5.7	6.7	11.2	3.9	18.4	206.3
1964	6.1	7.3	12.0	4.4	20.2	215.9
1965	4.6	7.1	12.2	4.5	20.1	215.5
1966	5.2	8.4	12.0	4.0	20.2	213.7
1967	5.8	9.1	12.2	3.9	23.7	219.3
1968	5.8	10.8	11.9	4.1	22.4	223.9
1969	5.2	9.5	10.1	4.0	19.1	217.8
1970	3.7	6.5	5.1	3.7	17.6	207.0
1971	4.3	7.1	7.9	4.0	19.3	212.9
1972	5.0	7.6	8.6	4.0	19.1	211.0
1973	4.0	8.9	9.6	4.0	21.9	217.2
1974	4.2	8.3	8.9	4.1	26.5	220.1
1975	5.3	8.6	9.5	3.9	28.1	225.4
1976	6.4	9.0	11.3	4.3	28.7	233.2
1977	3.9	10.0	10.1	4.1	27.0	227.1
1978	4.7	10.2	10.6	4.2	22.9	228.9
1979	4.8	11.2	10.5	4.1	25.3	228.3
1980	5.0	11.3	11.1	4.6	28.8	236.8
1981	5.9	11.9	12.4	4.8	32.6	239.3
1982	7.3	11.5	12.6	4.8	31.5	238.5
1983	6.9	12.9	13.7	4.9	24.8	230.1
1984	5.9	12.2	13.2	4.8	27.1	231.5

SOURCE: Foreign Agricultural Circular, Grains: World Grain Situation and Outlook, Various Issues.

The willingness and ability to carry stocks from one season to another has traditionally been accepted as a prerequisite to market power (McCalla, 1966; Alaouze et al.). Canada, for example, maintained very large stocks in the 1960s alledgedly due to the price leadership activities. Other exporters being part of the competitive fringe minimized their levels of ending stocks. Table 6 and Figure 6 show ending stocks for major wheat exporters since 1960. Ending stocks have generally been increasing in the U.S. since 1973, becoming fairly high in recent years. The projected level of ending stocks is expected to increase further in 1985/86 to 42.2 MMT. There is no apparent trend in stocks with either Argentina or France which illustrates their implicit policies of minimizing year-end stocks. Australia has also maintained a policy in recent years of minimizing year-end stocks, despite their relatively volatile production. In the past two years stocks increased to abnormally large levels. However, this increase was by default and was due to the record large production in 1983/84 which was abnormally low in quality and it took more than one marketing year to dispose of it as feed wheat. Consequently,

TABLE 5. WHEAT YIELD FOR MAJOR WHEAT EXPORTERS AND WORLD AVERAGE

Year	Argentina	Australia	Canada	France	U.S.	World
	Metric Tonnes Per Hectare					
1960	1.16	1.37	1.42	2.5	1.76	1.18
1961	1.29	1.13	1.50	2.4	1.60	1.10
1962	1.52	1.25	1.42	3.1	1.68	1.22
1963	1.58	1.34	1.76	2.7	1.70	1.13
1964	1.84	1.38	1.36	3.2	1.73	1.25
1965	1.32	1.00	1.54	3.3	1.78	1.22
1966	1.20	1.51	1.87	2.8	1.76	1.44
1967	1.26	0.83	1.32	3.6	1.74	1.36
1968	0.98	1.36	1.49	3.7	1.92	1.48
1969	1.35	1.11	1.81	3.6	2.06	1.42
1970	1.33	1.22	1.79	3.5	2.08	1.52
1971	1.32	1.21	1.83	3.9	2.28	1.65
1972	1.39	0.87	1.68	4.6	2.20	1.63
1973	1.66	1.34	1.69	4.5	2.12	1.72
1974	1.41	1.37	1.49	4.6	1.83	1.64
1975	1.63	1.40	1.80	3.9	2.06	1.58
1976	1.71	1.32	2.10	3.8	2.04	1.81
1977	1.46	0.94	1.96	4.2	2.06	1.69
1978	1.73	1.77	2.00	5.0	2.11	1.95
1979	1.69	1.45	1.64	4.8	2.30	1.86
1980	1.55	0.96	1.73	5.2	2.25	1.87
1981	1.40	1.38	2.00	4.8	2.32	1.87
1982	2.05	0.77	2.13	5.2	2.39	2.01
1983	1.79	1.68	1.94	5.3	2.65	2.13
1984	2.24	1.54	1.61	6.9	2.61	2.22

SOURCE: Foreign Agricultural Circular, Grains: World Grain Situation and Outlook, Various Issues.

there has not been a change in policy regarding stockholding. On the other hand there appears to have been a change in Canada's stockholding policy which became somewhat apparent in the 1980s, though stockholding in these years were partly affected by constraints in the export logistics. The change in policy has become very apparent in the last several years during which transportation was not a constraint and ending stocks have been reduced to 7.2 MMT in 1984/85, which would be a record minimum. Canada does have a tendency to maintain higher stocks than other members of the competitive fringe, but there has been a definite change in policy from the 1960s when ending stocks averaged 14.4 MMT, to the 1980s when ending stocks in each year were less than or equal to 10.0 MMT.

Another way to examine and compare stockholding patterns of exporters is the stocks/production ratio. This indicates the amount of ending stocks relative to production, which captures increases in the latter through time. Table 7 and Figure 7 shows these data for each of the major exporters. The

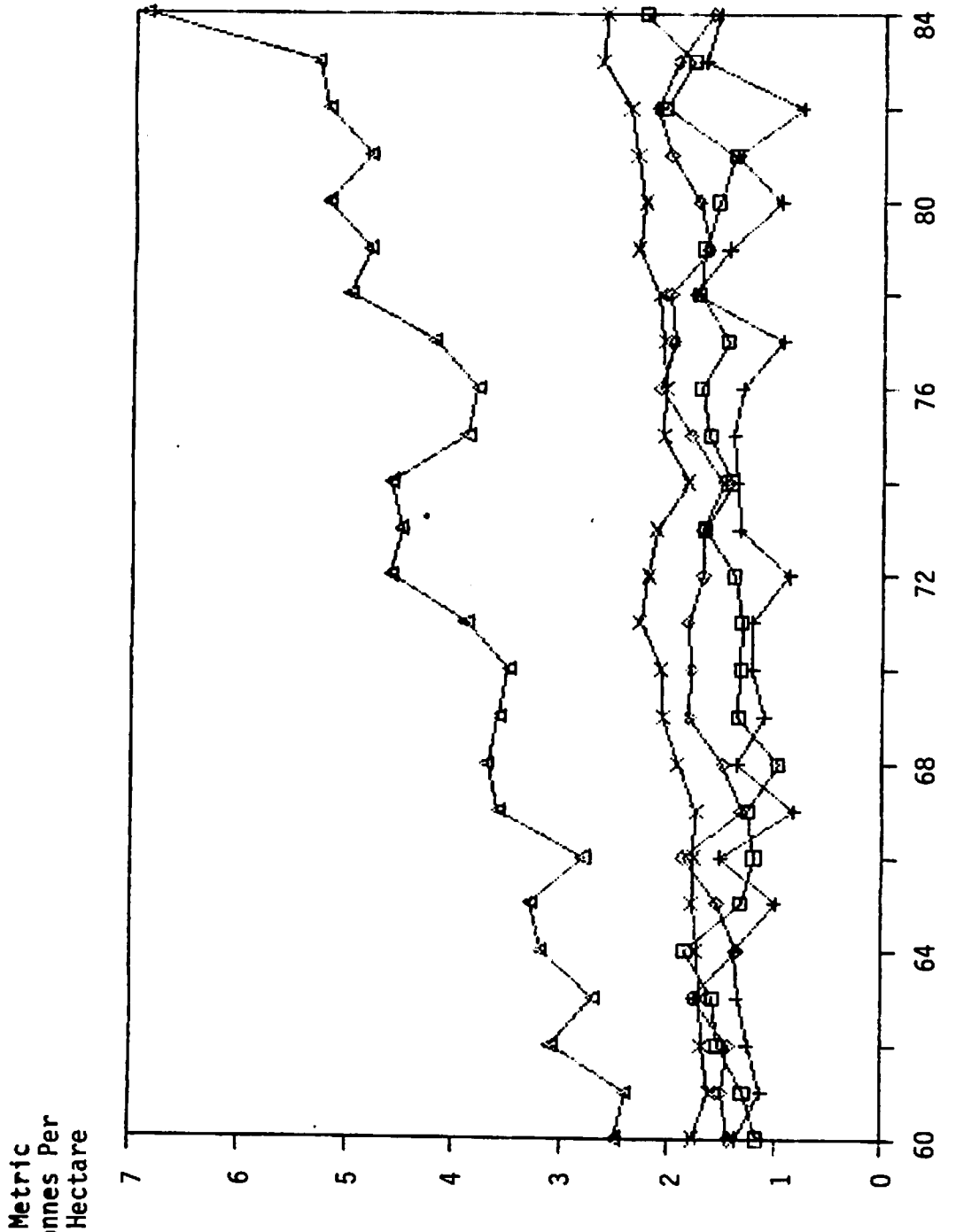

Figure 5. Yield by Major Wheat Exporters, 1960-1984.

TABLE 6. ENDING STOCK FOR MAJOR WHEAT EXPORTERS AND WORLD TOTAL

Year	Argentina	Australia	Canada	France	U.S.	World
	Million Metric Tonnes					
1961	0.2	0.8	10.6	1.4	36.0	70.2
1962	0.5	1.0	13.3	2.9	32.5	74.0
1963	2.2	0.9	12.5	1.9	24.5	67.8
1964	3.3	1.0	13.9	1.7	22.2	76.2
1965	0.2	0.8	11.4	2.4	14.6	55.3
1966	0.2	2.5	15.5	1.4	11.6	82.1
1967	1.0	1.7	18.3	1.2	14.7	90.6
1968	0.9	7.6	13.4	1.3	22.2	115.0
1969	0.8	7.5	18.3	0.8	24.1	97.8
1970	0.7	3.7	20.0	1.0	22.4	74.2
1971	0.4	1.6	15.9	1.5	26.8	81.0
1972	0.3	0.6	9.9	1.5	16.2	62.6
1973	1.0	2.0	10.1	1.4	9.3	70.2
1974	0.7	1.7	8.0	3.0	11.8	63.7
1975	0.7	2.7	8.2	1.3	18.1	64.2
1976	1.6	2.1	13.3	1.6	30.3	99.8
1977	1.2	0.8	12.1	1.5	32.1	84.2
1978	1.1	4.6	14.9	2.8	25.1	100.9
1979	0.4	4.3	10.7	2.4	24.5	81.0
1980	0.4	2.0	8.6	2.5	26.9	78.2
1981	0.8	4.9	9.8	1.5	31.5	85.1
1982	1.1	2.4	10.0	2.9	42.2	96.4
1983	0.7	7.4	9.2	1.3	38.1	98.5
1984	0.7	7.9	7.2	4.5	38.2	110.4

SOURCE: Foreign Agricultural Circular, Grains: World Grain Situation and Outlook, Various Issues.

U.S. stocks/production ratio has been increasing since 1980 and is currently at 0.54. There appears to be no apparent trend for either Australia or France. However, the stocks/production ratio has decreased significantly since 1980 for both Canada (Figure 7a) and Argentina. The reduction for Canada is fairly sharp with an average value of 0.91 in the 1960s and 0.38 in the 1980s. These observations would suggest and support a definite change in export policy in the case of Canada which has become fairly apparent in the 1980s, though it may have been building since the early 1970s. It appears that the Canadians have recognized their limited ability to influence prices through stockholding, have improved their grain handling and transportation system, and now behave as a price-taking member of the competitive fringe.

In the past year much anxiety has been raised about the proposed shipment of Argentine wheat to the U.S. Allegations were raised that the shipment was economical only because of unfair subsidies, but in fact none were applicable. In fact, the export tax policy in Argentina should have detracted from the economics of the sale. The proposed transaction was very

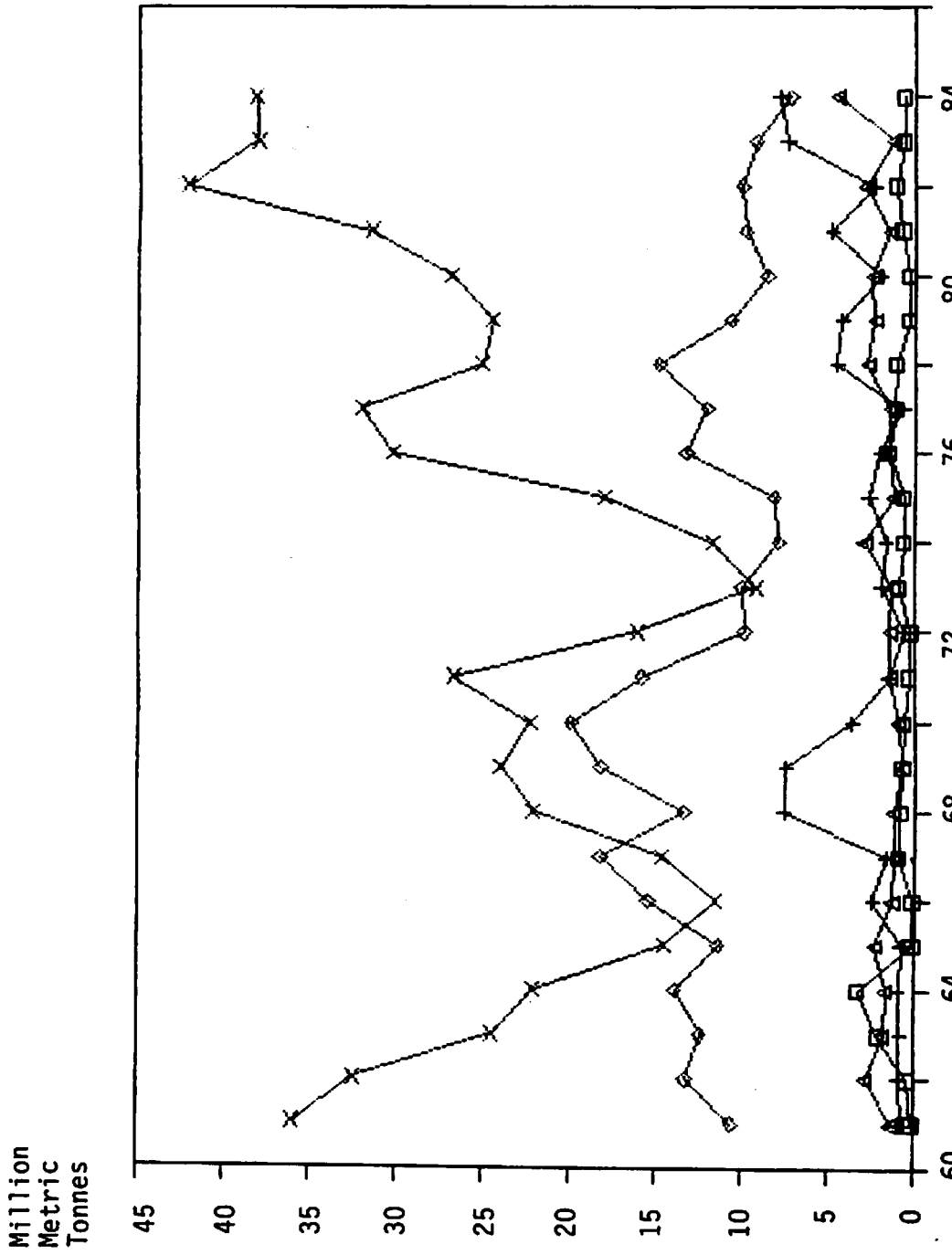

Figure 6. Ending Stocks of Wheat (by Major Exporters), 1960-1984.

TABLE 7. STOCK/PRODUCTION RATIO OF MAJOR WHEAT EXPORTERS AND WORLD AVERAGE

Year	Argentina	Australia	Canada	France	U.S.	World
	percent					
1960	19	13	117	18	104	34
1961	14	12	138	15	107	31
1962	14	12	86	21	109	29
1963	9	10	63	19	79	29
1964	7	10	85	12	64	28
1965	13	11	64	16	41	21
1966	13	20	69	12	33	27
1967	11	23	114	8	36	30
1968	14	51	76	9	52	35
1969	11	71	101	6	61	32
1970	16	47	222	8	61	24
1971	14	19	110	10	61	23
1972	12	9	68	8	38	18
1973	12	17	62	8	20	19
1974	13	15	56	16	24	18
1975	9	23	48	9	31	18
1976	7	18	56	10	52	24
1977	14	9	61	9	58	22
1978	10	25	71	13	52	23
1979	10	27	62	12	42	19
1980	10	18	45	11	42	18
1981	10	30	40	7	42	19
1982	5	27	37	12	56	20
1983	7	34	35	5	58	20
1984	6	26	34	14	54	21

Note: The stock/production ratio is derived by dividing ending stocks by production.

SOURCE: Foreign Agriculture Circular, Grains: World Grain Situation and Outlook, Various Issues.

consistent with the price-taking behavior of competitive fringe sellers--in the case of Argentina it is actually individual producers which comprise the fringe. Of particular importance is not the transaction itself but the mere fact that it was an economical arbitrage.

Little attention has been given to recent expanded imports of Canadian wheat to the U.S. In the 1970s there were generally very little wheat exports from Canada to the U.S. with only periodic "border sales." In the past three years, however, exports have increased substantially (Table 8). The first large transaction was made in 1982/83 and was frost-damaged wheat. Even though it was sold as "special bin" much of it went into commercial milling channels. In 1984/85, the imports through June were 145,000, were comprised of traditional milling wheat, and shipments were concentrated during April,

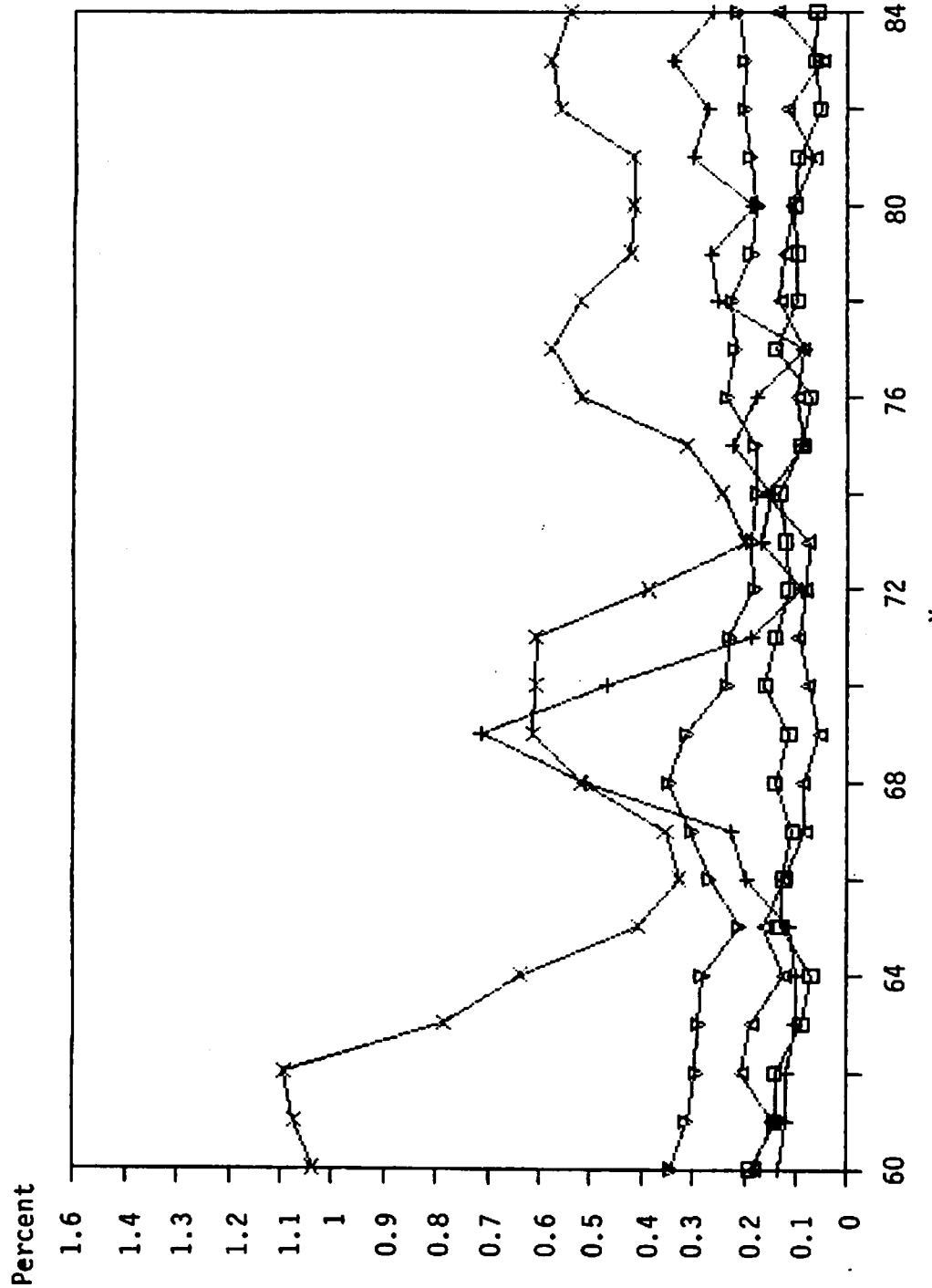

Figure 7. Stocks Divided by Production (Ratio for Major Exporters), 1960-1984.

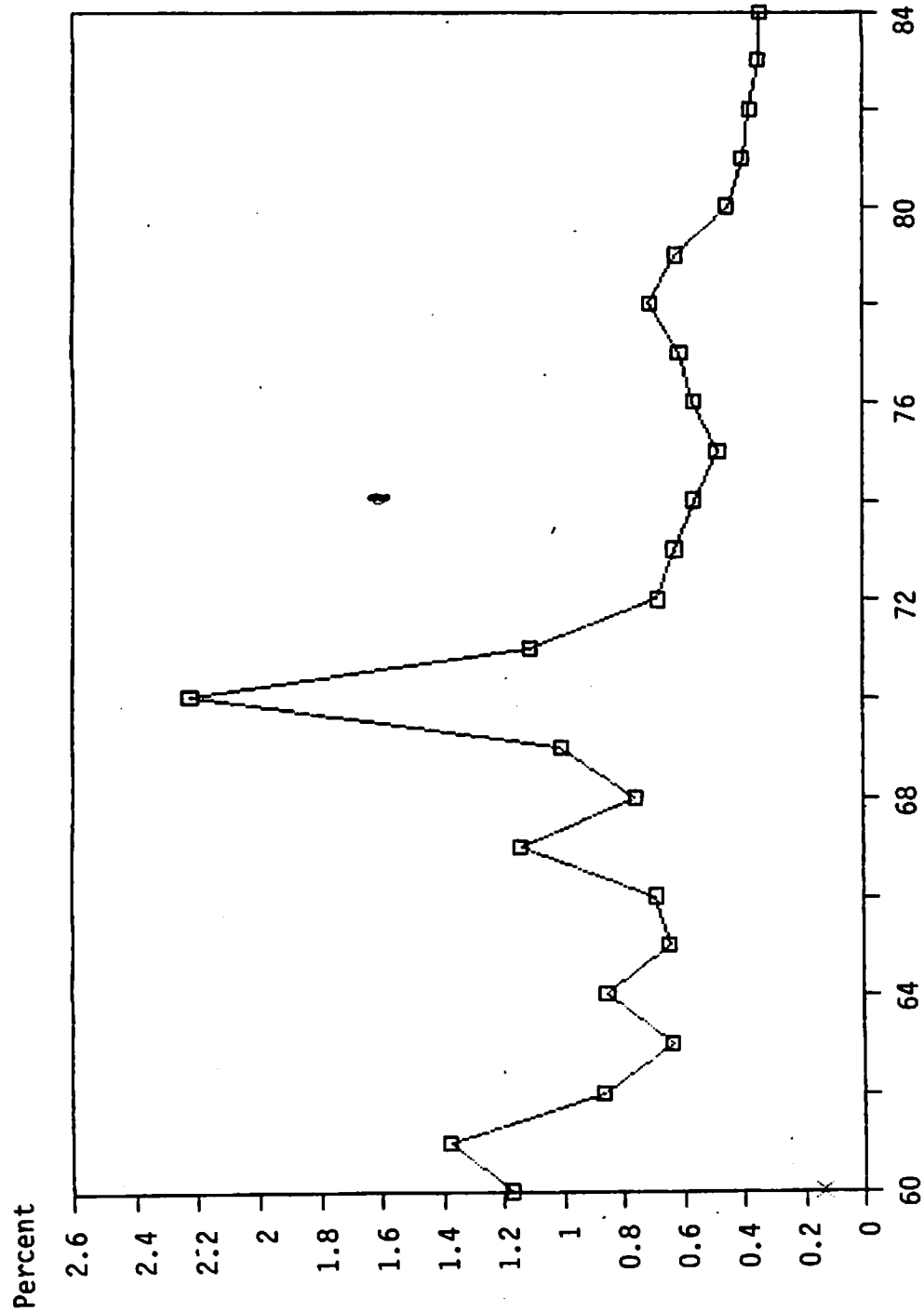

Figure 7a. Stocks Divided by Production (Ratio for Canada), 1960-1984.

TABLE 8. CANADIAN WHEAT EXPORTS TO THE U.S.

Year[1]	
1970	0
1971	0
1972	0
1973	77
1974	0
1975	22
1976	35
1977	0
1978	0
1979	0
1980	0
1981	0
1982	115
1983	60
1984	145[2]

[1]Marketing Year is August/July except for marketing year which is through June 1985.
[2]Including: 7,245 No. 1 CW 13.5 percent protien; 99,060 No. 1 CW 14.5 percent protein; 12,145 No. 2 CW; and 26,255 No. 3 CW.

SOURCE: Canadian Grain Council, Statistical Handbook, 1984.

May, and June (27,000, 19,000, and 61,000 MT, respectively). Though these figures appear (small), they would have potentially been in competition with HRS wheat shipments from Duluth/Superior whose shipments during May and June were 75,836 and 85,170 MT, respectively.

The size or detail of the transactions are not as important as the institutional arrangements which allow them to be economical. In the case of HRS wheat, producers are highly participative in farm programs (in excess of 90 percent in the past three years). At and immediately following harvest sales of free stocks and wheat ineligible for the program are made and shipped prior to December. In the post-harvest period free stocks become very tight and the normal market response is for increases in the basis and/or futures to attract wheat away from storage to meet mill and export demand. However, in the past few years the Canadian sales were made in the period commencing with opening of the Great Lakes shipping season. Though these sales are relatively small, the important point is willingness of Canada to price wheat to sell and deplete stocks to abnormally low levels, which is very consistent with a competitive fringe price-taker.

Conclusions and Implications

International trade in wheat has evolved from an oligopoly in which Canada was the price leader during the 1950s and 1960s; to a competitive equilibrium in the 1970s; to what appears to be a price leadership model with the U.S. being the price leader in the 1980s. The earlier oligopolistic structure was facilitated by an active International Wheat Agreement, and an active U.S. subsidy mechanism for price determination. Neither of these are present in today's environment. Currently, U.S. farm programs, particularly the loan rate program, plays a dominant role in the international price structure for wheat. It is the interaction between cash and futures markets with the loan program which determine FOB and CIF prices, which are effectively ceiling prices for the price-taking competitive fringe. It is in this indirect way that the U.S. has the role of price leader, although it was likely not intentional.

There are several important aspects of the dominant country price leadership model. The U.S. is assumed the leader although passive, and all others make up the competitive fringe, are price-takers, act independently and are each individually too small to have a perceptible influence on price. The supply function for the competitive fringe is of critical importance in this market structure and largely determines the effective demand function for the U.S. A more elastic competitive fringe supply implies a more elastic effective U.S. demand. Technological improvements and expansion in exporting capacity each result in reductions in the effective demand function for the U.S. With "sticky prices" determined by the U.S. farm programs, changes in aggregate demand are all absorbed by the U.S. in terms of stock and supply adjustment. Recent appreciation of the U.S. dollar was also demonstrated to adversely affect the effective export demand function for the U.S., by simultaneously reducing aggregate demand and increasing competitive fringe supply (introduced as shifts when measured in U.S. dollars).

The expert strategies by each of the major wheat exporters tend to support a price leadership model. France, Argentina, and Australia have always had implicit policies to minimize the level of ending stocks, pricing exports to reach that level. Canada on the other hand did maintain abnormally large stocks in the 1960s, as an exercise of market power to support prices. More recently, however, there has obviously been a major decision to increase exports and reduce the levels of ending stocks which is a recognition of their reduction of market power. Decisions related to this change in policy were likely made in the early 1970s but have not become blatantly apparent until the 1980s due to the concurrent logistical inability to expand exports in the earlier period. Since 1980 the level of ending stocks decreased significantly and in 1984/85 will be a record low. Also in these last three years there had been relatively sizable exports to the U.S. from Canada in what appears to be more than border states, but are economical simply due to the price structure for U.S. wheat in the post-harvest period. These observations support that all exporters now aggressively price their exports with the objective of carrying over minimal ending stocks.

International competition in wheat trade has also seen a proliferation of nonprice, and possibly price, variables. The major export expansion tool for the U.S. has been the use of credit. Other exporters also increased their use of credit offerings, but not as extensive as that of the U.S. Each of the

other exporters have also aggressively sought long-term bilateral trade agreements (LTA's). Most notable is the distinct increase in LTA's by Canada since the pre-1970 era. Canada has increased both the diversity of countries using LTA's as well as the proportion of sales under LTA's. As a result prices and delivery terms have been increasingly determined on a state-to-state negotiation, and not easily discerned by other market participants. Other countries are using LTA's to a lesser extent and those used by the U.S. are minimal.

There have been several critical decisions made by major competitiors which will likely continue to affect the U.S. in the longer term. Of particular importance are the decision by Argentina to reduce import taxes and increase utilization of more productive inputs in 1976; a decision in 1979 to allow private firms to own and/or lease export facilities in Argentina, resulting in improved logistical efficiency; a series of related Canadian decisions to expand the export capacity and improve their logistical efficiency commencing from the early 1970s; and the apparent development in Canada of wheats of different quality characteristics, but higher yielding. All of these decisions result in rightward shifts in supply and/or remove constraints to increased exports (i.e., making export supply more elastic at higher price levels), and a simultaneous reduction in the effective U.S. export demand function. Of particular importance is that first, those decisions were made in the early to mid-1970s when the dollar was undervalued. Second, their impacts on the effective export supply function are dynamic and take an extended period for adoption. Finally, by nature of the decisions there are likely very important irreversibilities which will make the supply function very inelastic for price reductions.

There are several important implications of a dominant country price leadership market structure. In the long run if the U.S. continues to pursue a passive role in pricing (i.e., by not accounting for shifts in aggregate demand and competitive fringe supply), expansion in the competitive fringe will continue and U.S. market share will decrease. In addition, if effective export prices remain relatively inflexible the U.S. will continue to absorb the shocks in aggregate demand. Typically, a dominant country price leadership structure would by a short-run phenomena. In the longer run, a more aggressive role in export pricing by the U.S. would require taking the market fundamentals into consideration, namely supply response of the competitive fringe, and aggregate demand. In doing so the market structure would have a tendency to evolve either towards some type of cooperative oligopoly, or competition.

References

Alouze, C.M., A. Watson, and N. Sturgess. 1978. "Oligopoly Pricing in the World Wheat Markets." American Journal of Agricultural Economics 60: 173-185.

Canada Grains Council. 1985. Wheat Grades for Canada -Maintaining Excellence. Winnipeg, January.

Canadian International Grain Institute. 1975. Grains and Oilseeds: Handling, Marketing, Processing. Winnipeg.

Canadian Wheat Board. 1985. Grain Matters. Winnipeg, July.

International Wheat Council. 1985. Impact of Credit Terms, Subsidized Exports, and Special Price Practices. Special report by the IWC. CITY June.

Lloyns, R.M.A., et al. 1985. Institutional Constraints to Biotechnological Developments in Canadian Grains with Special Reference to Licensing of Varieties. Research Bulletin No. 85-1. Winnipeg: University of Manitoba, Department of Agricultural Economics, March.

Longmire, J. and A. Morey. 1983. Strong Dollar Dampens Demand for U.S. Farm Exports. Foreign Agriculture Report No. 193. Washington, D.C.: USDA, ERS, December.

Malchup, F. 1952. Economics of Seller's Competition. Baltimore pp. 495-500.

McCalla, A.F. 1966. "A Duopoly Model of World Wheat Pricing." Journal of Farm Economics 48(3):711-27.

McCalla, A.F. 1979. "Strategies in International Agricultural Marketing: Public vs. Private Sector." In International Trade and Agriculture Theory and Policy, edited by J.S. Hillman and S. Schmitz. pp. 209-38.

Meilke, M. Argentine Agricultural Policies in the Grains and Oilseeds Sectors. Washington, D.C.: USDA ERS.

Oleson, B.T. 1979. "Price Determination and Market Share Formation in the International Wheat Market." Unpublished Ph.D. dissertation. Minneapolis: University of Minnesota.

Paarlberg, P.A. Webb, J. Dunmore, and J. Deaton. 1985. "The U.S. Competitive Position in World Commodity Trade." In Agricultural Food Policy Review: Commodity Program Perspectives. Agricultural Economic Report No. 530. Washington, D.C.: USDA, ERS, July.

Scherer, F.M. 1971. Industrial Market Structure and Economic Performance. Chicago: Rand McNally.

Telser, L. 1962. "The Demand for Branded Goods." Review of Economics and Statistics 44(3): pp. _____.

Worcester, D. 1957. "Why Dominant Firms Decline." Journal of Political Economics 65:338-47.

THE RESPONSE OF U.S. AND COMPETITOR COARSE GRAINS EXPORTS TO CHANGING GLOBAL ECONOMIC CONDITIONS

Alan J. Webb and C.S. Kim*

Introduction

The American agricultural sector has experienced severe financial distress over the past four years. Land values have declined by as much as 28 percent in some midwestern states since their peak in 1981 and ERS estimates that as of January 1985, more than one-third of the 679,000 family-sized commercial farms were experiencing financial problems (see ERS 1985).

Causes of the Current Financial Crisis

A major source of this financial distress has been the decline in U.S. exports. In the 1970s, rapidly expanding exports combined with historically high rates of inflation and low real rates of interest led to a rapid expansion of borrowing in the agricultural sector. These conditions turned around sharply in the early 1980s after the Federal Reserve turned to a more restrictive monetary policy. The rapid rise in real U.S. interest rates that followed led to an appreciation of the dollar and an increase in interest rates worldwide. A global recession ensued. Countries with large international debts--such as Poland, Argentina, Brazil, Mexico, Nigeria, and others--found that not only the cost of servicing their debts had increased but also that their ability to generate foreign exchange earnings to meet debt payments had been reduced.

These forces combined with continued increases in production led to a sharp decline in agricultural prices. As world commodity prices have fallen to the level of loan rates, the U.S. Government has entered the market to purchase grain for stocks rather than allowing grain to be exported at prices below the loan rate. This has forced much of the adjustment to the decline in world demand upon the United States. Policies in other countries have reduced U.S. grain exports as well. A continuation of high support prices in the EC--and the expansion of the Community itself--has accelerated the reduction in the region's net imports of agricultural products and, in the case of wheat and more recently, coarse grains, have even helped to transform the EC into a net exporter.

An analysis of a change in export markets frequently looks at two aspects: factors affecting the size of the market--or market growth factors--and factors affecting relative market shares of exporting countries--competitive factors. The growing concern with the decline in U.S. competitiveness has focused heavily on the second set of factors. Yet these two sets of factors are not totally distinct. In particular, the competitive position of the United States as measured by the U.S. share of that market,

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depends in part on the level of trade and the structure of the market. Bill Wilson has discussed the decline in U.S. competitiveness in the world wheat market. He has noted the increase in production of wheat of major U.S. competitors and has pointed out that even though total wheat trade has continued to expand in the 1980s, U.S. exports and the U.S. share of the world market have declined as those of the competitive fringe have expanded.

Structure and Change in World Coarse Grain Market

The decline in the U.S. share of world markets has been used widely as evidence of the decline in U.S. competitiveness. This view fails to recognize that a change in world demand does not affect all exporters in the same way. A country with large stocks and a relatively open market--such as the United States--will have a much greater response to a given change in world demand than will a country which holds no stocks and insulates its domestic food and agricultural economy from changes in the world. A simple three-panel diagram will help illustrate the point (Figure 1).

Two exporting countries, Argentina and the United States, are shown with excess supply functions ES^{ar} and ES^{us}. Together they comprise the world excess supply, ES^{w}, and together they face a world export demand (XD) equal to quantity Q_e at price P_e. At this price, the United States will export q_u and Argentina will export q_a. Market shares would be represented in the third panel by $0q_u/0Q_e$ for the United States and $q_uQ_e/0Q_e$ for Argentina.

A decline in world demand from XD to XD' causes the price to fall to P_e' and quantity traded is reduced to $0Q'_e$. The impact of this change in market conditions, however, is not evenly distributed between the two exporters. Argentine exports fall by roughly a third from q_a to q'_a while U.S. exports fall by more than 50 percent from q_u to q_u'. When the level of world trade falls, the U.S. market share falls as well. When trade declines, the U.S. share of the market is only $0q'_u/0Q'_e$ or slightly more than 50 percent compared with a share of 60 to 70 percent when trade is at $0Q_e$.

Although the changes in Figure 1 were exaggerated to make a point, the United States faces a similar situation in the world coarse grains market. Two elements combine to force most of the adjustment to a change in world demand on the United States: the pattern of trade and the relative size of price elasticities of the major trading regions.

In the pattern of world coarse grains trade, the United States is by far the dominant exporter of coarse grains. U.S. exports have accounted for 55 to 70 percent of world coarse grains exports in the past decade. Hence, when there is a change in world demand for coarse grains, the effects will be concentrated on the United States. In addition, because world demand for coarse grains is closely linked to demand for meat and livestock products, swings in global income will have a greater impact on coarse grains trade than they will on food grain trade. As a result, not only are changes in coarse grains trade more concentrated on the United States, but the response to a given change in global income is larger than for wheat or rice.

The relative size of price elasticities of major trading regions is the second important element forcing most of the adjustment to changes in world

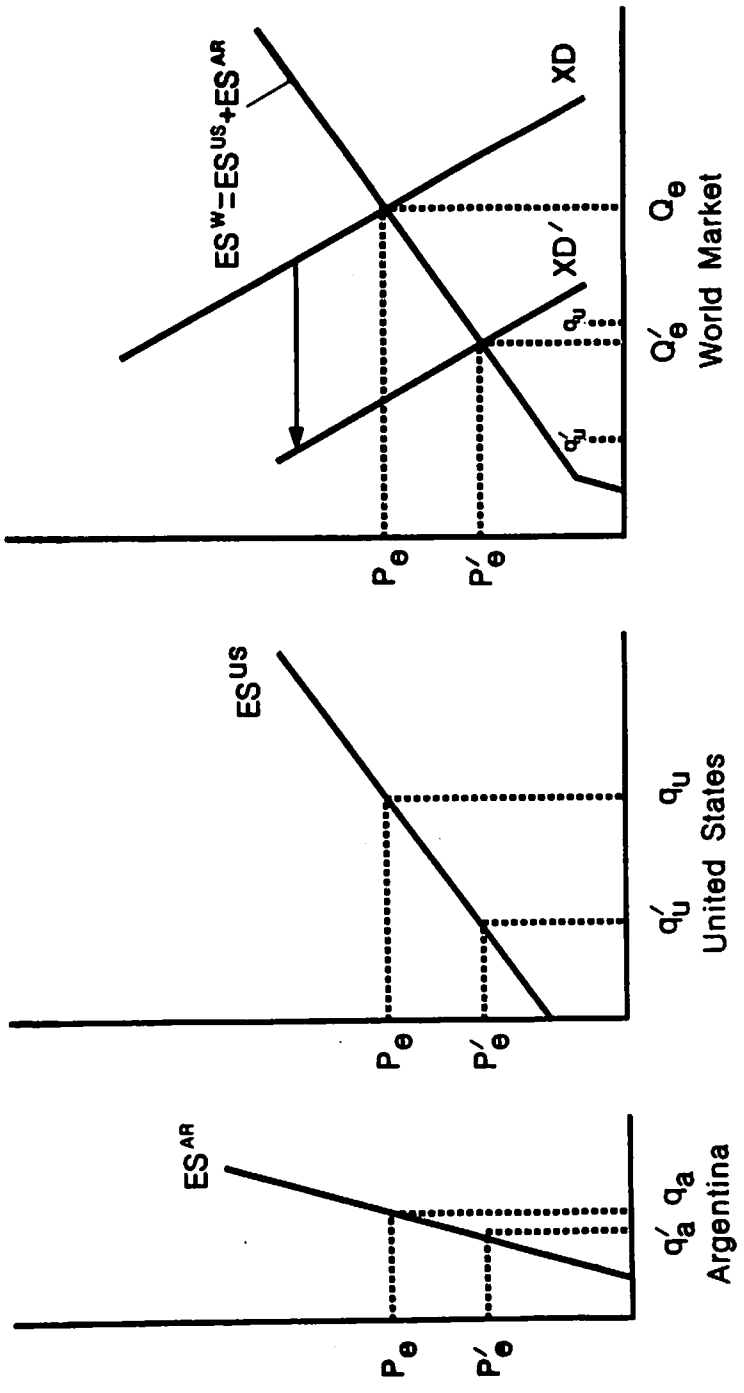

Figure 1. Effect of a Decline in World Demand on Two Exporters with Different Excess Supply Elasticities.

demand on the United States. A useful tool for determining the elasticity of demand facing an individual exporter is the export demand formula used by Bredahl, Collins, and Meyers. They specify the elasticity of export demand for the kth exporter (E^k) as the weighted sum of all other countries excess demand and excess supply elasticities multiplied by their relevant transmission elasticities. More formally,

$$E^k = \sum_j e^d_j T_{kj} \frac{M_j}{X_k} - \sum_{i \neq k} e^s_i T_{ki} \frac{X_i}{X_k}$$

where

e^d_j is the excess demand elasticity of the j^{th} importing country,

$j = 1, \ldots, m.$

e^s_i is the excess supply elasticity of the i^{th} exporting country,

$i = 1, \ldots, n.$

T_{kj} and T_{ki} are price transmission elasticities between the price of the k^{th} exporter and the price in either the j^{th} importer or the i^{th} exporter.

The excess supply and excess demand elasticities used in this identity are computed directly from the underlying domestic supply and demand elasticities which reflect the response of production and consumption to internal domestic prices. The transmission elasticities (T_{kj} and T_{ki}) provide the link between prices across countries. As such, they reflect transportation costs, tariffs, trade barriers, and other factors which inhibit the transmission of price changes across countries.

In the computation of the U.S. export demand elasticity (E^k in the export elasticity equation), the structure of the market and policies in importing countries suggest an elasticity less than 1.0. Even if the elasticities of excess supply (e^s_j) and excess demand (e^d_i) themselves are large, the price transmission elasticities for major importing regions--Eastern Europe, the Soviet Union, Africa, and the EC--are probably very low. On the export side, the transmission elasticities may be near 1.0 but the ratio of the other country's exports to U.S. exports (X_i/X_k) will be very low. Given these parameters, it is likely that the United States faces an inelastic demand for its coarse grains exports in the short to intermediate run.

Column 2 in Table 1 shows the pattern of world coarse grain trade in 1980 for six exporting countries and seven importing regions or countries. The United States is clearly the largest trading nation. Column 4 in Table 1 shows a series of likely price elasticities for these trading regions. The elasticities shown are intended to reflect the combined effects of a country's response to internal prices and the response of those prices to world prices. Hence, the elasticities in Table 1 are really the product of a country's transmission elasticity (T_k) and its domestic excess supply (e^s_i) or excess

TABLE 1. COARSE GRAIN TRADE AND MARKET SHARES IN 1980 WITH SELECTED PRICE ELASTICITIES

Country	Code	1980 Exports	1980 Shares	Elasticity
		(mmt)	(percent)	
Exporters				
United States	USA	69.5	58.7	1.66
Argentina	ARG	14.4	12.2	.22
Australia	AUS	2.8	2.4	1.40
Canada	CAN	4.8	4.1	1.71
Thailand	THA	2.4	2.0	.53
Other Exporters	TWX	24.4	20.6	.44
Total	TOT	118.3	100.0	1.21
Less U.S.	TLU	48.8	41.3	.56
Importers				
Japan	JPN	18.9	16.0	- .60
European Community	EC	20.8	17.6	- .30
Eastern Europe/USSR	EES	29.8	25.2	- .27
Other Western Europe	OWE	8.9	7.5	- .20
Africa/Middle-East	AME	10.4	8.8	- .60
Mexico	MEX	7.1	6.0	- .40
Other Importers	TWM	22.4	18.9	- .40
Total	TOT	118.3	100.0	- .38

demand (e_i) elasticities. Excess supply and demand elasticities for these countries and regions were compiled from studies by Tyres (1984), Longmire and Dunmore, Bishop (1980), Seeley, and Safley as well as from analysis and information provided by country analysts with the Economic Research Service.

The United States, Australia, and Canada are the most price responsive of the countries and regions shown in Table 1 but because Australia and Canada have such a small share of total exports (Figure 2), the United States must make most of the adjustments to a price change. The price responsiveness of importing regions is very low. Western Europe and the E.C. have well-protected grain markets. Hence, the linkage between world and domestic prices in most of these countries is very weak. This is also true of regions such as the Soviet Union, Eastern Europe and, to a lesser extent, Mexico and Africa where state trading agencies carry out grain purchases in international markets and resell grain on domestic markets at government-established prices. Japanese coarse grain imports for livestock feeds enter without restriction, but the high level of per capita incomes reduces consumer response to price changes. In addition, restrictions on beef, pork, and poultry imports have distorted the price relationships which would otherwise exist among these products. One effect has been to increase the price of beef relative to other sources of protein. This reduces the incentives for consumers to substitute meats which have a low feed conversion ratio--such as beef--for meats with a high feed conversion ratio--such as poultry--when grain prices fall.

All of the price elasticities selected, except the elasticity for the United States, represent a conscious attempt to choose those at the upper limit (in absolute value) of the range of elasticities surveyed. The purpose in choosing a set of foreign elasticities with an upward bias is to introduce a conservative bias into the simulation of the effects on the United States of a change in coarse grains demand which follows.

Simulation of Change in Coarse Grains Demand

It should not be surprising--given the current structure of world coarse grains trade--that the 20.2 million ton decline in world demand which occurred between 1980 and 1982 should be associated not only with a decline in U.S. exports but a decline in U.S. market share as well. Although trade has recovered slightly since 1982, world and U.S. exports are still 5 and 10 million tons, respectively, below their peak in 1980. The sources of this decline have been Eastern Europe and the USSR. The decline in U.S. exports has been accompanied by a decline in the U.S. share of world coarse grains trade from 58.7 percent in 1980 to 51.5 percent in 1984.

The key question is whether the fall in U.S. exports and market share which occurred in the first half of this decade are primarily the result of the decline in global demand or whether the decline has been significantly greater or less than expected given the market structure.

Two scenarios are considered. The first simulates the change in world coarse grains demand between 1980 and 1982 and compares the results with an actual decline in U.S. exports of 15 million tons and a decline in U.S. share of almost 4 percent. The second scenario simulates the mild recovery in coarse grains trade (an increase of 15.2 mmt.) which occurred between 1982 and 1984. These results are then compared with the actual change in U.S. exports and market share. By comparing the 1980-82 decline in global demand with the subsequent increase in 1982-84, the results of the two simulations will show whether the response of U.S. exports has been symmetric, i.e., whether the U.S. response to a decline follows the same pattern as a response to an increase in demand.

The elasticities in Table 1 were used to generate a set of linear equations which were adjusted to reflect the trade and prices as they existed in 1980. A 20.2 million ton decline in world trade is assumed--similar to what occurred between 1980 and 1982--and compared the resulting distribution of exports with the 1982 actual pattern of trade. Figures 2 and 3 compare the actual (labelled "AC") and the simulated (labelled "SI") changes in the volume of exports and market shares, respectively. Figure 2 shows that, given a 20.2 million ton decline in world trade, the simulated decline in U.S. exports would be 16.3 million tons compared to an actual decline of 15.5 million tons. All other countries, except Canada, show actual declines to be the same or greater than the simulated declines. Overall, the simulated distribution of the decline across coarse grains exporters--based on relative export supply elasticities--is very close to what actually occurred. Simulated changes in market shares (Figure 3) are also very close to actual changes. The United States, as expected, has a large decline in share but the actual decline is less than the simulated decline--primarily because of declines in Argentine and Australian market shares.

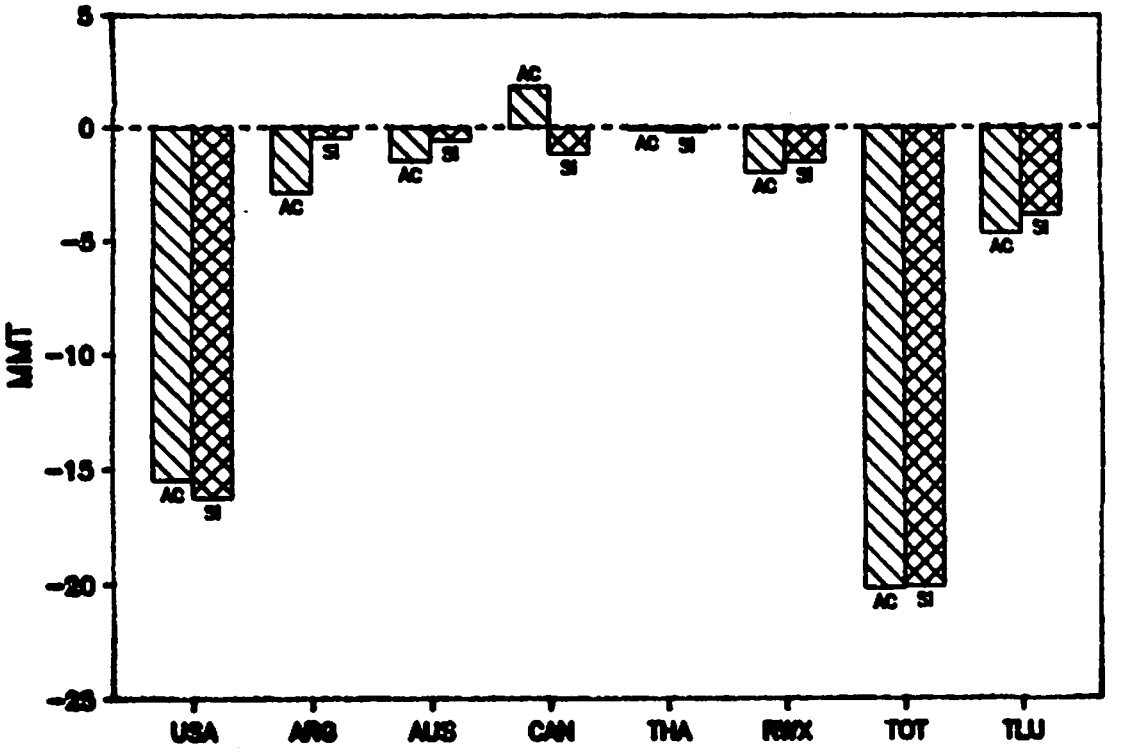

Figure 2. Actual and Simulated Changes in Coarse Grains Exports, 1980-1982.

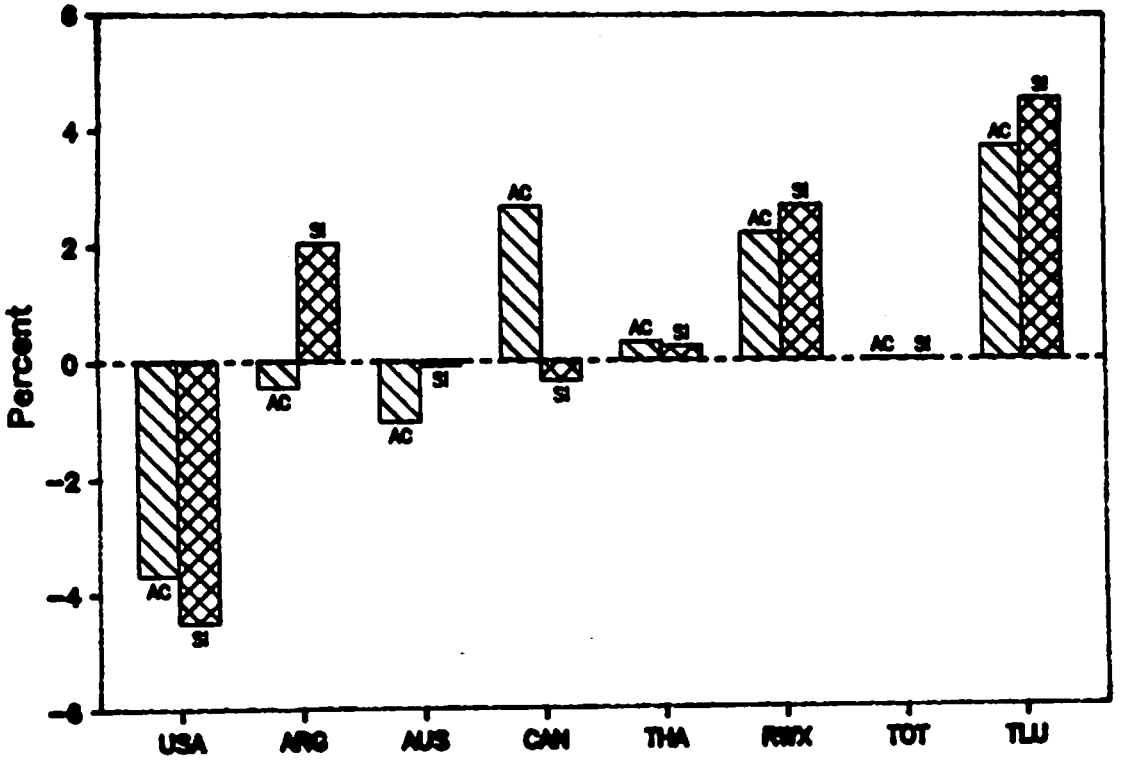

Figure 3. Actual and Simulated Changes in Coarse Grains Market Shares, 1980-1982.

These results indicate that the 4 percent decline in the U.S. share of the world coarse grains market was consistent with what the size and price responsiveness of different exporters would lead us to expect. However, when the same elasticities were used to simulate the 15.2 million ton increase in world trade which occurred between 1982 and 1984, the United States does not perform as well as expected. As the dominant coarse grain exporter, the United States would be expected to capture 13 million tons of the increase in trade (Figure 4). Instead, U.S. exports increase by only 4.3 million tons. Of the net 10.9 million ton increase originating from all other exporters, the bulk came from the rest of the world group of which the EC is a major component.

The changes in market shares between 1982 and 1984 (Figure 5) provides an even sharper contrast between actual and simulated results. The United States loses market share in this period despite an expanding market. Australia, Thailand, and the rest of the world all should lose market share to the United States--according to the simulation results--but the reverse actually occurs.

Two important points come out of these two simulations. First, the major proportion of the decline in U.S. exports and market share between 1980 and 1982 were not due to competitive factors--i.e., factors that put the United States at a competitive disadvantage relative to other exporters--but due to market growth factors.

The second point is that the United States has not shared as much as expected in the recovery of world coarse grains trade which has occurred since 1982. The four major competitiors, however, picked up only a small part of this difference. Instead, the major increase in exports occurred to the "rest of world" category of which 60 percent of 1984 exports were by the European Community. This indicates that although market growth factors were important in the 1982-84 period, competitive forces--especially E.C. price supports and export restitutions--were significant as well.

The results of these two simulations are dependent in part on the elasticities chosen as parameters. Even though the elasticities selected from previous studies were chosen to give--if anything--a slight upward bias to the short-term price response of other countries, the United States remained the major adjuster to shifts in world coarse grains demand. Even so, a simple test of sensitivity of the results to the elasticities chosen is useful to determine whether larger foreign price elasticities would significantly reduce the burden of adjustment on the United States. Hence, all elasticities--except the U.S. elasticity--were increased to three times the levels used in the simulations. The 20.2 mmt. fall in demand between 1980 and 1982 was then simulated again and the results were compared with those of the original simulation. The adjustment by the United States is reduced in the new simulation as all other exporters increase the amount by which they reduce their exports. U.S. exports, however, still decline by nearly 12 mmts. and this awccounts for nearly 60 percent of the total adjustment.

The choice of price elasticities clearly does influence the distribution among exporters of the total decline in demand but of even

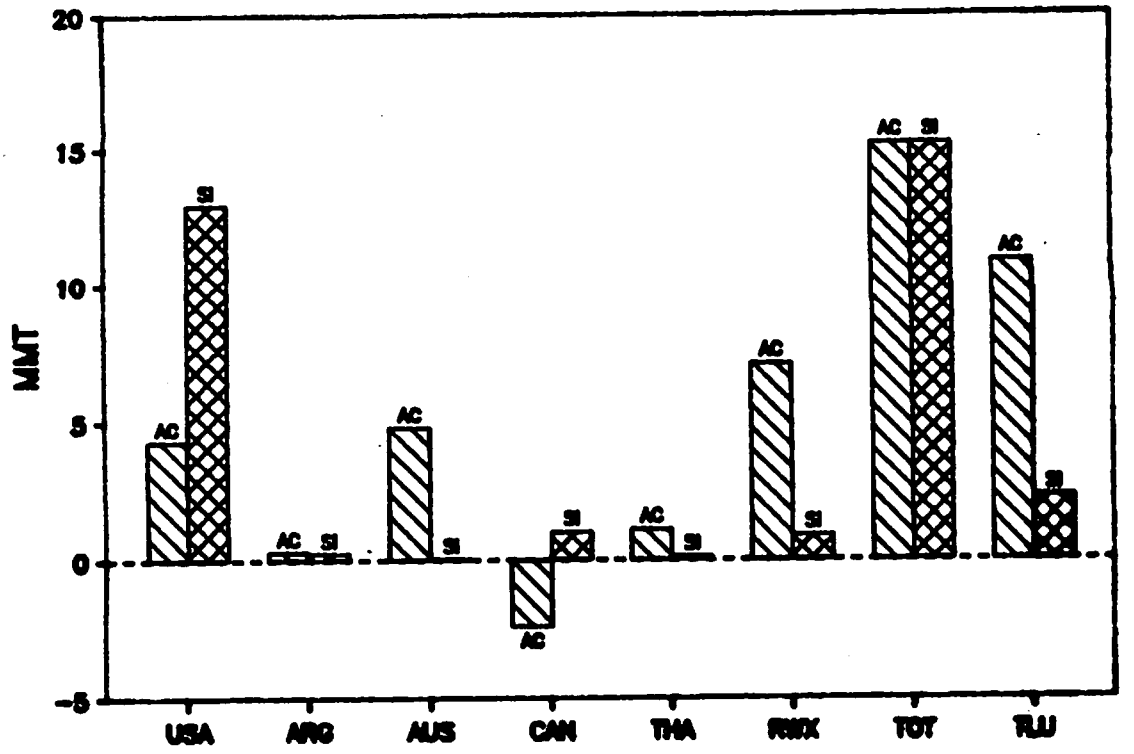

Figure 4. Actual and Simulated Changes in Coarse Grains Exports, 1982-1984.

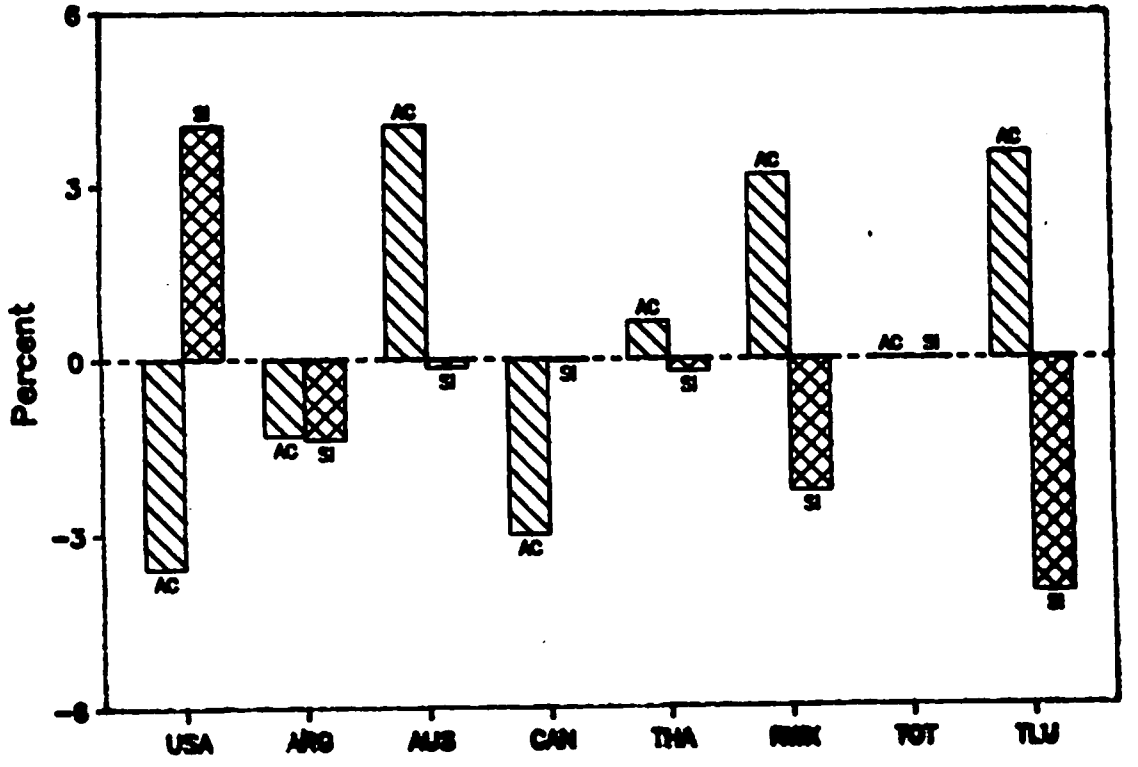

Figure 5. Actual and Simulated Changes in Coarse Grains Market Shares, 1982-1984.

greater importance is the dominant position of the United States in the market. In order for policies designed to "restore U.S. competitiveness" to be effective, policymakers will have to recognize the sources of the declines in U.S. exports as well as the role the United States plays in each of its major export markets.

Policy Proposals

There are essentially two types of commodity policies which have been considered to improve U.S. competitiveness in agricultural markets. One is lowering of the U.S. loan rate and the other is to provide some form of an export subsidy. A critical element in the successful operation of these two proposals is the elasticity of export demand facing the United States.

Figures 6 and 7 show how these two policy alternatives would affect the United States given an inelastic export demand (XD_{US}) for U.S. coarse grains. Figure 6 shows a U.S. excess supply function (ES_{US}) which becomes perfectly elastic when prices fall to the loan rate. It is assumed that U.S. excess demand intersects excess supply in this elastic region. This is consistent with the current market situation facing U.S. grain exporters (Paarlberg, Webb, Morey, and Sharples). If the U.S. loan rate were to be eliminated, export prices would fall from P to P' but the quantity exported would increase by only $q_e q'$. Because the percentage of decline in price is greater than the percentage of increase in the quantity exported, total revenue to the U.S. farm sector would decline.

Figure 7 provides the same type of analysis for an increase in export subsidies. Here, it is assumed that export prices are above the loan rate at price P_e. An increase in export subsidies will shift the excess supply schedule to the right (from ES_{US} to ES'_{US}). The effects are the same as for the reduction of the loan rate--the percentage decline in price is greater than the percentage gain in exports and, consequently, total revenues to the U.S. farm sector decline.

If it is true that the United States faces an inelastic export demand for its coarse grains exports, then a change in U.S. commodity policies are not likely to improve the prospects for U.S. exports in the short run. Other exporters have relatively small shares of the market and any adjustments they make will be of little benefit to the United States. The EC is the exception. A major reform of the Common Agricultural Policy could greatly improve U.S. coarse grain export prospects, but such a reform is extremely unlikely. U.S. commodity policies cannot be expected to induce this reform and, without it, there is little likelihood that U.S. export policies will be effective in stimulating coarse grains exports. The real hope of reviving U.S. coarse grains exports must come from the demand side. A global economic recovery and a resurgence of world grain trade will probably work more toward the advantage of the United States than any of the commodity policy options that the United States might undertake.

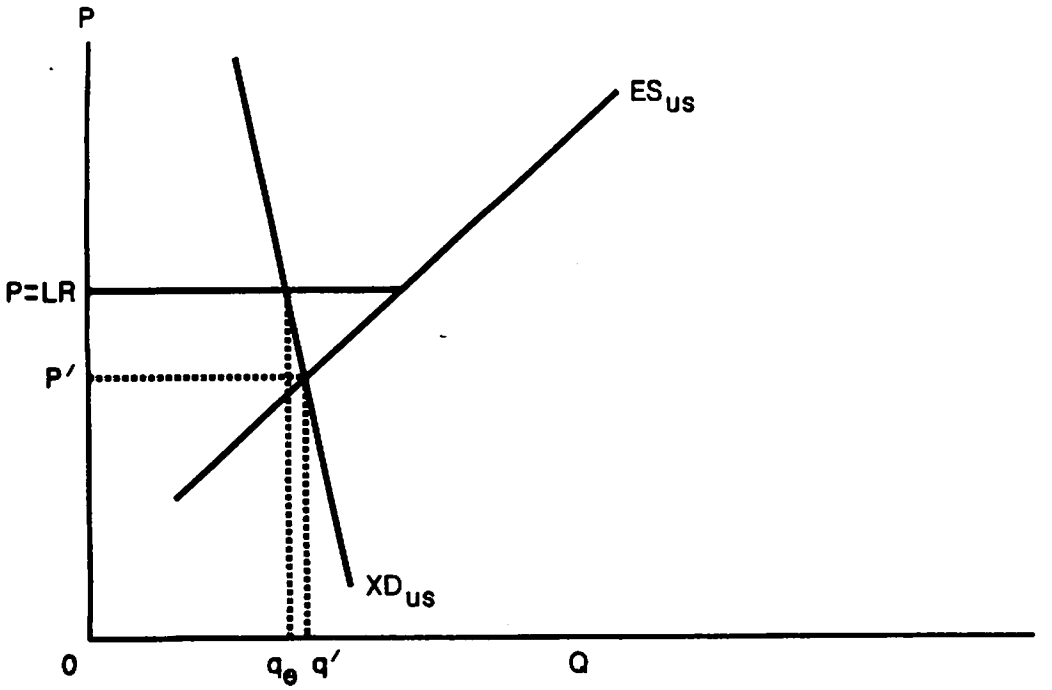

Figure 6. Reducing the Loan Rate.

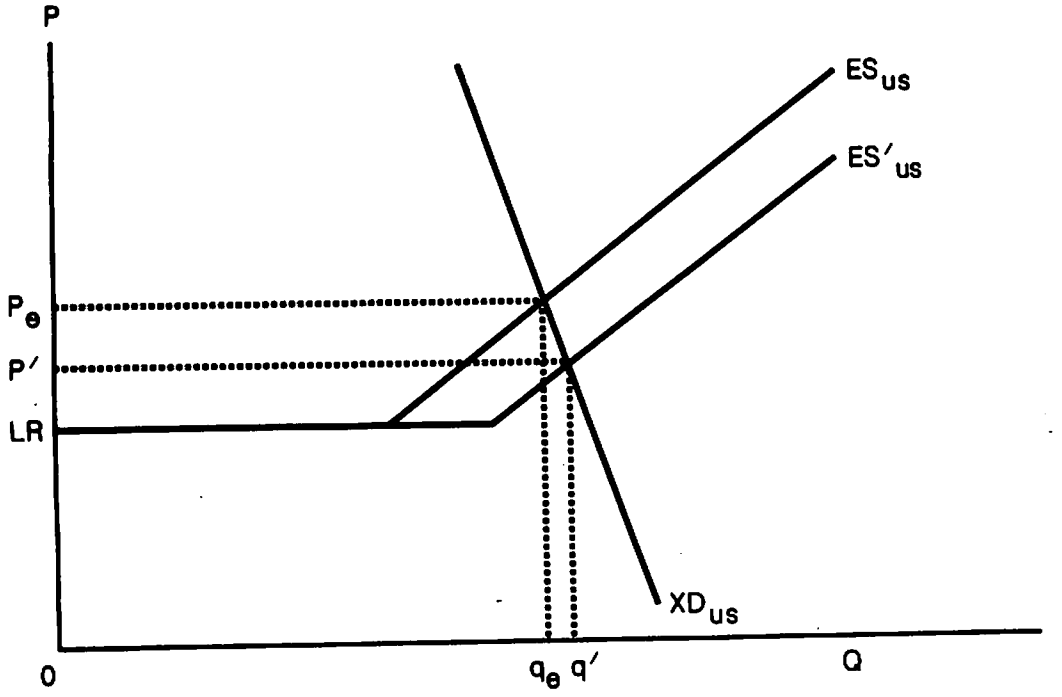

Figure 7. Subsidizing U.S. Exports.

References

Bishop, Robert V. 1980. "Documentation of the Elasticities Underlying the Current Grains, Oilseeds, and Livestock (GOL) Model." IED Working Paper. Washington, D.C.: USDA, ESCS, January.

Bredahl, Maury E., William H. Meyers, and Keith J. Collins. 1979. "The Elasticity of Foreign Demand for U.S. Agricultural Products: The Importance of the Price Transmission Elasticity." American Journal of Agricultural Economics, 61(1):58-63.

Dunmore, John and James Longmire. 1984. Sources of Recent Changes in U.S. Agricultural Exports, ERS Staff Report No. AGES-831219.

Economic Research Service. 1985. The Current Financial Condition of Farmers and Farm Lenders. Agricultural Information Bulletin No. 490. Washington, D.C.: USDA, March.

Paarlberg, Philip L., Alan J. Webb, Arthur Morly, and Jerry A. Sharples. 1984. Impacts of Policy on U.S. Agricultural Trade. ERS Staff Report No. AGES-840802. Washington, D.C.: USDA, December.

Safley, Charles D. 1980. "World Feed Grain Projected Production-Consumption Balances, U.S. Exports, and Price Variability." Unpublished Ph.D. dissertation. Stillwater: Oklahoma State University, May.

Seeley, Ralph. 1985. Price Elasticities from the IIASA World Agriculture Model. ERS Staff Report No. AGES-850418. Washington, D.C.: USDA, May.

Tyres, Rodney. 1984. Agricultural Protection and Market Insulation: Analysis of International Impacts by Stochastic Simulation, Research Paper No. 111. Australian-Japan Research Centre, May.