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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

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*Authors are with the Economic Research Service, USDA in Washington, D.C. The views expressed in this paper are those of the authors and do not necessarily reflect those of the U.S. Department of Agriculture.

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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, 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.

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 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 panel three by Oq_u/OQ_e for the United States and q_uQ_e/OQ_e for Argentina.

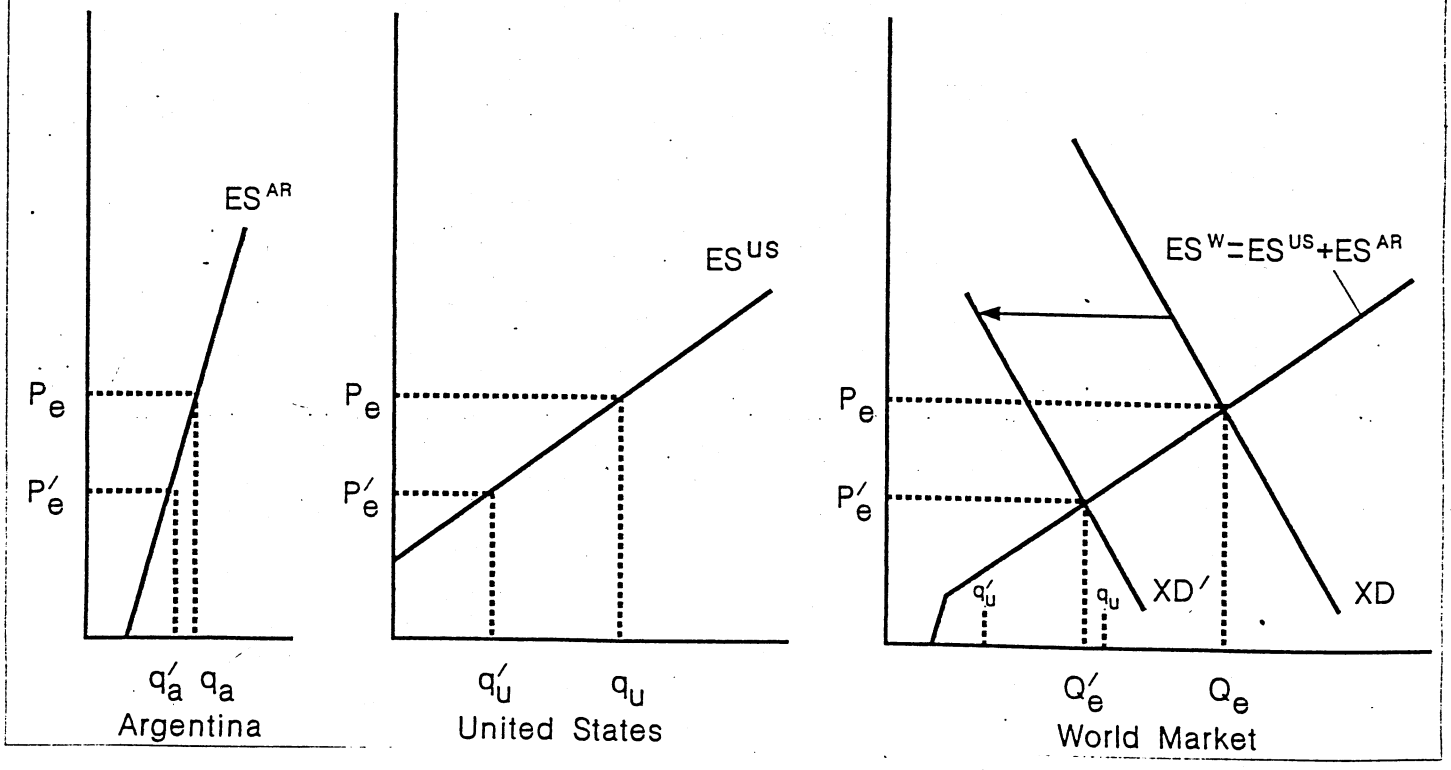
A decline in world demand form XD to XD' causes the price to fall to P_e' and quantity traded is reduced to OQ'_e. The impact of this change in market conditions, however, is not evenly distributed between the two exporters. Argentine exports fall by roughly a third from q_a to q'_a while U.S. exports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

Figure 1

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



concentrted 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 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 (1979). 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,

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

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 (Ek 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_j^s) and excess demand (e_i^d) 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_i^s) or excess demand (e_i^d) elasticities. Excess supply and demand elasticities for these countries and regions were compiled from studies by Tyres (1984), Longmire and Dunmore (1983), Bishop (1980), Seeley (1985), and Safley (1980) 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

Table 1--Coarse Grain Trade and Market Shares in 1980 with Selected Price Elasticities

Country	Code	1980 Exports (mmt)	1980 Shares (percent)	Elasticity
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	RWX	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	RWM	22.4	18.9	-.40
Total	TOT	118.3	100.0	-.38

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 the 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 "S1") changes in the volume of exports and market shares, respectively. Figure 2 shows that, given a 20.2

FIG 2:Actual and Simulated Changes
in Coarse Grains Exports 1980–1982

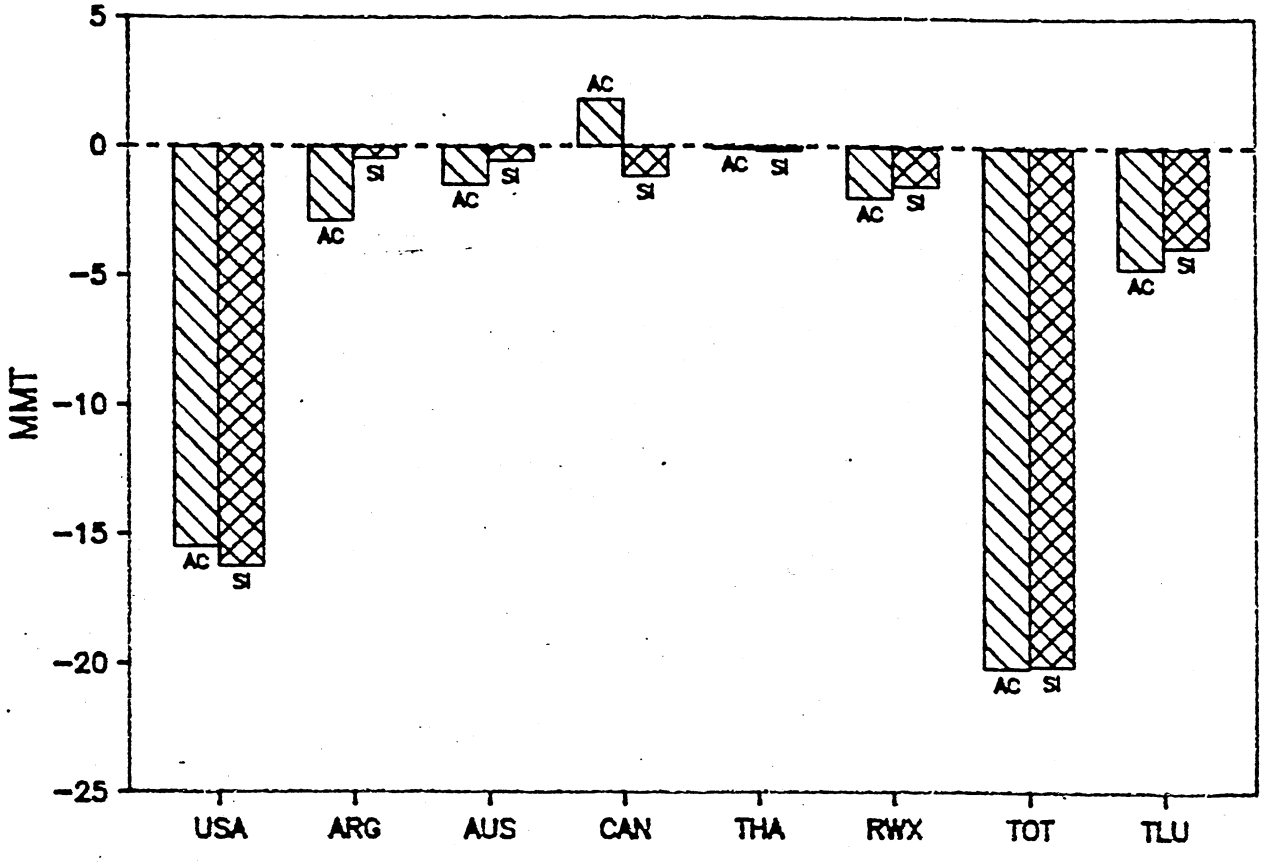
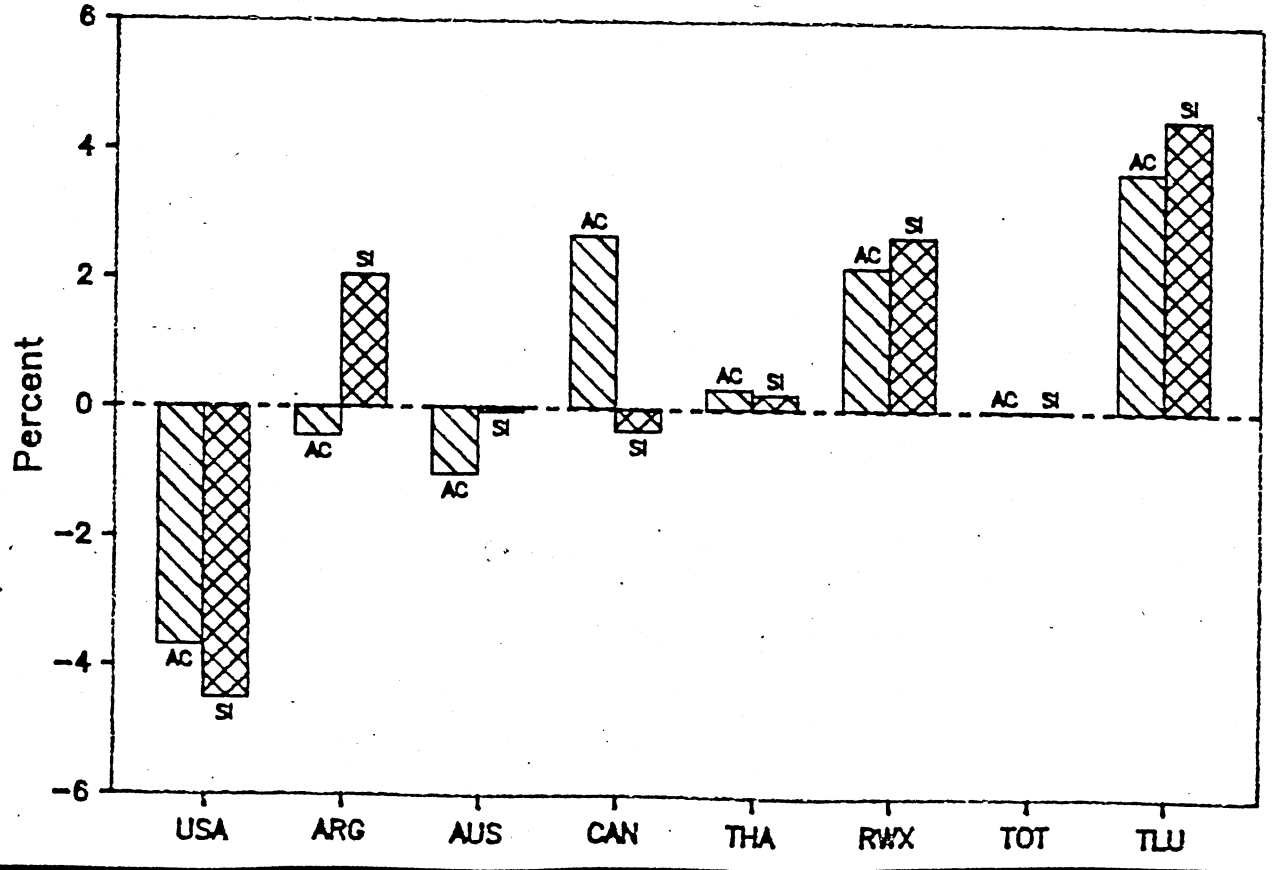


FIG 3:Actual and Simulated Changes
in Coarse Grains Market Shares 1980–82



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 ~~fell slightly instead of increasing or remaining unchanged~~.

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.

FIG 4:Actual and Simulated Changes
in Coarse Grains Exports 1982–1984

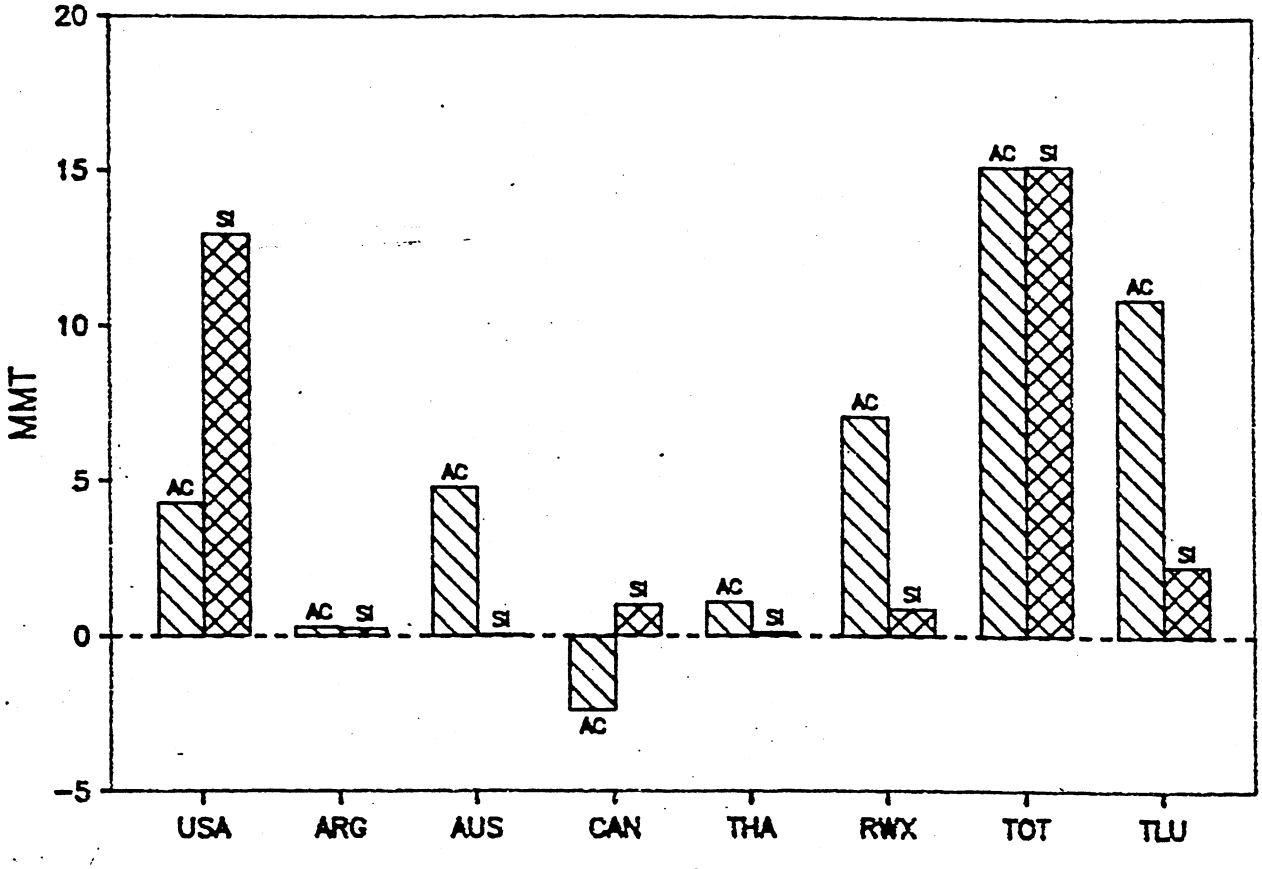
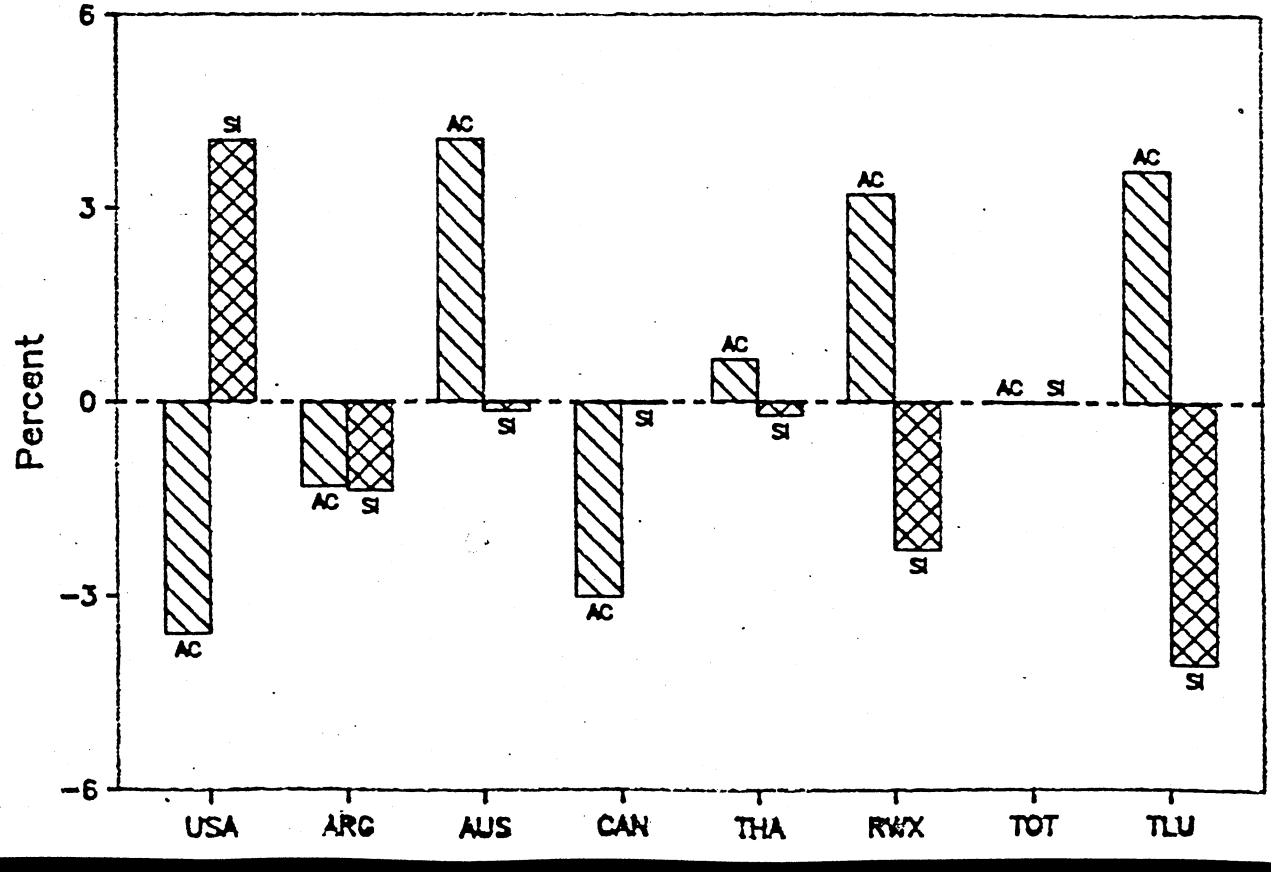


FIG 5:Actual and Simulated Changes
in Coarse Grains Market Shares 1982–84



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 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_e 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 6

Reducing the Loan Rate

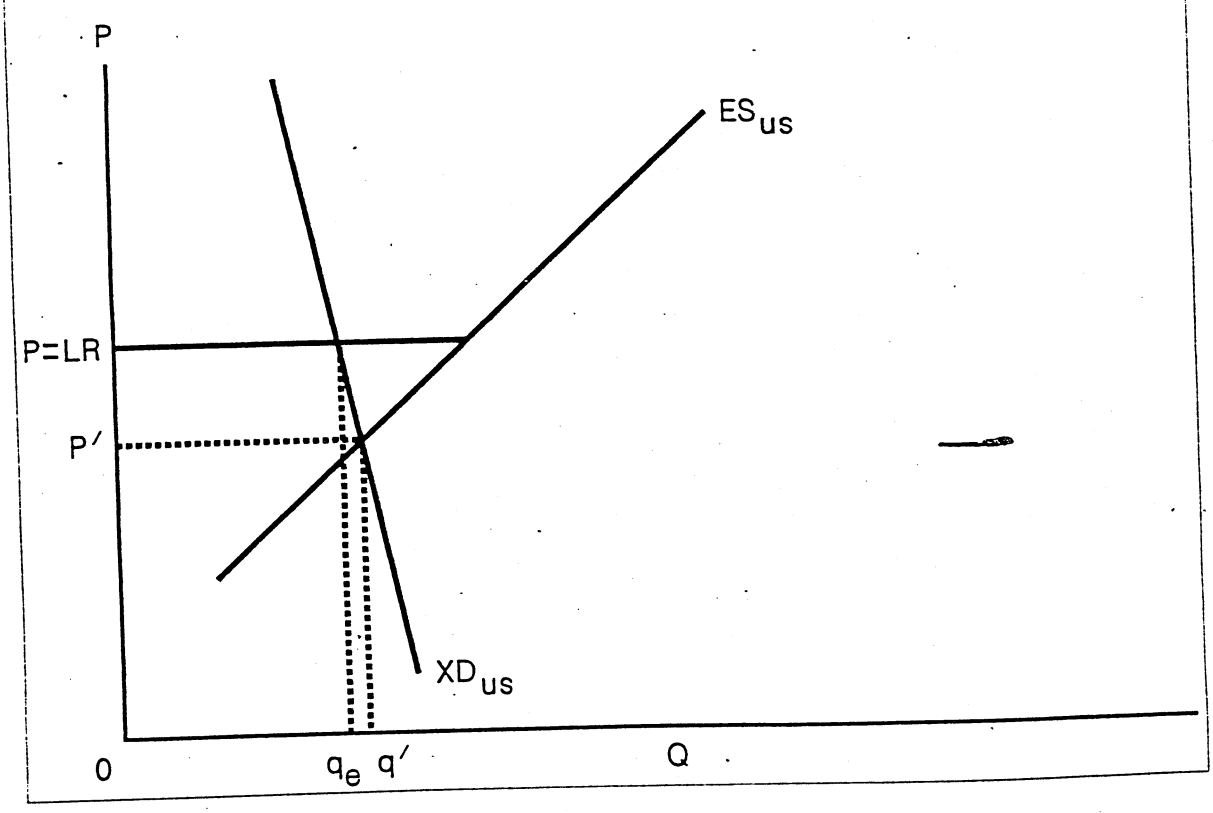


Figure 7

Subsidizing U.S. Exports

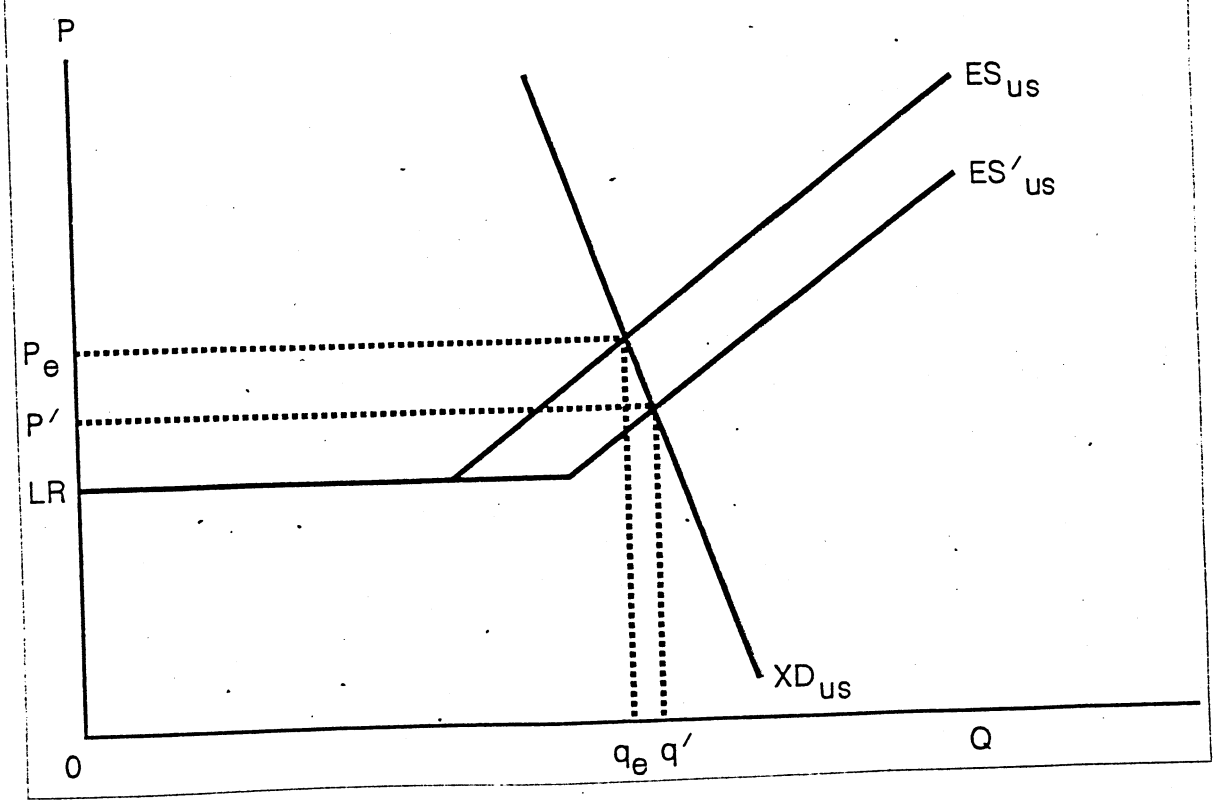


Figure 7 provides the type of analysis for an increase in export subsidies. Here, it is assumed that export prices are above the loan rate at price P_e. An increase in export subsidies will shift the excess supply schedule to the right (from ES_{US} to ES'_{US}). The effect is the same as for the reduction 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 commodity policy option that the United States might undertake.

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