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Agricultural Trade Responsiveness in Western Hemisphere Countries

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ABSTRACT

Import demand and export supply elasticities for grains, soybeans, and cotton for the Western Hemisphere countries studied suggest that neither imports nor exports will be very responsive in the medium run (2-3 years) to a reduction in U.S. commodity prices stemming from the Farm Security Act of 1985, because domestic and trade policies insulate domestic prices from changes in world prices. Import demand for feed grains and soybeans is generally more responsive to price declines than food grains. Factors other than price are often more important in influencing import decisions. But policies can change quickly, especially in many Latin American countries; a period of sustained lower U.S. prices may elicit policy changes in the long run that make import demand more responsive to lower prices.

Keywords: import demand, export supply, price responsiveness, agricultural policy, United States, Canada, Mexico, Brazil, Argentina, wheat, coarse grains, soybeans, cotton.

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SUMMARY

The U.S. agricultural sector became increasingly dependent on exports during the seventies to absorb increases in production and to help maintain farm income. But, exports have been falling in the eighties, contributing to large farm stocks and declining farm prices. As the farm sector has grappled with the issues of shrinking exports, burgeoning stocks, and falling prices, many feel that U.S. support prices for major farm commodities are too high and inflexible downward to allow U.S. products to compete effectively in world trade.

The Food Security Act of 1985 reduces support prices, thus allowing farm prices to fall. Proponents of the new farm legislation argued that lower prices would stimulate U.S. exports and ultimately contribute to growth in farm income. Because of the importance of U.S. agricultural exports in world trade, lower U.S. prices would have a significant impact on world prices for many commodities.

Countries of the Western Hemisphere--Canada, Mexico, Brazil, Argentina, and other Latin American countries--are both major customers of and competitors with U.S. farm exports. The response of their agricultural imports and exports will be an important factor in determining the success of a U.S. farm policy that reduces support prices. Understanding a country's productive capacity, institutions, and agricultural and trade policies helps one anticipate that response.

The magnitude of a country's trade response to a change in world prices can be summarized by the elasticity of import demand and export supply. These elasticities for grains, soybeans and products, and cotton for Western Hemisphere countries suggest that neither imports nor exports will be very responsive in the medium run to lower U.S. prices. Many domestic and trade policies in the countries insulate domestic prices from world price changes, and factors other than prices are often more important in influencing import decisions.

But policies can and do change quickly, especially in many Latin American countries. It is therefore difficult to forecast the magnitude of the response in the long run. A sustained period of lower U.S. prices could elicit policy changes in the long run that allow prices to play a greater role in import decisions and open up import markets.

For Canada, low world wheat and barley prices do not necessarily imply a drop in acreage in the medium run. Although Canadian grain production is relatively market-oriented, there are programs and institutions which will delay a strong supply response to declining wheat and coarse grain prices. Even in the long run, a drastic reduction in Canadian wheat production and exports is unlikely.

There are relatively few employment alternatives for many farmers in western Canada, particularly with a depressed energy sector. In much of the grain-producing region, there are few, if any, good alternatives to wheat production. The long-term pattern of lower margins, higher volumes, and larger operations required to provide adequate income will encourage further consolidation of farms in Canada.

For Latin American countries, neither agricultural imports nor exports are expected to change significantly in the medium term as a result of declines in prices of U.S. commodities. The insulation of national economies from the world economy and the large share of food needs provided by imports means import demand is not very responsive to declining world prices. Wheat, coarse grain, and soybean exports from Latin American competitors are not likely to fall in the medium run in response to lower U.S. prices because producer prices are shielded from changes in world prices through various policies.

Latin American governments use a range of policy tools to protect their economies from the vagaries of world economic conditions. These policies can greatly affect direction and magnitude of responses to change in world agricultural markets. Government policies are subject to quick, unanticipated modification, cancellation, or reversal upon changes in political or economic conditions. The following country summaries refer primarily to the medium-run response to world price changes.

Mexico is a major importer of U.S. grains and soybeans because domestic demand has expanded much more rapidly than supply. Lower world prices will further discourage domestic production of these basic commodities and stimulate imports. However, supply response (especially for corn) is relatively inelastic and the political appeal of food self-sufficiency has periodically resulted in the protection of domestic producers by high price supports and trade restrictions. Corn and wheat consumption are already subsidized below world prices. Lower world prices are not likely to stimulate changes in domestic demand or imports in the medium run. In the long run, import demand is driven by changes in production and macroeconomic factors such as income.

Mexico competes with the United States in world cotton markets. Lower world prices would further discourage the production and exports of Mexican cotton, which are already declining due to ecological problems and unfavorable domestic policies.

Brazil has effectively isolated its agricultural producers from fluctuations in world price through fixed support prices and export controls. As a result, supplies of Brazilian soybeans and soybean products, the major agricultural exports, have not responded significantly in the past to world price changes. However, recent policy changes have made soybean export supply more responsive to world price changes. The Government has used production credit and currency devaluations as principal tools for sustaining domestic production for export. Wheat imports are not likely to be responsive to falls in world prices in the medium run because domestic prices are already subsidized below world prices. Corn and rice imports are more influenced by weather-related production shortfalls than by changes in world prices.

Argentina is a major competitor with the United States in export markets for wheat, coarse grains, and soybeans. If Argentine export tax rates and exchange rate adjustments were rigidly maintained at current levels, Argentine exports of grain and feed products would likely decline in response to lower world prices. However, Argentine policy is flexible. The Government has both the capability and proclivity to rapidly adjust export taxes and exchange rates in order to insulate its producers from a sudden drop in world prices. Implementation of such policy responses seems likely, which would not only diminish export supply responsiveness but could lead to shortrun increases in Argentine exports.

The Caribbean, Central America, and Andean regions are net importers of U.S. food and feed grains. Import demand for food grains in the medium term is inelastic, but feed grains and soybean meal are more responsive to world price. Medium-run import demand elasticities range from less than 0.2 for wheat to close to unity for coarse grains and soybean meal. Some cotton is exported from this region. Cotton exports are very sensitive to changes in price and could decline or disappear with any significant drop in world prices. There appears to be a general trend towards less government intervention in agricultural markets in this region, which could increase price responsiveness over the longer term.

Agricultural Trade Responsiveness in Western Hemisphere Countries

INTRODUCTION

The past two decades have seen the agricultural sector in the United States become increasingly dependent on world trade. A quarter of U.S. production is now exported and for some commodities, such as wheat and corn, the export share is even higher. This development has made U.S. agriculture vulnerable to volatile world agricultural and economic conditions. The influence of factors such as the exchange value of the dollar, international interest rates, and the competitiveness of foreign producers now reverberate throughout the U.S. agricultural economy.

U.S. agriculture depends on exports; the downswing in U.S. exports over the past 5 years has contributed to large stocks, falling prices, and declines in farm income. Many analysts feel that a major factor influencing exports has been government programs that have supported U.S. prices for major commodities above market-clearing levels. Because loan rates set a floor price for U.S. prices, U.S. commodities are being priced out of the international market. To help remedy the situation, the agricultural sector now has farm legislation in place that will result in a gradual lowering of government support prices for major U.S. commodities: wheat, coarse grains, soybeans, and cotton.

What would be the effect on U.S. exports and farm income, as well as on the agricultural sectors of major U.S. customers and competitors, of sharply lower U.S. prices? Because of the importance of U.S. exports in world agricultural trade, lower U.S. prices would translate into lower world prices and could have a major impact on production and trade in the rest of the world. The price responsiveness of foreign import demand and export supply is crucial to deciding whether various proposals for alleviating current farm financial difficulties will in fact stimulate exports and raise farm incomes.

If the foreign import demand for U.S. farm commodities is relatively unresponsive to lower U.S. prices, the volume of U.S. exports would increase proportionally less than prices decrease, and total revenue from exports would fall. For example, if U.S. wheat prices fell 20 percent because of a reduction in loan rates, but wheat export volumes increased only 10 percent, export revenues would actually decline. In this case, the import demand for U.S. wheat is said to be inelastic. On the other hand, if wheat prices fell 20 percent but wheat export volumes increased 30 percent, total export revenue would increase. The import demand for U.S. wheat would be elastic.

The response of the major exporters is also crucial to U.S. farm policy decisions, because foreign exports could similarly be stimulated by lower world prices. For many commodities, the U.S. price has set the world price. Lower U.S. prices will have a direct impact on the export price for other countries' exports.

There is a need to know the magnitude of the elasticities of both import demand and export supply for major U.S. customers and competitors. Just as important is the need to understand the factors that affect changes in the elasticities and how countries are likely to respond to lower U.S. prices. This paper investigates these questions for major Western Hemisphere countries--Canada, Mexico, Brazil, and Argentina.

These countries--and the remaining Latin American countries--are both major customers of and competitors with U.S. farm exports. The response of their agricultural exports and imports to lower U.S. prices is potentially of great significance to the U.S. farm sector. Canada, Brazil, and Argentina are major competitors in world grain and oilseed markets (table 1). The region takes about 20 percent of total U.S. agricultural exports (table 2). As U.S. agricultural exports have fallen off in recent years, the share to Western Hemisphere countries has increased.

IMPORT DEMAND AND EXPORT SUPPLY ELASTICITIES

Trade elasticities measure how much a country's agricultural imports or exports change in response to a change in the import or export price (hereafter referred to as the world price). For example, an export supply elasticity of 0.5 means that a 10-percent increase in price results in a 5-percent increase in exports. Similarly, an import demand elasticity of -0.5 means a 10-percent increase in price results in a 5 percent fall in import volume.

Table 1--Selected Western Hemisphere countries' shares of world exports, 1984/85

Country	Wheat	Coarse grains	Oilseeds 1/	Oilmeals 1/	Vegetable oils 1/
			Percent		
United States	35.4	55.2	56.8	17.1	9.4
Canada	18.1	3.3	5.1	1.3	1.9
Brazil	0	na	11.3	31.2	9.8
Argentina	7.5	11.8	10.5	14.3	11.6
Share of world exports	61.0	70.3	83.7	63.9	32.7

na = negligible amount.
1/ Oilseeds and oilmeals includes soybeans, cottonseed, rapeseed, peanuts, and sunflowers. Vegetable oils also includes palm oil.
Source: (11).

Table 2--U.S. agricultural exports to Western Hemisphere countries

Country	Fiscal year beginning October 1				
	1982	1983	1984	1985	1986 forecast
	Million dollars				
Canada	1,869	1,870	1,936	1,727	1,500
Mexico	1,493	1,777	1,967	1,566	1,484
Caribbean Islands	764	773	827	771	774
Central America	343	356	396	358	372
Andean countries	1,698	1,500	1,600	1,277	1,253
Bolivia	19	38	34	17	35
Chile	248	215	199	78	113
Colombia	273	256	220	238	221
Ecuador	102	116	143	117	119
Peru	310	258	227	106	135
Venezuela	746	617	777	721	630
Brazil	577	400	437	557	624
Other 1/	58	52	52	38	52
Total Latin America	4,933	4,858	5,279	4,567	4,565
	Percent				
Percentage of total U.S. agr. exports	17.4	19.3	19.0	20.2	21.7

1/ Includes Guyana, Surinam, French Guiana, Argentina, Paraguay, and Uruguay.

Sources: U.S. Bureau of the Census and ERS estimates.

Five factors are important in determining the elasticities of import demand and export supply for a particular commodity:

- o the elasticity of domestic supply;
- o the elasticity of domestic demand;
- o the elasticity of stocks demand;
- o the share of total production (consumption) dependent on exports (imports); and
- o the elasticity of price transmission.

"The lower the elasticities of domestic demand, domestic supply, and stocks demand, the lower will be the elasticities of export supply/import demand. The [elasticities] will also be influenced by the extent to which countries/regions depend on trade relative to domestic production and use. The greater the dependence on trade (imports or exports), the smaller the elasticities of excess [export] supply or excess [import] demand" (10).

The fifth factor, the elasticity of price transmission, measures how responsive a country's domestic price is to changes in the world price. Many factors influence the degree of price responsiveness, but agricultural and trade policies are especially important. Governments can insulate domestic prices from international prices by various means such as fixed domestic procurement prices, variable import levies, or exchange rate manipulations. Where these kinds of restrictive policies do not exist, domestic prices are free to move with world prices.

The price transmission elasticity will usually range between 0 and 1.0. A price transmission of 1.0, or perfect price transmission, means changes in the U.S. price and the foreign domestic price would be equal, excluding transportation costs, or that the U.S. and foreign price would vary proportionally. In the case of zero price transmission, governments completely isolate internal prices from changes in world market prices (5). The lower the price transmission elasticity, the lower will be the elasticities of import demand and export supply. In addition, low price transmission elasticities mean higher price variability on the world market, because the basic effect of a country's policies that insulate domestic from world prices is to force market adjustments onto the rest of the world (1).

Four methods have been used to estimate elasticities of import demand and export supply (See 12 for a more complete description of these methods.) Two of the models use mathematical models. The direct estimation method involves econometrically estimating a reduced form excess supply/excess demand function facing the country in question. A second method involves the simulation of a multiple-equation model to obtain price elasticities. These elasticities differ from those obtained from other methods because other factors are not held constant. These "dynamic" elasticities indicate how import demand or export supply would change over time after all other factors have adjusted to the price change.

Because these two methods require large amounts of data or complex estimation procedures, this study primarily uses a combination of two other techniques: the calculation method and the synthetic method. The calculation method uses the formula:

$$n_m = n_d \frac{D}{M} \frac{dPc}{dPw} \frac{Pw}{Pc} - e_s \frac{S}{M} \frac{dPp}{dPw} \frac{Pw}{Pp}$$

Where: n_m = import demand (or export supply) elasticity
n_d = price elasticity of demand
e_s = price elasticity of supply
D/M = ratio of domestic utilization to imports (exports)
S/M = ratio of domestic production to imports (exports)
$\frac{dPc}{dPw} \times \frac{Pw}{Pc}$ = transmission elasticity for consumer prices
$\frac{dPp}{dPw} \times \frac{Pw}{Pp}$ = transmission elasticity for producer prices

Where:
Pc = consumer price
Pp = producer price
Pw = border price

The data requirements are not as strict for this method, but assumptions must be made about the elasticities in the absence of empirical estimates. This is where the fourth method comes in. The synthetic method requires knowledge of the country and commodity in question. Based on this knowledge, one must evaluate the elasticities available in the literature and choose appropriate values; for example, an average of estimates from selected studies or a value that simulates historical data well. This technique is necessary for countries or regions where data are not available, a problem with many Latin American countries.

A crucial issue that arises in the interpretation of the import demand and export supply elasticities is the timepath of responsiveness and how the elasticities change over time. Supply and government policy are usually assumed to be fixed in the short run (1 year), but over a longer period of 2 to 3 years, a country's area, yields, and exports will likely respond to lower prices. Price responsiveness is assumed to be greater in the long run (for example, after 4-5 years), but economists have difficulty estimating longrun elasticities because of the unpredictable behavior of governments and institutions.

A related factor that is critical in analyzing the price responsiveness of trade is the strength and duration of U.S. price declines. Countries are not likely to alter policies in the short run but faced with a prolonged period of lower prices--a new plateau--policies and institutions are more likely to be changed.

This study assumes that supply elasticities are zero in the short run. Thus, the elasticities presented here are medium term (2-3 years), because they allow for some production response.

The trade elasticities measure how much imports or exports change in response to a change in the world price of that commodity; for example, how Argentina's wheat exports change in response to a change in the world wheat price. The elasticities do not account for cross-commodity price effects, nor how much Argentina's wheat exports would change in response to a change in the world corn price.

The elasticities come from a variety of sources and were estimated using the various methods described above. Estimates from other sources may differ, yet be valid because of differences in time periods of estimation, methodologies, or assumptions regarding government policy. Even estimates for the United States vary widely (12). Therefore, caution should be used when making comparisons among countries.

CANADA

Canada has been the world's second leading wheat exporter over the past decade, although it accounts for only 5 percent of world production. Canada's role in world coarse grain production and exports is less significant (table 3). Barley, grown mostly in western Canada, is the most important coarse grain produced and exported. Over the past decade, corn production, centered in eastern Canada, has been increasing at a faster rate.

Wheat, barley, and rapeseed are Canada's most important commodities in terms of both cash and export receipts. Canada competes directly with the United States in world wheat markets, and to a lesser extent in coarse grains and oilseeds markets. Canada and the United States are also major agricultural trading partners, each shipping about $2 billion to the other in 1985. However, much of this agricultural trade occurs in products not covered in this report, such as livestock and horticultural products.

Table 3--Canada: Indicators of importance of key commodities, average 1982/83-84/85

Indicator	Wheat	Coarse grains
	1,000 metric tons	
Production	24,814	23,142
Imports	0	561
Exports	20,239	5,719
Domestic use (TDU)	5,337	18,700
Ending stocks	8,885	5,668
	Percent	
Prod./world prod.	5.0	3.1
Exports/prod.	81.6	24.9
Exports/world trade	19.1	6.1
Stocks/TDU	166.5	30.4

TDU = total domestic use.
Source: (11).

Canadian farmers, like their U.S. counterparts, have faced severe financial distress in the eighties, as indicated by the record number of bankruptcies, large increases in outstanding debt and loans in arrears, falling land values, and depressed equipment sales. Although heavy grain export sales in the early eighties partly compensated for declining grain prices, the financial position of some Canadian farmers is tenuous. Canadian grain farmers are in a poor position to absorb further declines in grain prices.

Factors Affecting Price Responsiveness

Canadian supply response is affected by a variety of factors: farmer preferences, relative prices, Canadian Wheat Board (CWB) operations, and onfarm stocks. Stabilization programs and domestic price policies for grains also influence price responsiveness. Canada's grain export sector generally tends to be market-oriented, particularly compared with that of other U.S. competitors such as the European Community. Canadian grain supplies are responsive to a change in the world price. However, institutional and policy factors will dampen or delay the supply response to declines in price.

Relative prices

The allocation of crop area is somewhat sensitive to relative prices, especially area devoted to barley and rapeseed. Wheat prices relative to major competing crops exert little influence on wheat acreage, which is more sensitive to CWB delivery quotas and farm stocks. Many Canadian farmers strongly prefer growing wheat; it generally brings a greater return per acre than barley and is considered less risky than rapeseed. Much of the wheat area is suitable for little else except grazing cattle, and substitution possibilities are limited.

Operations of the CWB

The CWB, sole legal exporter of wheat, barley, and oats produced in western Canada, regulates movement of grains and oilseeds from farmers to export positions through its quota delivery system. Through its pricing and marketing practices, the CWB strongly influences farmers' planting decisions. Farmers are free to plant what they want, but the CWB determines deliveries. The CWB alters quotas in response to market conditions, which for wheat are driven almost exclusively by foreign import demand. Thus, supply response is driven to a large extent by quantity signals--that is, quotas--rather than by price signals.

Farmers' plantings, especially of wheat, are heavily influenced by the amount of grain that moves off their farms. Thus, changes in wheat area are highly correlated with changes in stocks. Wheat exports have been high and stocks low during the seventies. Despite declining prices, Canadian farmers have increased wheat area substantially.

The CWB price pooling mechanism ensures that each farmer receives the same price for each kind and grade of grain delivered to the CWB, which provides intra year price stability to farmers. But the CWB is not able to insulate Canadian farmers from year-to-year fluctuations in world prices. Canada has been a price taker in world grain markets since the early seventies, when the United States became the dominant exporter. Because prices received by Canadian farmers parallel those received by U.S. farmers, lower U.S. prices

would probably be reflected in lower CWB initial payments (a guaranteed floor price).

The CWB mandate is to sell as much grain at the best price possible. It has thus established long-term agreements with a number of its major customers. However, many of the agreements have expired recently, or will soon, and whether they will be renewed is unclear. The conditions which prompted some countries to enter into the agreements in the early eighties--tighter stocks and higher prices in the seventies and uncertainty following the U.S. grain embargo in 1980--no longer exist.

Long-term agreements have covered roughly three-quarters of Canada's grain exports in recent years and have ostensibly provided a rationale for the CWB to encourage higher production. A reduction in U.S. loan rates could encourage the CWB to more aggressively pursue long-term agreements as a means of offsetting expected lower prices with greater volumes.

The CWB extends 3-year commercial credit guaranteed by the Federal Government. Credit sales as a percentage of total grains and oilseeds exports declined from 29 percent in 1977/78 to about 14 percent in 1980/81, but jumped sharply in 1982/83 to 33 percent when the USSR became a credit customer. No concessional credit has been given since 1977/78.

Because CWB credit is government-backed, the risk is eventually borne by the Federal treasury and taxpayers. Given that Canada's budget deficit is relatively larger than that of the United States and the Government is committed to reducing the deficit, Canada is unlikely to engage in an extensive "credit war" to win customers.

In the long run, the CWB must maintain its financial integrity; it cannot simply undersell other exporters with no regard to costs. Although the Government is obligated to make up any deficits, it would not be in the CWB's long-term interest to continually incur deficits. The barley account had a Can.$5 million deficit in 1982/83, the first deficit since 1969/70. Canadian producers follow developments in U.S. and world markets. A wheat board that consistently discounted Canadian grain to boost sales would not likely enjoy continued producer support.

Domestic grain price policy

Initiated in 1973, the two-price wheat policy attempts to insulate domestic milling wheat prices from the world wheat market. The price to Canadian millers is subject to both a floor and ceiling, currently Can$5.00 and Can$7.00 per bushel. A decline in the world wheat price, already below the millers' floor price, would therefore have little or no effect on domestic food use of wheat.

Canadian export prices for barley roughly parallel U.S. corn prices, adjusted for relative feed values. Barley occasionally sells at a premium to U.S. corn; for example, following the U.S. grain embargo in 1980. Lower U.S. prices would directly reduce Canadian export prices.

Lower domestic barley prices could result in either increased livestock feeding, or a shift of area into rapeseed, depending on factors such as livestock inventories, barley stocks, and rapeseed prices and stocks. But a decline in U.S. prices has a less direct impact on domestic barley prices because of internal market conditions and barriers to barley imports.

Institutional and geographical barriers effectively create two domestic Canadian markets for feed grains: eastern and western. Because corn imports from the United States are not restricted, the U.S. corn price acts as an upper bound to eastern Canadian feed grain prices (13). (U.S. corn is not competitive with local feed grains in western Canadian markets.) A relatively small portion of western feed grains move into eastern Canada. These factors may isolate the feed grain market in the West from changes in U.S. feed grain prices.

CWB marketing practices, including import permits and the corn-competitive formula pricing of feed grains, at times has insulated domestic barley prices from world coarse grain prices. However, both policies were changed in 1985. Import permits are no longer issued by the CWB, and the corn-competitive pricing policy has been eliminated. Under this policy, the CWB was obligated to sell western feed grains at a price based on the landed price of U.S. corn at Montreal.

Exchange rate policy and grain prices

The Canadian economy is so closely linked to the U.S. economy through interest and inflation rates that Canadian monetary officials are limited in their ability to influence exchange rates. Officials must generally maintain interest rates comparable to U.S. rates, or capital will flow south, putting downward pressure on the Canadian dollar. However, high interest rates adversely affect economic growth. Canadian policymakers must operate within these two constraints.

The Canadian dollar has depreciated against the U.S. dollar since the late seventies, reflecting higher Canadian inflation and an overall poorer economic performance. This depreciation has enhanced Canada's competitive position in world markets. However, while the Canadian dollar has weakened significantly against the U.S. dollar, it has remained relatively strong against other currencies. Hence, the extent to which the CWB can exploit any advantage conferred by the U.S.-Canadian dollar movement is limited to direct competition with the United States. It is not clear to what extent the CWB has passed on the exchange rate advantage to producers through higher returns, or has chosen to undercut U.S. prices, because information on individual sale prices is not available. Which strategy the CWB has been following may depend on whether it assumes export demand is elastic or inelastic.

Stabilization policy for grains and oilseeds

The Western Grain Stabilization Program (WGSP), which provides cash flow protection to producers of wheat, barley, and other major crops in western Canada, will buffer the impact of a drop in world wheat and coarse grain prices. The program is voluntary, but over three-quarters of eligible farmers participate, many of whom are small- and medium-sized producers less able to compensate for price declines by increasing output. A price decline that causes net cash returns to fall below the previous 5-year average will trigger a payment from the stabilization fund equal to the net cash shortfall. Payouts would be made annually as long as net cash returns are below the average of the previous 5 years.

Support is not provided indefinitely, however, because the addition of "low" years to the moving average reduces the likelihood of a payout. WGSP payouts will enable many participating grain producers who might otherwise go bankrupt to stay in production in the short run, and will also provide them with cash to meet planting costs the following spring. As such, the program will delay supply adjustment to lower world prices by a large percentage of wheat and barley producers.

Export Supply Response

Two sets of export supply elasticities for wheat and barley are presented. One set was obtained using the simulation method (table 5). The second set was estimated using the calculation method and the synthetic method to obtain estimates of supply, demand, and price transmission elasticities (table 6). Although the export supply elasticities differ, both show the response for wheat to be inelastic and that for barley to be elastic. A range of mediumrun supply elasticities based on area changes is presented in table 4.

Supply response and price transmission elasticities

As Bredahl pointed out, when a national marketing board controls exports, it is not always possible to determine whether export supply is driven by price changes or government policy, and that a behavioral model of the CWB is a "necessary prerequisite" to determining the elasticity of export supply (5). Such a modeling exercise was not attempted for this study.

Table 4--Canada: Comparison of mediumrun supply elasticities

Author/ commodity	CWB final price		CWB final realized price		Farm price 1/	
	Wheat	Barley	Wheat	Barley	Wheat	Barley
Mielke (18)						
Wheat	0.53	-0.69	0.35	-0.84	--	--
Barley	-1.65	1.50	-.40	.70	--	--
Jolly & Abel (15)						
Wheat	--	--	1.16	--	--	--
Barley	--	--	-.94	--	-0.85	0.74
Lowe & Petrie(16)						
Wheat	--	--	1.578	-.994	--	--
Barley	--	--	--	.236	--	--
Colman (9)						
Wheat	.562	--	--	--	--	--
Barley	--	--	-.555	.867	--	--
Spriggs (22)						
Wheat	--	--	--	--	.43	-.22
Barley	--	--	--	--	-.56	.34

-- = not applicable.

1/ Farm price is expected farm returns, based on local off-board price and recent yields.

Table 5--Canada: Export supply elasticities 1/

Effect of a 1-percent change in the U.S. price of:	Canadian exports of:			
	Short run		Long run	
	Wheat	Barley	Wheat	Barley
Wheat	0.74	-1.51	0.82	-2.86
Barley	0	2.86	-.56	2.70

1/ The export supply elasticities were estimated based on small changes in U.S. prices and are not necessarily valid for large changes in price. Source: (22).

Price transmission elasticities for Canadian wheat and barley were assumed to be close to 1.0. The CWB sells wheat at prices that must be competitive with world market prices; therefore, the price returned to farmers must reflect the world price. Certain Canadian policies insulate producers from changes in world prices: import licensing requirements, the two-price wheat policy, and the CWB price pooling system. But these policies tend to affect the price for domestic use, a small part of total production, or smooth out price fluctuations within the marketing year. They do not impede transmission of year-to-year changes in world grain prices to Canadian producers.

Wheat response

The export supply response of wheat reflects a relatively inelastic production response and stable domestic demand. Longrun wheat export supply response will be affected by CWB marketing practices, such as the use of long-term trade agreements, dealing with state trading agencies, and aggressive pursuit of markets. By ensuring sale of a large portion of the crop, long-term agreements reduce the responsiveness of export supply to changes in price. To the extent that the CWB modifies the market mechanism, it will reduce the responsiveness of both export supply and foreign import demand to price changes.

Table 6--Canada: Domestic, price transmission, and export supply elasticities

Commodity	Domestic elasticities		Price transmisssion elasticities		Export supply elasticities
	Supply	Demand	Producer	Consumer	
Wheat	0.50	0.20	0.95	0.75	0.54
Barley	.70	.50	.90	.75	1.32

Source: ERS estimates.

Other factors will also influence the export supply response of Canadian wheat, as well as foreign import demand:

- Recent improvements in Canada's rail network have eased an export constraint that should make export supply more responsive to increases in world grain prices, but would not affect supply response to price declines.

- Canada produces a high-quality, high-protein wheat desired for blending purposes; the perception of Canadian wheat as a differentiated product would tend to reduce the elasticity of demand for imports of Canadian wheat.

- Canada exports over three-fourths of its wheat production; the high degree of dependence on world trade means export supply is less responsive to world price declines.

On balance, these factors tend to make Canadian wheat export supply response relatively inelastic. In the long run, western Canada would not likely produce less grain; a more likely outcome is fewer farmers producing the same, or greater, volume. Farm rationalization and consolidation will encourage higher production volumes to maintain income in the face of declining margins.

The export supply response of wheat is expected to continue to be relatively inelastic. There are few economic crop alternatives to wheat in much of the wheat-producing area of Canada. The Government has voiced a strong commitment to continued expansion of grain exports, as evidenced by their program of rail and port modernization, and may use existing stabilization plans or emergency interim measures to support income in the grain sector in the short run to ensure long-term viability.

Barley response

The elasticities show export supply response of barley to be more elastic than that of wheat. This result derives from a more elastic supply and demand than for wheat. Barley's supply is more responsive to price changes than wheat because in areas where barley can be produced, there are more production alternatives than in much of the wheat-growing areas. Demand for barley is more elastic because it is used primarily for animal feed, where there are substitutes. Also, livestock producers may respond to feed price increases by increasing slaughter. Wheat, on the other hand, is used primarily for food for which there are few good substitutes.

The shortrun barley supply elasticity in table 5 is slightly higher than the longrun elasticity, whereas the opposite would be expected. Over the estimation period, the shortrun stock adjustment to price was stronger than the longrun production adjustment. The feed use adjustment was approximately the same in both the short and long run. An intuitive explanation of this phenomenon is that a short-term price decline would result in reduced barley acreage, with feed grain needs being met by stock drawdown. Long-term price weakness, however, would more likely result in some lower level of production occurring on fewer, larger farms.

Elasticities in table 5 suggest that barley export supply in the longrun will be more sensitive to changes in the world wheat price than to changes in the

world barley price. This finding is consistent with the observation that Canadian grain producers strongly prefer growing wheat and will move additional acreage into barley only when there is an adverse wheat price movement. Because barley returns less per acre than wheat, it will be a less attractive alternative in the long run. Barley export supply response could become more elastic over time if rapeseed becomes a more acceptable alternative to barley production.

MEXICO

Mexico's imports of agricultural commodities, primarily corn, sorghum, soybeans, and wheat, have been growing since the midseventies. Mexico's rapid population and economic growth, the latter spurred by the discovery of oil, pushed the country from a net exporter to a net importer of agricultural commodities. At the same time, the once strong production sector lost its earlier impetus based on the development of irrigation and the adaptation of high-yielding varieties. Unless large amounts of support are provided to the agricultural sector, significant increases in crop yield or area will not likely be achieved in the near term.

Imports are used to maintain a stable and reasonably priced urban food supply. Although there is great year-to-year variability, imports as a percentage of domestic utilization are high for corn, sorghum, and soybeans (table 7). The large shares of domestic consumption that must be imported every year have made Mexican authorities very sensitive to trade patterns and issues. These sensitivities have been heightened by the growing trade deficit and a huge foreign debt.

Mexico's food policy was reoriented in 1980 toward food self-sufficiency, but this costly position has been moderated since 1982 in the face of the country's foreign debt situation, the International Monetary Fund's (IMF) austerity program, and the economic slowdown of the past few years.

Factors Affecting Price Responsiveness

Mexican import price responsiveness is influenced by government regulation and intervention in the pricing and trading of agricultural products. The Government regulates imports and exports through licensing requirements and subsidizes consumer food prices and prices of certain farm inputs.

Trade policy

The most important factor influencing agricultural trade is the Government's policy to import basic food needs not covered by production and the issuing of import licenses and export permits. Food imports are largely determined by cabinet-level officials based on estimates of production and domestic requirements. Although the Government once handled all grain and oilseed imports, private sector involvement is growing, which could make Mexican import decisions more responsive to world price changes. A commission comprised of both public and private sector members has been established to determine overall import requirements. Import licenses are then granted to the importer, whether public or private.

Average tariffs are low. Average duties were recently estimated at 10 percent ad valorem, with some imports such as agricultural machinery having low or no duties (14). However, a new trade regime is being implemented,

Table 7--Mexico: Indicators of importance of key commodities, average 1982/83-84/85

Indicator	Corn	Wheat	Sorghum	Soybeans	Cotton
			1,000 metric tons		
Production	8,733	3,867	3,633	567	225
Imports	2,715	333	3,012	1,321	0
Exports	0	5	0	0	105
Domestic use (TDU)	11,900	4,183	6,645	1,837	123
Stocks	319	414	1,060	247	29
			Percent		
Prod./world prod.	2.1	0.8	5.7	0.6	1.4
Exports/prod.	0	0	0	0	46.7
Imports/TDU	22.8	8.0	45.3	71.9	0
Exports/world trade	0	0	0	0	2.4
Imports/world trade	4.2	.4	24.3	5.1	0
Stocks/TDU	2.7	9.9	16.0	13.4	23.6

Source: (11).

which calls for the gradual replacement of import licensing with higher average tariffs (3). Cotton exports are subject to export taxes. More importantly, export permits are issued only after domestic supplies for the milling industry are assured.

Mexico's exchange rate was overvalued for many years, but Mexico is attempting to bring its peso into equilibrium with currencies of its major trading partners, in particular the United States. A reduction of the exchange rate distortion of past years should increase the price transmission between domestic and world prices.

Domestic price policies

Mexico has relied primarily on two methods to direct agricultural production. One has been a price support system for basic commodities. This system has not been fully successful in stimulating production or maintaining real prices in the face of rapid inflation. Only recently has the program covered large volumes of output. With the exception of two short periods in the midseventies and early eighties, real support prices for grains and oilseeds have declined, although recent price increases for corn and soybeans have exceeded the inflation rate (21).

The second program is a wide range of price subsidies for inputs, including irrigation, fertilizers, and credit. These subsidies have at times resulted in declining real prices for inputs. Official minimum wages, an important production cost, have also been falling in real terms. These programs could lessen the impact of lower world prices, but the Government's ability to continue to finance farm input subsidies is in doubt.

Consumer prices are also subsidized, especially for bread, corn tortillas, milk, sugar, and eggs. Until November 1984, the Government subsidized sorghum and soymeal feed prices to egg producers. The Government is spending billions of dollars on these programs which benefit rich and poor alike. Whether these and other subsidy programs can continue to be justified will depend on changes in the Government's social philosophy as well as its ability to finance such programs. In order to bring its economic program in line with IMF guidelines for refinancing its foreign debt, the Mexican Government has agreed to lower subsidy levels to reduce the public deficit, estimated at over 7 percent of gross domestic product (GDP) in 1984.

Import Demand and Export Supply Response

Trade elasticities for Mexico were estimated using the calculation method (table 8). Over the long run, population and income growth are generally more important than world prices in influencing grain and oilseed import decisions. In the short run, stocks policy and domestic supply variations because of weather are also important. The impact of world prices on domestic markets also depends on the degree of intervention by the Government in trade and domestic markets.

Feed grain and oilseed imports will be generally more sensitive to world prices than food grain (wheat and corn) imports. Prices are relatively less important in determining corn and wheat imports because these commodities are staple foods and prices are administered at the retail level. Feed grain and oilseed imports are used primarily in animal feed and wholesale prices to feed users are not fixed.

Trade elasticities for grains, soybeans, and cotton

The estimates of price transmission indicate most farmgate (producer) prices are somewhat responsive to changes in world prices. But producer price transmission elasticities are all less than 1.0, reflecting the various policies that insulate domestic from world price changes.

Table 8--Mexico: Domestic, price transmission, and trade elasticities

Commodity	Domestic elasticities		Price transmission elasticities		Trade elasticity
	Supply	Demand	Producer	Consumer	
Corn (M)	0.2	-0.2	0.32	0	-0.21
Wheat (M)	.4	-.1	.17	0	-.78
Sorghum (M)	1.5	-.3	.51	1	-1.58
Soybeans (M)	.7	-1.2	.48	1	-1.81
Cotton (X)	.4	-.5	.76	1	1.24

M = imported; X = exported.
Sources: (2, 8, 17, 20).

The consumer price transmission elasticities for sorghum, soybeans, and cotton were assumed to be 1.0. The Government recently reduced subsidies on sorghum and soybeans and is selling these commodities to feed users at a price that reflects the world price.

The import demand elasticities for Mexican food grains reflect changes in domestic production more than consumer response to changing world prices. Retail prices of most corn and wheat products are fixed by Government decree. Periodic adjustments in prices have not necessarily reflected trends in world prices, as indicated by price transmission elasticities of zero.

The response of sorghum and soybean imports to world prices reflects changes in both production and the quantity demanded by Mexican feed users. These import demand elasticities are relatively high, reflecting less government interference in the pricing mechanism.

Of the commodities considered here, cotton is the only export crop. Mexican cotton production has been very sensitive to U.S. policy changes and export supply has been relatively elastic. Production and exports have declined in recent years, however, despite the floor provided by U.S. support prices. Cultivation has been adversely affected by the inability to control pest problems, and domestic pricing and crop insurance policy has not favored cotton producers. Also, the Government controls exports in order to ensure adequate supplies to domestic mills.

Interpretation of elasticities

Several factors could have an important influence on the magnitude of the estimated elasticities:

- The Government can control the price transmission by regulating trade and setting domestic prices. Producer prices for corn will at some point be inflexible downward because so much of Mexico's peasant agriculture depends on corn production and the Government is committed to maintaining peasant income levels. A strong self-sufficiency sentiment in Mexico, although currently tempered by financial constraints, is periodically reflected in large increases in the support prices for grains and oilseeds.

- The trade shares of domestic production and utilization are quite variable, and the size of these shares heavily weight the magnitudes of the trade elasticities. If imports increase at a faster rate than either domestic production or consumption, the export supply and import demand elasticities will decline. For example, if imports of corn and wheat increase to 50 percent of domestic production (which is likely), the import demand elasticities for these commodities would then be closer to -0.1.

- Most of the grains and oilseeds are important production substitutes. If relative crop prices remain constant, the total supply response and impacts on trade may be extremely small.

Brazil is the world's second largest soybean producer, third in corn, and sixth in cotton. It is a less significant rice and wheat producer. Only soybeans and soybean products are consistently exported on a large scale, while wheat is regularly imported (table 9). Rice, corn, and cotton are exported in modest amounts when production exceeds domestic needs, but the Government regulates shipments through export registrations. These commodities, especially rice, are imported when production falls short of domestic demand. The Government purchases corn even when world prices are above Brazilian prices, because stabilization of domestic corn prices is considered important enough to justify the budgetary outlay of importing at a loss.

Brazil has concentrated on soybeans and products as its major annual export crop. Appropriate varieties were identified and researched, and new management techniques greatly improved average yields. Unless export policy for other crops is liberalized (possible) and relative yields change dramatically (unlikely), soybeans and products will remain the dominant field crop grown for export in Brazil.

Factors Affecting Price Responsiveness

Government policy has greatly influenced soybean, soybean products, and cotton prices. Policy interventions have been especially significant in limiting or encouraging exports. These policies have reduced the responsiveness of domestic prices to changes in world prices.

Table 9--Brazil: Indicators of importance of key commodities, average 1981-83

Indicator	Wheat	Coarse grains	Rice	Soybeans	Soybean meal	Cotton
			Million tons			
Production	1.8	21.1	5.8	15.3	9.9	0.7
Imports	4.5	.3	.3	.1	0	--
Exports	0	.2	0	1.5	7.9	.1
Domestic use (TDU)	6.4	21.7	6.2	13.8	2.1	.6
Stocks	.5	.3	.3	.6	.3	.4
			Percent			
Prod./world prod.	0.4	2.8	1.9	17.3	16.6	4.3
Imports/TDU	70.3	1.2	4.4	.5	0	--
Exports/prod.	0	.8	.3	9.8	79.8	14.9
Imports/world trade	4.4	.3	2.3	.4	0	--
Exports/world trade	0	.2	.2	5.6	36.4	2.3
Stocks/TDU	7.8	1.4	4.0	4.3	14.3	68.4

-- = not significant.
Source: (11).

Soybeans and products

Brazilian soybean prices have generally been below world prices. Soybean exports have been limited by tax and credit policies or export registration quotas. These same policy tools, especially differential export taxes, have been used to encourage soybean meal and oil exports. Lower export taxes on meal and oil result in larger crush margins, which protect crushers from world price fluctuations.

Throughout the seventies, soybean yields were increasing, and production costs were subsidized through various credit schemes. The Government was committed to expanding the production and crushing of soybeans. Growing soybeans in Brazil was profitable even in the face of falling world prices, and area expanded as rapidly as infrastructural bottlenecks could be overcome. Export supply elasticities for this period would be low.

Severe economic problems in 1981 forced the Government to impose austerity programs that reduced production subsidies for soybeans. Soybean prices became more responsive to world prices, and alternative crop prices (corn) increased relative to Brazilian soybean prices. Soybean area fell slightly for 3 years. In 1983 a large devaluation of about 30 percent increased the profitability of production for export. The devaluation increased interest in soybeans and a record area was planted for the 1984 crop.

The 1983 maxi-devaluation has been maintained by continuous smaller devaluations, and the lower value of the cruziero will encourage exports to help finance debt repayments. The devaluation will likely offset the reduction of production subsidies caused by austerity programs, leaving Brazilian soybean growers competitive on world markets. Area planted could well increase in the later eighties in the face of falling real prices, just as occurred in the late seventies.

Cotton exports

Before 1973, cotton exports were almost as large as Brazilian domestic consumption. Cotton prices were below world market levels and Brazil was a major textile exporter. Cotton exports have dwindled since 1973, while domestic consumption has grown. Now, cotton may only be registered for export if domestic supplies are excessive. Government policy gives textile exports priority over raw cotton exports. However, if the Government reduces restrictions, cotton exports would become more responsive to world prices.

Import Demand and Export Supply Response

Brazil's production and imports of major crops are not very responsive to world prices (table 10). Corn and rice trade is influenced more by weather-induced supply fluctuations than by world prices; the import demand elasticities will remain low unless trade liberalization increases Brazil's linkages with world prices. Cotton may be experiencing such a liberalization because the Government has been issuing export permits more freely. Thus, the export supply elasticity may increase.

Table 10--Brazil: Import demand and export supply elasticities

Commodity	Import demand	Export supply
Wheat	0.1	--
Corn	.1	0.1
Rice	.1	.1
Soybeans	--	.3
Soybean meal	--	.3
Cotton	--	.4

-- = not applicable.
Source: Unpublished ERS materials.

Brazilian wheat prices are isolated from the world market, resulting in a low import demand elasticity. Consumer prices for wheat flour are subsidized well below world prices, while producer prices for wheat are supported above world market prices. The Government procures all domestic and imported wheat. Changes in world wheat prices have minor budgetary importance for the Government, but little impact on Brazil's total foreign exchange outlays because wheat imports are a small share of total imports. Unless the wheat program is changed, the import demand elasticity may remain near zero.

Because of the reliance on exports, soybeans and soybean meal are more oriented to world market forces than wheat. Historical estimates of export supply elasticities have varied from 0.2 to 0.9, depending upon domestic policy direction and the time period of estimation. Elasticities estimated with pre-1975 data are higher than estimates using data from the 1975-81 period because of policy changes. Calculations of current elasticities are complicated by Brazil's rapid expansion of soybean meal production and export market share since 1976, a period of declining real prices. Recent governments have been slower to impose export limits on soybeans, making production and exports more responsive to world prices.

ARGENTINA

Wheat, coarse grains, and soybeans are among Argentina's key domestic and export crops (table 11). Argentina is the world's fourth largest wheat exporter, shipping about 6-7 percent of wheat in world trade since 1975. Argentina is the second largest exporter of coarse grains, mostly corn and sorghum, and has exported about 12 percent of coarse grains in world trade since 1975. Argentina is also the world's second largest soybean exporter. Exports of soybean oil and meal are expected to replace bean exports over the next few years (19).

Factors Affecting Price Responsiveness

The Government has used export taxes to garner revenues and to mitigate the effects of changes in official exchange rates. Agricultural exports provide 80 percent of foreign exchange earnings. Export taxes respond to the Government's requirement for revenue. Taxes on agricultural exports provide 20 percent of government revenue, although agriculture accounts for only 15 percent of GDP. Export taxes and currency controls have reduced domestic responsiveness to world price changes.

Export taxes

Argentine export taxes have varied over the past decade and have contributed to wide differentials between domestic and export prices (table 12). For example, wholesale prices in Buenos Aires were only 40 percent of the world price in 1975/76, but as much as 88 percent between 1977-79; producer prices were even lower. Export taxes were reduced in the late seventies, but producer prices remained low because of exchange controls. Since 1982, export taxes have increased, decreasing domestic prices relative to export prices. This trend is expected to change as the Government increasingly supports agricultural production and exports as a means to finance the large external debt.

The Government will have difficulty lowering export taxes, however, because it faces severe constraints in borrowing in international financial markets and relies heavily on export tax revenue. In addition, low domestic prices resulting from export tax policies are in line with efforts to keep inflation down. On the other hand, increased foreign exchange earnings derived from increased agricultural exports provide a strong incentive to reduce export taxes. The Government is seriously considering replacing the export tax with land taxes.

Table 11--Argentina: Indicators of importance of key commodities, average 1982/83-84/85 1/

Indicators	Wheat	Corn	Soybeans	Soybean meal 2/
		Million tons		
Production	11.7	18.1	4.8	1.9
Imports	0	0	0	0
Exports	7.1	11.2	2.2	1.7
Domestic use (TDU)	4.6	6.9	2.6	.2
Stocks	.7	.4	.2	--
		Percent		
Prod./world prod.	2.3	2.4	5.4	3.3
Exports/prod.	60.0	62.0	46.0	87.0
Exports/world trade	6.9	12.0	8.2	7.7
Stocks/TDU	15.5	6.5	6.2	2/ 23.6

-- = not significant.
1/ Local marketing year begins in December for wheat, March for corn, and April for soybeans and products.
2/ Percent of total oilmeal domestic use or production, on 44% meal equivalent basis.
Source: (11).

Table 12--Ratio of wholesale price to export price

Year	Wheat	Corn	Sorghum	Soybeans
		Ratio		
1973	na	65	60	na
1974	47	56	67	na
1975	40	33	37	na
1976	40	51	54	na
1977	83	36	70	72
1978	91	86	82	80
1979	84	88	86	83
1980	91	89	86	89
1981	105	94	85	88
1982	84	79	79	81
1983	69	77	71	78
1984	68	77	66	64

na = not available.

The Government uses export tax policy to favor certain commodities. For example, the wheat tax has been reduced relative to coarse grains to encourage wheat production and exports. The tax on soybean meal and oil is lower than the tax on soybean exports, which effectively subsidizes the crushing industry and encourages crushing.

Exchange rate policy

Argentina has maintained different exchange rate regimes over the past decade. A two-tiered rate was used for commercial and financial transactions between 1971 and 1975. In 1976, the Government established several official exchange rates, along with an array of exchange controls. However, the Government consolidated the rates later that year and also stabilized the black market rate. Beginning in 1978, the peso was subject to a managed float. In 1985, the peso was pegged to the dollar.

Exchange rate policy has been closely linked with trade and stabilization policies to control inflation. Because of the manipulation of exchange rates, official rates were held below market rates. This policy of overvaluing the currency, while helping to control inflation, prevented agricultural exporters from receiving the full value of their dollar sales. In some periods, different exchange rates were applied to commodity exports than to other foreign transactions. These exchange rate and export tax policies mean there is flexibility in adjusting these rates to counter a reduction in world prices.

Domestic price policy

Minimum price guarantees have traditionally been available for wheat. For example, the support price is guaranteed not to drop below 80 percent of the FOB export price. (The support price is close to the wholesale price, which

is about 80 percent of the FOB price because of the 20-percent tax on wheat exports.) The support price has been ineffective since it is not indexed to inflation, which was 700 percent in 1984. By law, full payment is guaranteed within 15 days of purchase, but payments often go into arrears and the value of the support price is eroded by inflation. Higher prices are usually available in the spot market.

Consumer prices are held artificially low by the export taxes and overvalued currency. Export prices keep domestic prices low by depressing producer prices. An overvalued currency keeps import prices low. These prices are occasionally made even lower as a result of price controls to fight inflation. Under these conditions, supplies seek the more remunerative export market.

Opportunities for and constraints to increased production

Yield increases and shifts from pasture to cropland could lead to greater production and exports. Most of the arable land is already being cultivated, but cropland could increase if fertile pastures were converted to cropland. However, neither a significant reduction nor expansion in cultivated area is expected to occur in the near term under any price scenario.

Yields for corn and wheat are low compared with other major exporters. Soybean yields are comparable to U.S. yields. Wheat yields may show large increases over the next few years as the Government continues to encourage fertilizer use among wheat farmers. Corn yields also may rise as a result of increased use of fertilizer and herbicides. Soybeans are 80-percent double-cropped with wheat. If double-cropping were discontinued to allow more soybeans to be planted earlier in the season, soybean yields could increase even more.

In recent years, more farmers have switched to single-cropped soybeans, resulting in lower wheat acreage since it is grown on the same land as soybeans. However, the fertilizer program for wheat farmers could result in yield increases, offsetting reductions in area.

Export Supply Response

The following section presents two sets of elasticities estimated using the calculation method (table 13). The first set contains historical estimates reported in various published sources. They were estimated for a period when certain policies discriminated against producers (10, 24). These elasticities would not necessarily apply if Argentine policy were adjusted in response to lower world prices. The second set presents projected elasticities that assume a particular policy response to sharply lower world prices.

The Government can implement policies that counteract the effect of declining world prices on Argentine prices. Export taxes have provided a wedge between

world prices and the domestic producer. For example, the wheat producer received only 70 percent of the export price in 1983. A decrease in the export tax means the producer receives a larger share of the export price and government revenues decline. If export taxes are used to offset changes in world prices, price transmission elasticities can be zero.

Table 13--Argentina: Price elasticities under alternative assumptions

Commodity	Historical domestic		Price transmission		Mediumrun export supply		Longrun export supply	
	Supply	Demand	Hist.	Proj.	Hist.	Proj.	Hist.	Proj.
Wheat	0.50	-0.18	.86	0	0.85	0	1.27	0.42
Corn	.20	-.60	.89	0	.64	0	1.32	.67
Coarse grains	.30	-.30	.91	0	.57	0	1.32	.75
Soymeal	na	na	na	na	na	0	na	.30
Soybeans	.50	-.60	.81	0	1.48	0	na	.50

na = not available.
Source: (ERS estimates, 10, 24).

The projected elasticities assume that export taxes are reduced sufficiently to offset the decline in U.S. prices. The price transmission elasticity would be higher if the Government chose to keep export taxes constant and allow producer prices to fall. Hence, depending on changes in export taxes, a decrease in world price does not necessarily mean that there will be a decrease in Argentine export supply.

A shift to pro-agricultural policies is currently underway to encourage exports to finance the external debt and government spending. This will be accomplished by reducing the export tax and the difference between market and official exchange rates. If the Government can afford to give up more tax revenues from agricultural exports, the export tax could be reduced and domestic prices would increase relative to the world price.

Wheat and coarse grains

Since 1976, when Argentina shifted to a more market-oriented economy, wheat supplies have been relatively inelastic with respect to domestic prices. A 10-percent change in domestic price has elicited a 5-percent change in supply. But the price transmission elasticity has been relatively high: 86 percent of changes in world wheat prices have historically been translated into domestic price changes. If Argentina reduces export taxes, the medium-run response of export supply for wheat with respect to a drop in the world price will be close to zero. Over the long run, with continued low prices, the export supply elasticity would be positive but inelastic. Given the flexibility the Government has to influence price transmission, the projected elasticities are not strictly comparable with the historical estimates.

Export supply response for corn and other coarse grains to price changes is based on a low domestic supply elasticity and relatively low but highly variable demand elasticities. The demand elasticities are derived from the demand for livestock feed. Argentina's livestock sector, which utilizes about one-third of domestic coarse grain production, would be particularly sensitive to shortrun changes in feed prices.

One reason that mediumrun elasticities for coarse grains are so low is that crop rotations occur over a lengthy (7-year) time horizon, and substitution in crop production cannot quickly be achieved. Over the longer run, planting, cultivating and grazing decisions are more easily adjusted and supply response is more pronounced. The longrun export supply elasticity of course grains with respect to world price has, historically, been greater than unity. With policy-induced reductions in price transmission, the longrun elasticity could be between 0.67 and 0.75.

Soybeans and products

The mediumrun responsiveness of soybean exports to changes in world price has been elastic, as world price changes have been effectively transmitted to Argentine producers. Domestic supply of soybeans will be less responsive to bean prices since meal production is expected to increase. The price transmission for soybean meal is likely to be minimal, because the Government is committed to the growth of the crushing industry. Increased meal production will result from new crushing facilities and differential export taxes favoring exports of soybean products. Over the long run, the soybean export supply elasticity will depend on the success of the crushing industry and meal and oil prices.

In the past, producer prices for soybeans were low because Argentina had to discount its lower quality seeds. But the development of the soybean crushing industry has supported producer prices even as world prices have declined. Argentina has increased its crushing capacity dramatically in recent years, and additional crushing facilities are under construction. Meal exports are increasing about half a million tons annually even though world soybean meal prices have been declining since 1980. The Government is likely to continue subsidizing the crushing industry, and these subsidies tend to favor soybean meal exports over soybean exports.

OTHER LATIN AMERICAN COUNTRIES

The remaining countries in Latin America--the Caribbean countries, Central America, the Andean region, Guyana, Surinam, Uruguay, and Paraguay--account for 39 percent of Latin America's total population of 150 million, have about 30 percent of the total region's GDP, and contribute about one third of the region's total agricultural output. These countries are net importers of grains and feed, but absorb less than 5 percent of world grain trade (table 14). The region is a small cotton exporter (4, 5, 6, 21).

Factors Affecting Price Responsiveness

Government involvement in the agricultural sector has been pervasive but may be declining. Input subsidies and livestock feed subsidies are being reduced throughout the region. The reduction in government support to the agricultural sector could encourage imports if demand becomes more responsive to price. But most governments still have a central marketing agency that controls imports through licensing or quotas, and increases in imports because of lower prices are not a certainty.

Table 14--Other Latin America: Indicators of importance of key commodities, average 1981-83

Indicators	Wheat	Coarse grains	Rice	Soybeans	Soybean meal 1/	Cotton
			million metric tons			
Production	1.0	5.9	4.1	0.6	na	0.4
Imports	4.5	3.1	.2	.2	0.6	0
Exports	0	0	.4	.7	.1	.3
Domestic use (TDU)	5.5	9.1	3.9	.1	.6	.1
			percent			
Prod./world prod.	0.2	2.0	1.4	0.7	na	2.5
Imports/TDU	81.8	34.1	5.1	225.0	109	0
Exports/prod.	0	0	9.8	120.0	na	80
Imports/world trade	4.4	4.1	1.7	.7	2.8	0
Exports/world trade	0	0	3.4	2.6	.5	7.0

na = not available.
1/ Percent of total oilmeal domestic use or production, on 44% meal equivalent basis.
Source: (11).

The availability of food aid commodities under PL-480 has made import decisions less responsive to price. Nearly all of these countries have imported PL-480 commodities. Peru, Ecuador, and Bolivia have received wheat for many years, and Peru has also imported vegetable oil. El Salvador has been the leading recipient of PL-480 aid since 1982/83, followed by the Dominican Republic, Jamaica, and Costa Rica. Wheat is the leading commodity sold through PL-480. Along with corn, soybean oil, and rice, they account for about 80 percent of the total value of commodities imported by these South American and Caribbean countries.

Argentina has periodically entered the Latin American grain and oilseed market depending upon its supplies and other export commitments. Following the U.S. embargo on the Soviet Union in 1980, Argentine exports to the Soviet Union shot up dramatically, while falling off to other Latin American countries. This situation has altered over the past several years as Argentina has regained its position in some Latin American markets. Last year Peru purchased vegetable oil from Argentina and Brazil instead of oil under PL-480 because of price considerations. These decisions are examples of interrelationships in Western Hemisphere agriculture and demonstrate how policies in Brazil and Argentina may influence import decisions in other Latin American countries.

Import Demand Response

Trade elasticities for this region necessarily had to be arrived at using the synthetic method because of the shortage of empirical estimates and the lack of reliable data. Most grain and oilseed imports are not very responsive to changes in world prices (table 15). Imports are influenced more by growth in population and income than by changes in world prices. Large budget deficits could result in reduced support for domestic agricultural prices, which could encourage imports. On the other hand, high foreign debt levels could limit foreign exchange outlays for agricultural imports.

Wheat

What little wheat is produced in the region will not show much response to lower world prices in the short run. Most countries generally have programs that insulate domestic wheat prices from international prices. Colombia, Peru, Chile, and Ecuador produce small amounts of wheat at prices set above import prices. However, since many of these countries are facing foreign debt constraints, declines in expenditures to support domestic producers and consumers could cause some production adjustment in 5 to 6 years.

The supply response is expected to be very inelastic in the short run and somewhat less in the medium term. The main factors determining wheat imports into the region are population growth, income growth, and credit availability. Import demand elasticities are thought to be very inelastic with rising prices, but somewhat more elastic with declining prices.

Coarse grains and soybean meal

Most corn and all of the other coarse grains and soybean meal are used in the livestock feed industry. For most of the countries, the supply response for coarse grains is expected to be inelastic in the short run and somewhat less inelastic in the medium term. Again, the debt situation could influence the elasticities depending on the cost of domestic agricultural programs.

Table 15--Other Latin America: Import demand and export supply elasticities

Commodity	Import demand	Export supply
Wheat	0.1 to 0.3	--
Coarse grains	.7 to 1.0	--
Rice	.3 to .5	na
Soybeans	na	--
Soybean meal	.7 to 1.0	--
Cotton	na	1 to 2

na = not available.
-- = not applicable.
Source: Unpublished ERS materials.

Import demand elasticities for coarse grains and soybean meal are more elastic than for wheat or rice. Coarse grain and soybean meal imports in the region are closely related to growth in the poultry industry, which, in turn, is related to income growth. Income growth is expected to recover and expand, but not at the rate of the sixties and seventies. Lower prices would encourage imports of feeds for the poultry industries. However, foreign exchange constraints may limit imports of commodities not considered essential, regardless of prices. Prices seem to play more of a role in allocating demand among coarse grains and between coarse grains and soybean meal than in determining the level of imports.

Rice

The region is both an importer and exporter of rice. Many countries have rice self-sufficiency programs. Lower world prices would have little impact in these countries over the next 2 to 3 years. There could be some adjustment in 5 to 6 years depending on the extent of the price decline and the financial conditions of the countries. The supply response is expected to be very inelastic in the short run but less so in the medium term.

Some of the smaller countries in the region are rice exporters. The supply response is more elastic in these countries than in the other countries in the region, and rice production is expected to fall with lower world prices. Again, however, foreign exchange requirements could encourage Governments to stimulate production in order to generate foreign exchange from exports.

Cotton

The region is an exporter of cotton, but it is also a high cost producer. Lower world prices would likely result in a decline in production, which could decrease competition for U.S. cotton exports. As with other commodities, the need for foreign exchange could result in domestic policies designed to protect producers from adverse market conditions.

Colombia, Peru, Nicaragua, El Salvador, and Guatemala are the major exporters of cotton. Their cotton and fabric industries declined in the early eighties because of world recession and low world prices. A recurrence of the same conditions will be an additional hardship on the countries' cotton industry, probably forcing them into further decline.

IMPLICATIONS FOR THE UNITED STATES

The Western Hemisphere countries include some of the United States' largest agricultural customers. In the 1984/85 marketing year, almost 20 percent of U.S. wheat exports went to Western Hemisphere countries, primarily Brazil, Chile, Venezuela, and Colombia. About 12 percent of U.S. coarse grain exports went to the region, chiefly to Mexico. Only 10 percent of U.S. soybeans but 35 percent of soybean meal was exported to Western Hemisphere countries.

For the major importers, the demand for food grain imports, wheat and rice, is generally not responsive in the medium term to a decline in prices. The import demand elasticities for most wheat and rice importers are low, because domestic prices are often insulated from changes in world prices by agricultural and trade policies. U.S. exports of wheat and rice are not likely to show significant increases in the medium term as a result of lower prices.

Coarse grain imports are more responsive to world price changes primarily because they are used as feed grains rather than food grains. The demand for meat, and thus feed grains and oilseeds, is more responsive to price changes than the demand for food grains. Import demand elasticities are generally higher than those for wheat and rice, but are still inelastic. A similar situation exists for soybeans and soybean meal. U.S. exports of coarse grains, soybeans, and soybean meal are likely to increase more than exports of food grains, but volume increases will still not offset the declines in price in the medium run.

Another major issue arising from a reduction in U.S. prices concerns the response of other countries' export supply. The United States faces export competition in wheat, coarse grains, and oilseeds from its Western Hemisphere neighbors. Canada is the world's second largest wheat exporter following the United States and Argentina is the second largest coarse grain exporter. After the United States, Brazil and Argentina are the major players in world soybean and products trade.

Lower U.S. grain prices would translate into lower prices for Canada, because the price transmission elasticity is high. However, stabilization programs, institutional factors, and geographic constraints in Canada will dampen or delay the supply response of wheat and coarse grains to a reduction in world prices. The United States is not likely to see reduced export competition from Canada as a result of lower prices. A more likely result is that low prices will speed up the process of farm consolidation in Canada, with the same or more output coming from fewer, larger farms.

Argentina's agricultural exports are currently very competitively priced in world markets, even though taxes and overvalued exchange rates have severely reduced profits in the farm sector. Argentina could offset lower U.S. prices by adjusting export taxes and exchange rates and still remain competitive with U.S. prices. Export supplies of grains and oilseeds and products are not likely to fall in response to lower U.S. prices.

Export supplies of soybeans and meal in Brazil have likewise not been highly responsive to price changes and are greatly influenced by government policy. But recent policy changes--for example, reductions in production subsidies--have made exports more responsive to market forces. Steady devaluations have made exports more competitive and soybean area may expand in the late eighties.

The Latin American region also competes with U.S. cotton exports, although cotton production and exports in several countries have suffered in recent years. Cotton exports in many countries are responsive to world prices and a drop in U.S. prices could lead to a decline in production and exports. Cotton exports from Brazil, which have fallen off in recent years, are subject to government restrictions and have not been very responsive to world price changes.

According to the elasticities presented here, U.S. export volumes to Western Hemisphere countries would not increase enough over the next 2 or 3 years to offset price declines. Total export revenue would fall. But problems involved with estimating elasticities--and the reliability and accuracy of any one set of elasticities--mean that elasticities should not be used in isolation when one examines the prospects for growth in U.S. exports.

Confusing the issue of how reliable the estimated elasticities are in predicting changes in import demand and export supply is the capricious nature of government policy, especially in many of the Latin American countries. Policies change quickly in the face of rapidly changing agricultural and economic conditions. A price transmission elasticity of 1.0 today could be zero tomorrow if a government quickly fixed import prices at some arbitrary level.

Many factors influence import and export levels and could override the impact of a decline in U.S. prices: Argentina's need for foreign exchange and its reliance on agricultural exports; Mexico's severe debt situation and drought-prone production; Canada's determination to maintain a viable family farm sector. In general, domestic and trade policies have often so insulated domestic prices from changes in world prices that import decisions have not been made primarily based on prices.

Many domestic agricultural policies were put in place during the seventies, a period of sharply rising prices. An equally sharp decline in world prices, brought on by a reduction in U.S. prices, may in fact elicit policy changes that open up import markets and allow prices to play a greater role in making import decisions. A U.S. agricultural sector with lower and more flexible prices could benefit from such a change.

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