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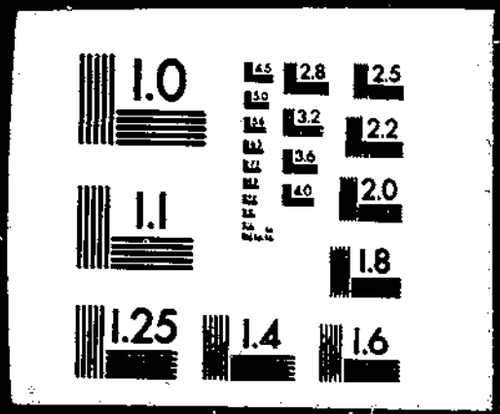

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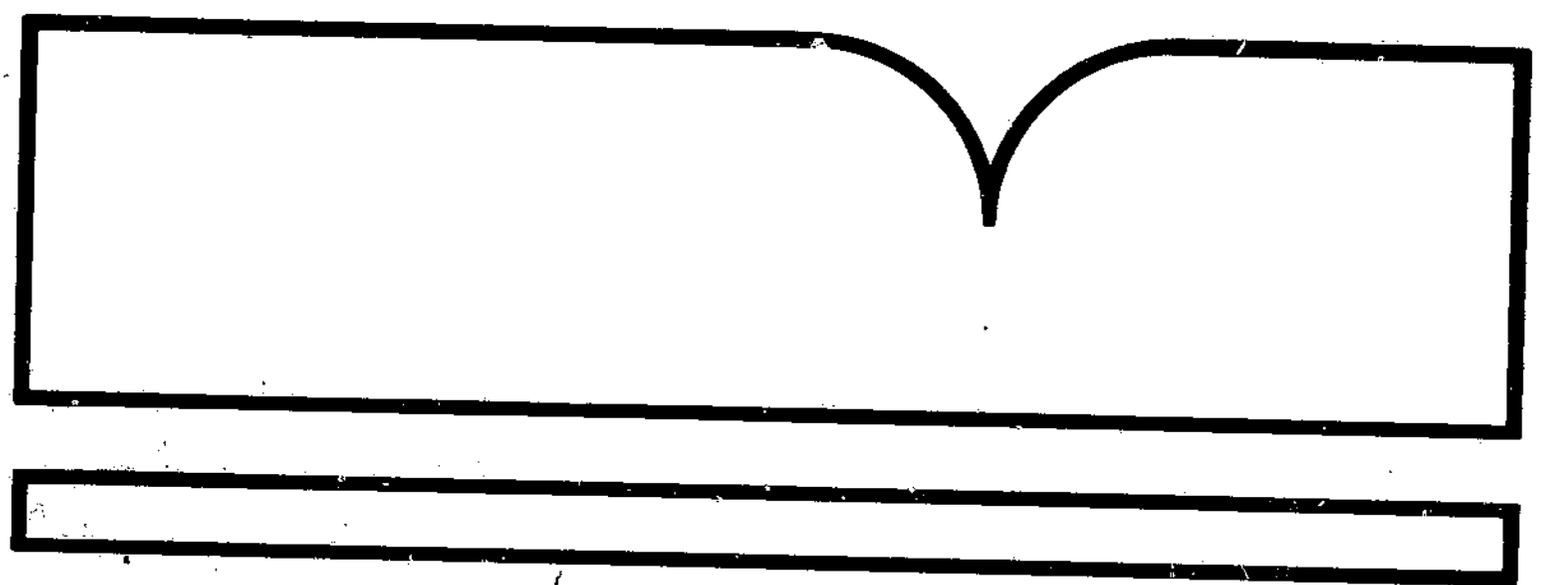

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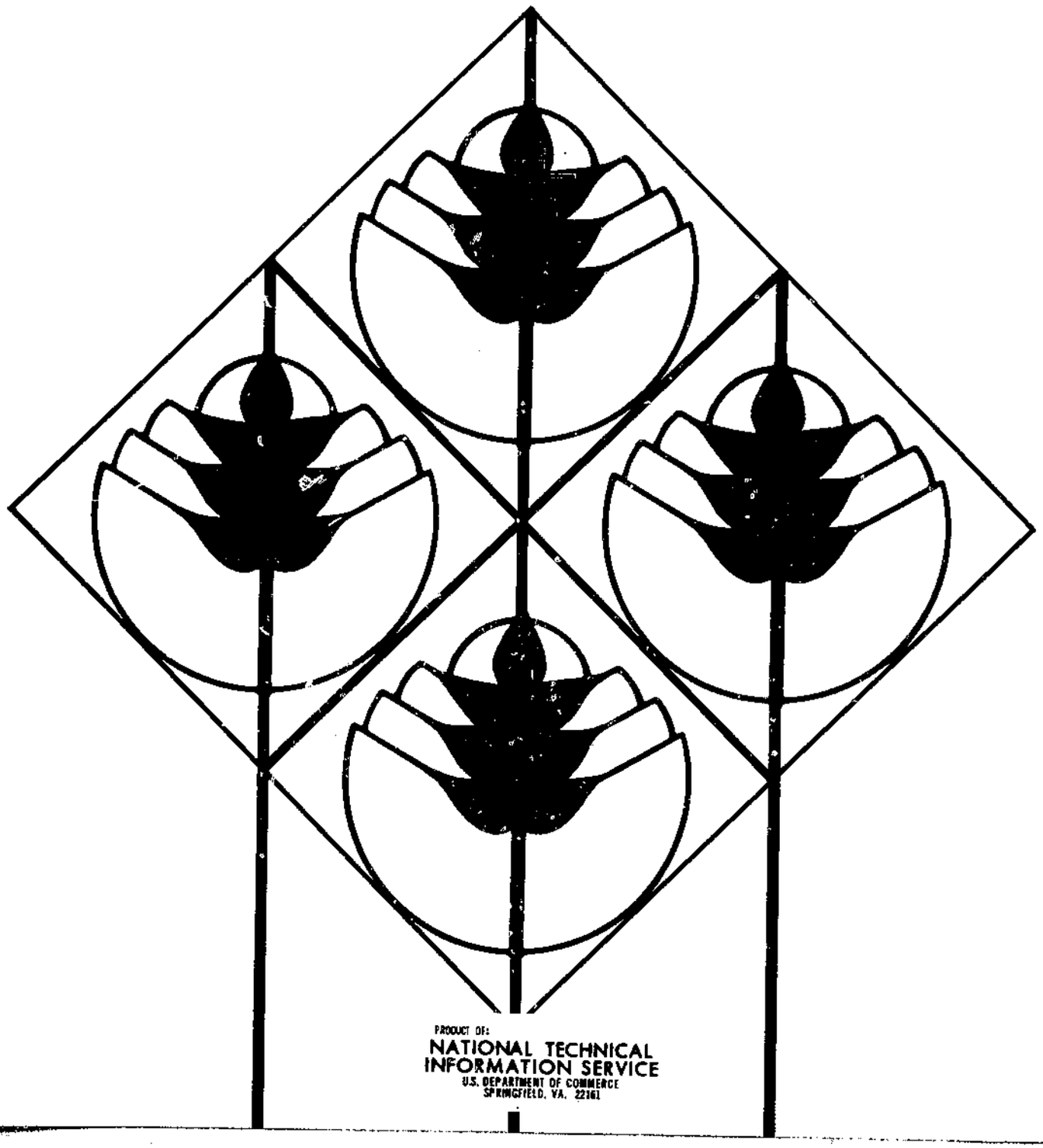
Foreign Agricultural Economic Report Number 163

The Implications of Establishing a U.S. Wheat Board

C. E. Bray
P. L. Paarlberg
F. D. Holland



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Key words: Wheat, marketing boards, price stability, exports, Canada, Australia

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Preface

The *Food and Agriculture Act of 1977* will expire in 1981. New legislation may influence the organization and operation of the food system for many years.

Along with the traditional concern over price and income policy, several new issues have emerged since 1977. Of particular significance are such matters as inflation, energy, credit, conservation of our resource base, the increasing international role of U.S. agriculture, and the design and implementation of both domestic and international food assistance programs.

This report on the question of a wheat marketing board is a product of the ESS research agenda on issues relating to food and agriculture legislation.

Contents

Summary

The United States can meet many of the objectives of a board system for marketing wheat exports without creating a board. This study compares the U.S. nonboard system to the Canadian and Australian wheat boards, and examines the implications of establishing one here.

Marketing boards have two main objectives: 1) increasing producer prices and thus, income, and 2) reducing fluctuations in producer prices. The Canadian and Australian wheat boards, which operate as compulsory marketing organizations in their respective countries, have used guaranteed floor prices, price pooling, and quotas to meet these objectives. The United States has adopted some of these methods without forming a marketing board, with comparable results. Prices vary about the same amount in all three countries, despite the different marketing systems.

Establishing a wheat board in the United States would require major changes in competitive U.S. marketing practices. U.S. producers accustomed to using individual marketing strategies to increase their returns would have to accept production-delivery quotas, collective marketing, and averaged pooled prices.

Whether a marketing board would aid U.S. consumers and producers depends on the conduct of the market prior to establishing the board. In a very competitive market, the board would mean higher export prices, but the domestic price would decline. In a market dominated by a single grain exporting firm, the domestic price would rise. The present U.S. market falls somewhere between these two scenarios. Establishing a U.S. board would possibly reduce wheat exports and increase price instability.

The Implications of Establishing a U.S. Wheat Board

C.E. Bray, P.L. Paarlberg, and F.D. Holland

Introduction

Several agricultural interest groups have pressed for a reexamination of U.S. conduct in international agricultural markets in recent years. Some interests, notably the American Agricultural Movement, have pressed for a U.S.-led grain cartel to exploit more fully the U.S. comparative advantage in agriculture, but legislative proposals have advocated the formation of a marketing board. Proponents of a wheat marketing board claim that it would redress the balance of bargaining power in international markets to the U.S. advantage. The United States would no longer be at a disadvantage when dealing with monopsonistic state importers. Supporters of a marketing board also argue that the board would raise the level of prices received from export sales, thus enhancing producer returns in the United States. Prices would be stabilized and income risk for U.S. producers would be reduced (*47*).[1]

This study examines the implications of establishing a marketing board in the United States for wheat exports by comparing the board systems in Canada and Australia. The experience of these two countries is contrasted to the nonboard marketing system of the United States. This study also estimates the impacts on U.S. and foreign wheat markets if the United States were to market wheat exports through a board. The hypothetical marketing board is compared to two extreme scenarios—one a competitive market, the other a market controlled by a single exporting firm—to estimate the gains, losses, and impacts on price instability from establishing a U.S. export marketing board for wheat.

A marketing board is a compulsory marketing organization established under legal authority to perform specific market operations (*23*). Marketing boards administer regulations which modify market structure and conduct to achieve an improvement in certain performance characteristics. The underlying structural change brought about by these regulations is an increased degree of monopolization (*28*).

Three major types of boards can be identified, running from the least to the most restrictive. They include:

(1) negotiating agencies;

(2) central selling agencies, which have powers to negotiate, sell, develop markets, and pool returns on behalf of producers;

(3) price and volume regulating agencies, which have the ability to regulate supply, price, or both. Supply is regulated by quotas, inventory control, surplus removal, and other means to balance production with consumption while maintaining a fixed price (*29*).

Marketing boards can license producers, processors, or dealers; collect fees; regulate the total quantity and quality of the product; establish producer prices; and implement producer payment mechanisms (*29*).

The primary objectives of marketing boards are to: (1) increase producer prices and incomes; (2) reduce fluctuations in producer prices and incomes; and (3) standardize terms of sale for all producers, which equalizes market opportunities and market returns among producers (*41*).[2]

The compulsory aspect of marketing boards is necessary for effective board operation. All producers of a commodity in a specified region are compelled by law to adhere to the marketing regulations because the degree of monopolization, and consequently the board's ability to influence market conduct and performance for wheat, depends on the percentage of producers marketing through the board. The greater the quantity of product that can enter the market outside the control of the board, the less effective will be the market regulations of the board.

[1] Italicized numbers in parentheses refer to items listed in the References.

[2] Although there is a distinction between increased prices and stabilized prices, this distinction is often blurred. There is no assurance that stable prices will necessarily result in prices over a period of years that are higher than would otherwise prevail if prices and incomes were to fluctuate widely (*18*).

Wheat Marketing Boards in Canada and Australia

All wheat produced in Canada's designated wheat board area (Manitoba, Saskatchewan, Alberta, and the Peace River Valley of British Columbia) and sold for export must be marketed through the Canadian Wheat Board (CWB).[3] The CWB has authority to purchase, take delivery of, store, transfer, sell, and ship grain (*9*).

The Australian Wheat Board (AWB) is the sole authority for marketing wheat in Australia. Producers are required to deliver all their wheat, except that retained for use on the farm where it is grown, to the board (*25*).

The basic principles of board operation must be accepted by producers and the public alike. The establishment of such a board should be the will (as determined by referendum or other means) of at least a majority of producers of the commodity under the board's jurisdiction. The inclusion of producer and consumer representatives in the decisionmaking process helps assure that the board continues to reflect the interests of groups affected by its operation (*37*). The formulation of the board under government fiat further contributes to its ability to achieve producer compliance (*27*). Both the CWB and AWB operate under government fiat. They are essentially producer oriented organizations and consequently the primary interest group represented is producers.

The CWB was established as a Crown corporation in 1935 for the orderly marketing of grain in the interest of grain producers operating within the board designated area (*4*).[4] The CWB attempts to achieve the best possible return for producers through the best combination of volume and price it can obtain in its sales. Although originally the CWB was authorized to market only wheat, producers in 1949 voted to extend the CWB's jurisdiction to oats and barley. The CWB is composed of three to five commissioners appointed by the Governor-in-Council and responsible to a Government cabinet official. An advisory commission composed of producers advises and assists the commissioners. These advisors are selected by grower elections and often include senior officials from the three prairie grain pools, the United Grain Growers, and representatives of other producer associations (*9*).

The AWB was instituted in 1947 under complementary Commonwealth and State legislation and is producer controlled. It derives its authority from the Wheat Industry Stabilization Act which is renewed every 5 years by State and Federal legislation (*2*). Australia is presently operating under its seventh 5-year stabilization plan. The board consists of 14 persons, 10 of whom are elected producer members (2 members from each mainland State). The remaining four members are appointed by the Minister of Agriculture and comprise an independent chairperson (the only full-time member of the board), a representative of flour mill owners, a finance member, and an employees' representative (*3*).

Wheat Board Operations

Many programs under wheat board jurisdiction in Canada and Australia are essentially general agricultural policies which could be implemented without a marketing board. Prices are stabilized in countries without marketing boards, for example, through subsidized or guaranteed prices; the United States has a price support system which is implemented by the U.S. Government. Therefore, in reviewing board marketing in the Canadian and Australian context, it might be possible to implement various policies related to the wheat sector without having to accept the concept of board marketing. The factors which distinguish a board system from alternate systems with comparable objectives are that with a marketing board: (1) there is only one agency responsible for purchasing and selling wheat; (2) that agency is a public enterprise directly involved in the operation of the marketplace; and (3) marketing is a collective process among all producers, and accomplished by compulsory producer participation and price pooling.

Purchasing. An agricultural marketing agency must adopt procedures for determining access to markets and for payment to individual producers (*28*). A wheat board's purchasing operations focus on the purchase price for grain and the mechanism used to regulate the quantity of grain

[3] With the introduction of the new feed grain policy in August 1974, marketing of feed grains including feed wheat for domestic use was removed from exclusive wheat board jurisdiction. Feed grains are now traded on the open market. For additional information, see (*7*).

[4] A Crown corporation is a semiautonomous government organization that administers and manages public business enterprises.

purchased at the established price. Both the Canadian and Australian wheat boards' pricing mechanisms include two payments to producers and price pooling. The first payment—a guaranteed price—is made upon delivery of grain to the elevator. The second is made after the crop is sold. Revenue pooling and initial-final pricing perform several functions. The initial payment establishes a minimum price and reduces the producer's risk by indicating the anticipated return a producer will receive for the product in the delivery period (*29*). The pooled or blend price is a weighted average of prices received in each market with the weights determined by the proportion of total sales made in each segregated market. Producers are reimbursed with a common price for comparable units of product delivered, thus eliminating some of the effects of price variation within the pool period (*28*).

This does not imply, however, that producers' total returns are entirely fixed. The total return to producers is a function of both the initial and final payments. The second payment is variable and directly related to world market conditions. If the initial price does not reflect world market conditions, the government must be prepared to make extensive financial transfers to the wheat sector. Since the wheat board is the primary purchaser of wheat, its pricing mechanism has significant ramifications for the country's wheat stabilization programs. In effect, the board administers government pricing programs.

Pricing. The Canadian producers' initial payment is established by Order-in-Council (an executive order) prior to the crop year. This price, less handling and transportation costs to terminal ports, is in effect a guaranteed floor price. Total receipts from grain sales are pooled into a single fund. The CWB's administrative operating costs, as well as interest, insurance, storage, and terminal elevator charges, are deducted from the pooled receipts. If the money in the pool after the crop is sold exceeds the initial payments plus CWB costs, the surplus is returned to producers in a final payment according to the quantity of grain they delivered. If the money in the pool does not exceed the initial payments and CWB costs incurred in selling the grain, the Federal Government makes up the deficit (*9*). The two-payment aspect of the pricing system means that producers do not receive the total payment for their crop until approximately a year after harvest.

The main components of AWB pricing are the first or initial payment to producers and the producers' stabilization fund (*36*). The level of the producer's first payment has been determined by different criteria in different years and has included: (1) the cost of production as determined by a formula (plans 1-5); (2) a combination of the cost of production and world market developments (plans 5-6); and (3) an average of net returns from three successive wheat pricing pools—the immediate past, the present, and the immediate future (plan 7).

The actual price, however, is determined through negotiations between the Australian Government, the Wheat Growers Federation, and other interest groups (*2*). Although the details vary between plans, the general theme has always been that if returns from the sale of wheat exceed the initial payment by a certain amount, part of the surplus is put into the producers' stabilization fund. In years when returns from the sale of wheat fall below the initial price, the difference is covered by the fund. If the fund is not sufficient to cover the difference, the Australian Government assumes responsibility for payment. The government's liabilities in previous plans were limited to a fixed quantity of wheat exports and a maximum payment per ton; however, the government is fully liable in the current plan (*36*). Thus, under the Australian system, producers in effect put aside some of the returns from one year to cover the initial payment in years when total returns fall below the initial payment price level (*36*).

Total receipts from the sale of Australian wheat are pooled and the pooled price determined by equalizing returns obtained from the domestic and export market, adjusted for any payments into or out of the stabilization fund (*25*). The second payment is made only after the loan from the Reserve Bank of Australia for the initial payment has been repaid. The time taken to make the final pool payment to producers varies directly with the time taken to dispose of the crop, which in part depends on the volume of forward contracted wheat sales and the time taken to receive payment (*16*). It is customary to have accounts for two or three pools open at any one time.

Price pooling represents one of the major differences between a board system and one without a board. U.S. wheat producers operating without a board have the freedom to sell as much as they desire when they desire, giving them considerable control over the prices they receive.

This freedom provides individual producers an opportunity to improve their income through skillful marketing (*42*). Under the price pooling system, producers operate collectively to reduce risk and obtain increased price stability at the expense of foregoing potential higher individual gains. With total returns received by wheat producers spread over several years, the price pooling system slows producer response to changing world market conditions and transfers additional price instability overseas. U.S. wheat producers, in contrast, face prices which adjust quickly to shifts in world demand.

Quotas. When prices are set or guaranteed, producers often have the incentive to increase output to improve total income. Expanded production may strain the physical capacity of the system to handle and move the wheat, which may lead to burdensome stocks and increase the commitment of the national treasury beyond politically acceptable levels. Thus, some form of production or supply management is usually necessary. Although marketing boards administer supply management programs, the two are not synonymous, since supply management programs may be employed in countries without marketing boards.

Supply management is commonly implemented through quotas (*18*). Quota schemes can be classified according to whether they attempt to control market supplies directly or indirectly and whether they apply to inputs or to output and sales. Direct quotas may apply to production, output, sales, or deliveries (*49*). Sales or delivery quotas control specific quantities of the wheat that quota holders may sell or deliver. Unlike output quotas, any production in excess of the quota limit is not necessarily destroyed. Since wheat can be stored without deterioration, supply above the quota may be stored and applied to the following quota period (*49, 23*). Marketing quotas can also be used to equalize marketing opportunities or returns among different producers (*49*).

Direct quotas allow individual producers more flexibility in resource allocation than do indirect control techniques such as input quotas (*49*). Input quotas restrict the amount of an input that may be used in production, for example, by restricting the planted acreage. To the extent that other factors of production may substitute for the controlled factor, individual producers may use the uncontrolled factors more intensively to maintain or increase output. If the amount of land that can be used is restricted, additional fertilizer may be applied or denser seeding rates used to increase the output per unit of controlled input (*33*). Because of factor substitution, input quotas control market supplies less effectively than do direct quota techniques (*49*). U.S. producers have operated under a form of indirect input quota—acreage set-aside and paid land-diversion programs. U.S. farmers have generally rejected mandatory marketing quotas. The United States has usually controlled supplies through voluntary participation in land controls, price guarantees, and income transfer payments (*21*).

The CWB operates a direct quota applicable to output and sales. The purpose of the system is to relate producer deliveries to market requirements, thus assuring an even flow of grain into the market system and giving all producers an equal opportunity to sell their grain. This is done by controlling the quantity of grain each producer can deliver at any particular time. Although the CWB regulates producers' deliveries, producers decide which crops they will grow. Under the quota system, the quantity that a producer can deliver is derived from the producer's quota base calculated according to the amount of land which producers have allocated to grain, oilseeds, forage, and summer fallow. The producer assigns a proportion of the total quota base to the delivery of a particular grain. When the CWB needs supplies of a particular grain, it announces the number of tons per quota hectare that producers can deliver. If the CWB announces a quota of 1.3 tons per hectare, a producer with a quota area of 40 hectares can deliver 52 tons (*9*).

The AWB operated under delivery quotas from 1969/70 until 1974/75 (*4*). National Delivery Quotas were developed every year and shares of the total were allocated to each state, which had its own procedures for allocating quotas among individual producers. Although procedures differed from state to state, quotas were generally allocated on the basis of the producer's average production over a number of years. Wheat in excess of the quota could be delivered if storage space became available. The price for wheat in excess of the quota was fixed, and was somewhat lower than for quota wheat (*36*). Deliveries of wheat in excess of the quota were also made part of delivery quotas in subsequent seasons. Quotas were implemented because rapid increases in acreage stimulated by a high guaranteed price and limited export markets had created supplies which could not be accommodated by the storage system.

The Australian quota scheme was suspended in 1974/75. Each state, however, retains the legislation enabling them to reintroduce quotas if needed (*3*). When not operating under quotas, the AWB generally purchases all wheat offered for sale by producers (*25*). Because it is paying for grain which it has not yet sold, financing of the producers' initial payment is an important aspect of AWB operation. The AWB is empowered to borrow from the Reserve Bank of Australia in order to operate its pooling system (*2*).

In contrast, the CWB pays only for grain that has been delivered under a quota which approximates CWB sales requirements. Thus, financing of the initial payment under the Canadian system is not as important as under the Australian system. Since the CWB purchases grain only under quota, however, on-farm storage becomes more crucial than in Australia.

Marketing. Although the wheat marketing boards in Canada and Australia have authority to buy, sell, and transport wheat, they do not actually handle it. Australian producers deliver their wheat to elevators operated by statewide Bulk Handling Authorities. The Bulk Handling Authorities (BHA) receive, weigh, store, and protect the wheat, deliver it to mills, and load it onto ships for export on behalf of the AWB (*16*). Upon delivery, the wheat becomes the absolute property of the board, free from all mortgages, charges, and liens. The BHA's consist of four state government authorities and two wheat growers' cooperatives. Railroads are also controlled in Australia by the state government (*25*).

The CWB owns no storage facilities. Virtually all off-farm storage space is privately or cooperatively owned (*4*).[5] Although wheat-handling facilities are privately owned, the concept of government-controlled rate structures was established early in Canadian grain history. Maximum primary terminal and transfer elevator tariffs are negotiated annually (*4*).

The CWB controls the transportation of all grains from primary elevators to domestic processing plants and export ports. This authority was delegated to the CWB by an Order-in-Council in 1971 (*9*). Rail shipping rates for grain for export wheat are fixed by statute at 0.5 Canadian cent per ton-mile.[6] Freight rates for grain shipped on the Great Lakes are determined through negotiation by the CWB and private shippers (*9*).

Under the CWB system, buyers, processors, and retailers deal only with the board to negotiate a sale (*23*). This arrangement may facilitate sales, particularly with countries that purchase grain through a central buying agency. Direct government-to-board transactions account for an increasing proportion of grain sales in Canada and Australia. In such direct negotiations, government buying agencies can take advantage of credit agreements, trade agreements, or other forms of government assistance. Purchases made through a board are usually made under a master contract which guarantees access to continued large supplies and commitments for 1 or more years (*9*).

Wheat board sales can be in one of two forms: (1) those directly negotiated with government buying agencies acting on behalf of their countries or (2) those made to private trading firms that buy grain from the board for resale (*9*). In Canada, private grain companies play a role even in sales negotiated directly by the CWB. Once the main contract terms have been established, private trading companies act as export agents to obtain the necessary documentation, supervise ship loading, and in some instances arrange ocean freight. In a straight commercial sale, the private companies negotiate the sale themselves, buy grain from the CWB on a cash basis, and assume responsibility for foreign exchange and freight if necessary. The firm's profits are determined by the spread between the price at which the grain was purchased from the CWB and the price at which it was resold. Private companies are most active in conducting sales in Canada's European markets because in those markets imports are purchased by companies (*9*).

In Australia, the AWB does not export all wheat itself but rather sells it to traders and permits

[5] The Canadian Government owns several terminals and one port facility.

[6] Canadian freight rates for export wheat resulted from the Crows-Nest Pass Agreement of 1897 between the Canadian Government and the Canadian Pacific Railroad. Under this agreement, the railroad received land and a fixed subsidy in exchange for a reduction in freight rates on grain. It has been estimated that this rate covers only 38 percent of the per-ton cost of moving export grain. For additional information, see (*6*).

them to export to specified buyers. Traders purchase wheat at the free on board (f.o.b.) price, including a commission of 0.5 percent on the value of the sale. Merchants must nominate destination, quantity, and date of shipment. They are not restricted to selling at the AWB daily asking price but at whatever price they can obtain (*25*). Private trading companies perform an active function in grain marketing under the wheat board system in Canada and Australia; their role in the market, however, is constrained by government regulation of rates. An additional layer of administration in the form of a wheat board with its concomitant operating costs may or may not affect the margin of profit that companies can obtain in board dominated markets relative to margins obtainable in markets where a wheat board does not operate.

Two-Priced Wheat. The pricing system of wheat sold domestically for human consumption in Canada and Australia differs from the pricing system for exported wheat. Prices for wheat sold domestically for human consumption are fixed at a guaranteed minimum level. Because they differ from prices for export wheat, they include implicit income transfers between producers and consumers, represented by the difference between the price of wheat for domestic consumption and average export returns (*36*).

The two-priced wheat system was introduced in Canada in 1973 to insulate domestic wheat prices from world market price instability. Under the program, the government attempts to stabilize consumer and producer floor support prices (*51*). The January 1979 price of spring wheat for human consumption in Canada was fixed at a guaranteed minimum of Can $147/ton. If export prices exceed Can $147/ton, millers pay the full export price up to a maximum of Can $184/ton. When export prices are below the minimum domestic price, consumers are in effect subsidizing producers. When the export price exceeds the maximum, producers are in effect subsidizing consumers. The system is essentially the same for durum wheat, although minimum and maximum prices range from Can $147 to Can $276/ton (*51*).

The home consumption price for wheat in Australia under the seventh wheat industry stabilization plan is based on three principles: (1) inflation in the production cost of wheat should be reflected in the price of wheat used domestically; (2) domestic prices should provide producers with a degree of protection against sudden falls in export prices; and (3) producers are entitled to higher prices in the local market than they receive for exports (*36*). Also under the plan, the price of milling wheat in Australia is based on a formula that includes an index of input prices paid by producers, export returns, and a factor to assure that domestic prices over the long run exceed export returns by 20 percent (*36*).

Comparison with U.S. Wheat Marketing

The major question underlying this analysis of wheat marketing boards and their function is whether the U.S. producer would be better off economically under the board system than under the present nonboard system. One way to answer that question is to compare producer income in Canada and Australia to producer income in the United States.

Wheat boards have two primary objectives: increased prices and stabilized prices. Does a wheat board raise producer prices higher than would otherwise prevail? It is extremely difficult to assess whether Australian and Canadian producers receive more for their grain than U.S. producers. Differences in absolute prices in the three countries may be attributable to factors other than differences in marketing structure, such as quality of the types of wheat produced. Extensive studies have been conducted comparing producer prices in the United States and in Canada, but no study has produced conclusive results. Differences in prices between the two countries depended on the number of relevant variables included in the analysis. The degree of variability in prices received by producers for wheat in the three countries was measured to determine whether a wheat board is better able than a nonboard market system to achieve price stability. A statistical analysis was conducted (using the data in table 1) to measure the variation in real prices received by producers in Canada, Australia, and the United States during 1960/61–1975/76.[7]

[7] 1975–76 was selected as the last year of analysis because the 1976/77 wheat pool in Australia has not been completed.

Table 1—Average prices for wheat in Canada, Australia, and the United States

Year	Canada				Australia				United States	
	Total price for grain[1]	Handling costs[2]	Average price received[3]	Average real price received[4]	Total price for grain[5]	Handling costs[6]	Average price received[7]	Average real price received[4]	Average price received[8]	Average real price received[4]
	Can$/ton				*Aus$/ton*				*U.S.$/ton*	
1960/61	65.95	9.31	56.64	59.00	50.09	7.81	42.28	41.45	63.93	67.65
1961/62	70.18	9.71	60.47	60.47	53.06	7.98	45.08	46.47	57.24	70.93
1962/63	68.86	10.17	58.69	56.27	51.23	8.03	43.20	42.77	74.96	77.76
1963/64	72.54	9.28	63.26	61.48	50.43	7.82	42.61	39.09	67.98	70.81
1964/65	69.33	9.52	59.81	59.00	49.58	8.17	41.41	39.07	50.34	53.21
1965/66	73.38	8.88	64.50	59.83	51.81	8.44	43.37	39.43	49.60	50.25
1966/67	73.01	8.44	64.57	55.19	52.04	8.79	43.25	39.68	59.89	56.55
1967/68	66.65	12.67	53.98	46.53	54.07	10.23	43.84	40.97	51.07	51.07
1968/69	62.49	14.19	48.30	42.37	45.46	9.78	35.68	33.66	45.56	44.45
1969/70	61.73	12.13	49.60	42.47	43.85	11.92	31.93	31.61	45.92	42.09
1970/71	61.40	10.59	50.81	43.80	46.82	10.89	35.93	36.66	48.87	44.03
1971/72	58.64	9.57	49.07	41.87	48.75	10.62	38.13	35.97	49.24	43.61
1972/73	79.15	9.47	69.68	52.43	49.54	12.32	37.22	25.85	64.67	51.74
1973/74	168.21	10.21	158.00	82.38	110.07	11.62	98.45	58.60	145.14	82.33
1974/75	164.39	9.91	154.48	69.12	106.67	13.51	93.16	62.95	150.28	80.06
1975/76	146.28	10.78	135.50	59.18	95.98	15.24	80.74	52.09	130.44	69.87

[1] Includes initial and final payments.
[2] Includes primary elevator, storage, and interest charges plus rail freight which are deducted from the initial payment; other costs are already deducted from the final payment before it is sent to producers.
[3] Total price for grain minus handling costs.
[4] Average price received deflated by farm price index for country.
[5] Includes initial and final payments.
[6] Includes holding and storage freight f.o.b. and administration cost.
[7] Total price minus handling costs.
[8] Obtained by weighting State prices by quantity sold. Includes allowance for unredeemed loans and purchases by the government valued at the average loan and purchase rate by State when applicable.

Source: *(2, 8, 10, 48,)* and telephone inquiries to the Canada Grains Council, Winnipeg.

The results of the test are as follows:

Country	Mean	Standard deviation	Coefficient of variation
	Australian dollars		*Percent*
Australia	41.65/ton	9.55/ton	23
	Canadian dollars		
Canada	55.71/ton	10.89/ton	20
	U.S. dollars		
United States	59.76/ton	14.13/ton	24

An F-test, used to measure the difference in variability in the three sets, found that the variability was not statistically different. This suggests either that: (1) the types of programs implemented in the three countries—whether under marketing boards or not—result in comparable variability in producer returns; or (2) that in situations where the major market is an export market, factors other than domestic policy—wheat board or not—influence prices in all countries sharing the export market. It can also be argued that if price stabilization is a primary objective for the implementation of a wheat marketing board, policy instruments used to stabilize prices can be implemented without recourse to board marketing.

Aside from the economic question of price stabilization, implementing a wheat marketing board in the United States would require a considerable change in producer marketing. Board marketing as practiced in Canada and Australia is through a single monopsonistic purchaser of wheat. Producers may have guaranteed prices but they may also be subject to production or marketing controls. Producers operate collectively, receiving an average pooled price. Private grain merchants serve a role in grain marketing but their role is constrained by government-controlled rates for grain handling.

The Canadian and Australian wheat marketing boards reflect those countries' history and political philosophy concerning the role of government in the marketplace. They also grew out of "crisis" situations which provided considerable incentive to develop alternative marketing systems for wheat. The CWB resulted from the severe price instability affecting the Prairie Provinces in the thirties when wheat prices dramatically fell from over Can $1.70/bushel to less than Can $0.90/bushel (*30*). The AWB grew out of the additional emergency requirements for shipping that developed during World War II. These shipping difficulties in addition to price instabilities made orderly wheat marketing imperative.

Stochastic Simulation Analysis Of a Hypothetical U.S. Wheat Marketing Board

The formation of a U.S. marketing board would drastically change the structure and conduct of marketing institutions in the United States. This study estimates the consequences of forming a hypothetical board to market U.S. wheat exports using a stochastic simulation model applied to the U.S. wheat market. The analysis concentrates on changes in the supply-demand balance of the United States and the rest of the world for wheat, shifts in income distribution, and impacts on price and supply instability. The stochastic simulation model of the world wheat market was developed and solved for three types of market conduct: competitive, marketing board (monopoly), and a single wheat exporting firm (monopsony-monopoly) by maximizing three different objective functions consistent with the market behavior of the scenarios.

Model Assumptions

To use the model to simulate the operation of a hypothetical U.S. marketing board, a number of assumptions must be specified. The quantitative estimates of the impacts of a U.S. marketing board on the wheat market are conditional upon these assumptions. The reader should not view the analysis as a forecast of most likely absolute impacts, but rather as an indication of potential impacts of establishing a marketing board.

The first set of assumptions concerns the operational structure of a hypothetical U.S. marketing board. The board used in this analysis conforms with a bill proposing a National Grain Board introduced into the U.S. House of Representatives in 1979 (*47*). This bill proposes that, "The Commodity Credit Corporation shall be

the seller or marketing agent for all export sales. An exporter may enter into a sale for export of any such commodity only if such commodity is purchased from the Corporation and such sale is approved by the Corporation" (*47*). Thus, the Commodity Credit Corporation of the U.S. Government would be the sole exporter of U.S. wheat and the hypothetical marketing board would be a government board, not a producer board as in Canada and Australia. The marketing board's authority would be confined to the export market and would not supplant the operation of private firms in the U.S. domestic market. Its only domestic control would be the purchase of commodities to meet export commitments. Further, the profits of the board are available to the Secretary of Agriculture for deficiency payments to growers (*47*).

The model in this study divides the world wheat market into two regions—the United States and the "Rest of the World." The Rest of the World is an aggregation of demand, production, and stocks of wheat in all foreign countries, both importers and competitive exporters. Consequently, the major U.S. competitors in the wheat market—Canada, Australia, the European Community, and Argentina—are included in this aggregate region.

The model assumes that wheat is a homogeneous commodity, even though different wheats are not perfect substitutes for one another (*20*). This assumption of homogeneity is made for two reasons. First, the substitutability between wheats is increasing with improvements in blending technology, especially in the European Community. Second, introduction of imperfect substitution among wheats adds a complexity to the model that would obscure major points of the analysis.

The analysis uses the traditional single-product partial equilibrium framework. The wheat market is assumed separable from all other commodities in production and consumption. If the cross-price elasticities between wheat and other commodities are not equal to zero, however, the magnitudes of the estimated impacts from adopting the marketing board will be biased (*40*). Regional cross elasticity estimates developed by Rojko and others are not large; consequently, the bias in the estimated impacts is considered small (*44*).

The demand and supply schedules in each of the three scenarios are the same. The estimated impacts of the marketing board are based on this assumption, yet the different institutions may vary in aggressiveness in marketing wheat overseas (*5*). A grain exporting firm may be a more aggressive marketer of wheat than the board; hence, the demand schedule facing the firm would exceed the demand schedule confronting the board. However, the U.S. Government is heavily involved in overseas market promotion through Foreign Agricultural Service programs. Hence, the relative position of the demand and supply schedules cannot be determined *a priori*.

This analysis compares the marketing board scenario to a competitive and a single exporting firm scenario—those which represent opposite extremes of market conduct. This method is used because there is no consensus on the current conduct of the grain exporting industry.

The four largest grain merchants are estimated to account for 80 percent of U.S. exports (*14*). To many, this concentration implies a lack of competition in the export market. Caves analyzes this issue using the traditional industrial organization methodology of structure, conduct, and performance modified to account for an industry whose primary goal is to profit from transporting grain between markets. He concludes that, "In its market conduct, the industry is notable for the low potential it provides for oligopolistic interdependence. The futures market can be taken as purely competitive, and the pricing of cash grain 'basis' of futures is a moment-to-moment decision resting on each dealer's current trading position and conjectures about the future, and thus apparently incapable of coordination with his rivals...with the evidence pointing to a largely competitive market structure and conduct..." (*14*).

Thompson and Dahl address the same issue by examining measures of performance in marketing corn (*46*). They compare prices in spatially separated markets for correlation of movements and differences based on transportation and handling costs. They find that price movements in spatially separated markets are highly correlated, and that the differences do approximate transportation and handling costs. Thus, on this evidence they conclude, "The pricing efficiency in the grain export industry meets efficiency criteria characteristics of perfectly competitive markets. Hence, there is little statistical evidence of oligopolistic exploitation by the small number of large firms that make up this industry" (*46*).

Rice adds further support to the view of a competitive market. He cites the public tender system of bidding for sales and the narrow price spreads as evidence of competition (*42*). He notes that in a recent Brazilian public tender, 16 firms offered bids with a price spread of $2.38 per metric ton, of which only 5 sellers received acceptance with a price spread of $1.43 per ton. Rice also argues that there are more exporters than commonly supposed citing as support the 22 members (excluding subsidiaries) of the North American Grain Exporters Association which exported in excess of 1 million tons (*42*).

Others, however, dispute the hypothesis of a competitive market. McCalla notes that both Caves and Thompson and Dahl assume the futures market is competitive (*32*). McCalla argues that the belief in competitive futures market may be mistaken, and that the Thompson and Dahl study actually tests whether the transportation industry is competitive because it focuses on the spread between the Chicago corn price and other marketing points, assuming Chicago prices are competitively determined.

Stochastic Simulations

The model used in this analysis is a nonlinear programming model which optimizes an objective function during each year of the simulation. Each of the three scenarios maximizes a different objective function developed from behavioral assumptions about the conduct of the different marketing institutions.

The competitive market is assumed to maximize net social payoff, and equilibrium occurs where the import demand and export supply schedules for wheat in the world market intersect (*39*). Thus, the competitive objective function maximizes the difference between the area underneath the import demand schedule and the area underneath the export supply schedule, or mathematically the difference between the integrals of the import demand and export supply functions. Since these functions are the difference between domestic supply and demand, including stock changes, the competitive objective function becomes equation 1.

The objective of the hypothetical marketing board is to maximize the return on U.S. wheat exports. This is accomplished by the U.S. Government acting as a monopoly seller of U.S. wheat in world markets, and consequently is similar to an optimum export tax (*39*), (*5*). The monopolist charges the price determined where the marginal function of the import demand schedule intersects the export supply function. To solve for this equilibrium, the competitive objective function must be modified. The price in the world market multiplied by the quantity traded yields the total revenue from exports. From this revenue, the cost of exporting wheat, or the area underneath the export supply function, is subtracted to yield the return to the United States from exporting wheat. Thus, the marketing board simulations use objective function 2.

The single exporting firm is assumed to maximize profits from exporting. Therefore, the firm acts as a monopolistic seller of wheat to the importer and a monopsonistic buyer of wheat from the exporter. Equilibrium in this market occurs where the marginal function of the export supply schedule and the marginal function of the import demand schedule intersect (*5*). The profit maximizing objective function used for this scenario is function 3.

For both the United States and the Rest of the World, linear quantity dependent functions of price are constructed for production, consumption, and carryout stocks. The set of elasticities chosen for the model is critical to the magnitude of expected impacts from the policy change. The demand and supply elasticities for the Rest of the World region are derived from the regional elasticities presented in Rojko and others (*44*). The regional elasticities are adjusted to include price and exchange rate policies of the different foreign nations using the estimated elasticities of exchange rate and price transmission presented by Collins (*15*). The elasticity of ending stocks demand in the Rest of the World is derived from a yet-to-be-published world wheat trade model developed by Holland. With the exception of the major competitors, stocks are assumed to be held for transaction purposes only; consequently, the elasticity is low. The demand and supply elasticities for the United States are from Wheatsim (*24*). The demand for wheat stocks in the United States is treated as speculative, and hence has a high elasticity. The elasticities used to construct the equations from 1975–77 average supply-demand balances are shown on page 12.

Empirical Model Equations and Variable Definitions

OBJECTIVE FUNCTIONS

Competitive

$$(1)\ \underset{X}{\text{Max}}\ Z = \int_{Pwh_{2t}}^{\overline{Pwh_{2t}}} (-BSTK_{2t} - S_{2t} + C_{2t}(Pwh_{2t}) + ESTK_{2t}(Pwh_{2t}))dPwh_{2t} + Pwh_{2t} \cdot X_{1t} - \int_{Pwh_{1t}}^{Pwh_{1t}} (BSTK_{1t} + S_{1t} - C_{1t}(Pwh_{1t}) - ESTK_{1t}(Pwh_{1t}))$$
$$dPwh_{1t} - Pwh_{2t} \cdot X_{1t} - FR_t \cdot X_{1t},$$

Marketing Board

$$(2)\ \underset{X}{\text{Max}}\ Z = Pwh_{2t} \cdot X_{1t} - \int_{Pwh_{1t}}^{Pwh_{1t}} (BSTK_{1t} + S_{1t} - C_{1t}(Pwh_{1t}) - ESTK_{1t}(Pwh_{1t}))$$
$$dPwh_{1t} - Pwh_{1t} \cdot X_{1t} - FR_t \cdot X_{1t},$$

Single Exporting Firm

$$(3)\ \text{Max } Z = Pwh_{2t} \cdot X_{1t} - Pwh_{1t} \cdot X_{1t} - FR_t \cdot X_{1t},$$

UNITED STATES

$$(4)\ BSTK_{1t} = ESTK_{1t-1},$$
$$(5)\ S_{1t} = 45.76 + 0.088 \cdot Pwh_{1t-1} + 1.40 \cdot T + \psi_1,$$
$$(6)\ C_{1t} = 27.24 - 0.048 \cdot Pwh_{1t} + 0.35 \cdot T,$$
$$(7)\ ESTK_{1t} = 66.97 - 0.309 \cdot Pwh_{1t},$$
$$(8)\ X_{1t} = (BSTK_{1t} + S_{1t}) - (C_{1t} + ESTK_{1t}),$$

REST OF THE WORLD

$$(9)\ BSTK_{2t} = ESTK_{2t-1},$$
$$(10)\ S_{2t} = 292.82 + 0.224_a Pwh_{2t-1} + 8.7 \cdot T + \psi_2,$$
$$(11)\ C_{2t} = 423.17 - 0.486 \cdot Pwh_{2t} + 9.40 \cdot T,$$
$$(12)\ ESTK_{2t} = 61.11 - 0.038 \cdot Pwh_{2t},$$
$$(13)\ M_{2t} = (C_{2t} + ESTK_{2t}) - (S_{2t} + BSTK_{2t}),$$

INTERNATIONAL LINKAGES

$$(14)\ X_{1t} = M_{2t},$$

where for country i,

$BSTK_{it}$ = Beginning stocks of wheat in the current period, i = 1,2,
$ESTK_{it}$ = Ending stocks of wheat in the current period, i = 1,2,
$ESTK_{it-1}$ = Ending stocks of wheat in the previous period, i = 1,2,
S_{it} = Wheat production in the current period, i = 1,2,
Pwh_{it-1} = Wheat price in the previous period, i = 1,2,
Pwh_{it} = Wheat price in the current period, i = 1,2,
C_{it} = Consumption of wheat in the current period, i = 1,2,
T = Time trend, T = 1, 2...5,
X_{1t} = U.S. wheat exports in the current period,
M_{2t} = Rest of the World wheat imports in the current period,
$\overline{Pwh_{it}}$ = Wheat price without trade, i = 1,2,
FR_t = Ocean freight rate for wheat in the current period,
ψ_i = Stochastic shock, for $\psi_1 \sim N(0,3.5^2)$ and $\psi_2 \sim N(0,15.0^2)$, and $r = -0.3$.

Price elasticities, U.S., and Rest of the World wheat markets

Item	United States	Rest of the World
	Price elasticity	
Production	0.2	0.1
Consumption	-.3	-.2
Ending stocks	-1.5	-.1

The production relations in each region are cobweb relations with the current year's production a function of last year's price. In addition, a random variable is included in the specification of the production relations for both the United States and the Rest of the World. These random variables represent the shocks of weather on wheat production. The values are obtained by a pseudo random number generator over a normal distribution. Both variables have a mean of zero and a correlation of -0.3 between the two regions. The standard deviation on the random shock for the United States is 3.5 million tons and is obtained from a time trend regression of U.S. wheat production from 1960-79. Similarly, the standard deviation on the random variable for wheat production in the Rest of the World is 15 million tons.

The objective functions are maximized to solve for the supply-demand balance for each scenario over a 5-year sequence. This sequence is repeated 100 times, with different random shocks for each year in the sequence. For each year of the three scenarios, the model solves for the mean value and standard deviation of each endogenous variable (table 2).

Compared to the competitive market scenario, adopting a marketing board to merchandise U.S. wheat exports raises export prices 9.5 percent to $133.18 per metric ton by reducing the volume of U.S. wheat exports from 35.42 to 27.58 million tons. The lower volume of wheat exports creates excess supplies of wheat in the U.S. market at the competitive price level. Consequently, without supply-management and price-support policies to compensate for reduced exports, the domestic U.S. wheat price declines 34 percent to clear the market. In response to lower prices, U.S. wheat production declines 5.1 percent, and consumption rises 9 percent. Without supply-management programs to further reduce production, carryout stocks of U.S. wheat rise 43.3 percent, from 29.36 to 42.06 million tons.

Table 2—U.S. and the Rest of the World average annual supply and demand balance for wheat, three scenarios

Item	Scenario		
	Competitive	Marketing board	Single exporting firm
United States:	*Million metric tons*		
Total supply—			
Beginning stocks	27.44	37.02	44.94
Production	59.42	56.38	54.44
Imports	0	0	0
Total utilization—			
Consumption	22.08	24.06	25.74
Exports	35.42	27.58	20.72
Ending stocks	29.36	42.06	52.88
	Dollars/metric ton		
Prices—			
Internal	121.62	80.60	45.56
World	121.62	133.18	143.34
Rest of the World:	*Million metric tons*		
Total supply—			
Beginning stocks	55.76	55.38	55.10
Production	340.32	342.48	344.30
Imports	35.42	27.58	20.72
Total utilization—			
Consumption	375.54	369.94	365.02
Exports	0	0	0
Ending Stocks	55.94	55.48	55.10
	Dollars/metric ton		
Prices—			
Internal	136.62	148.18	158.34
World	121.62	133.18	143.34

Higher wheat prices in the world market stimulate production in the Rest of the World by 0.6 percent—more than 2 million tons. Foreign consumption of wheat declines 1.5 percent from 375.54 to 369.94 million tons. Since stocks in the Rest of the World are assumed to be held largely for transaction purposes, carryout stock levels are only slightly lower, 55.38 million tons versus 55.76 million tons.

Compared to the single exporting firm scenario, formation of the U.S. marketing board lowers world prices 7.1 percent, and raises the U.S. domestic wheat price 76.9 percent. U.S. exports of wheat are 33 percent greater under the marketing board than if the single exporting firm dominates the market. U.S. wheat production rises by 3.6 percent, while U.S. wheat consumption is 0.7 percent lower. The lower price in the importing region reduces the Rest of the World's production by 0.5 percent and increases consumption by 1.3 percent.

The shifts in the demand-supply balance do not indicate which groups gain and which lose from the formation of the marketing board. To determine the shifts in benefits resulting from the marketing board, the changes in the demand-supply balance must be converted to measures of shifts in the costs and benefits to producers and consumers in each region (table 3). Consumers' surplus represents the difference between the amount consumers are willing to pay and the amount they must pay at each point along the quantity axis. Producers' surplus represents the difference between the market price and the marginal cost of producing each quantity. The changes in consumers' and producers' surplus represent one measure of the changes in economic position of the two groups (*39*).

Compared to the competitive scenario, the formation of the U.S. marketing board lowers the internal U.S. wheat price and production. Consequently, U.S. wheat growers suffer a loss of $11.9 billion over 5 years. Of that loss, $4.8 billion represents an income transfer to U.S. consumers. The 5-year cost to the United States in lost economic efficiency (deadweight losses) is $532 million. The marketing board raises export prices while lowering U.S. domestic prices. From this wedge between prices, the U.S. Government raises $7.4 billion in revenue over 5 years. Of that amount, $5.8 billion is an income transfer from U.S. wheat growers to the Government and is assumed to be returned to growers so that they do not suffer an income loss. The income transfer from foreign consumers to the U.S. Government is $1.5 billion. Since the profits from the board's operations are assumed to be used by the Secretary of Agriculture for deficiency payments to farmers, the $1.5 billion extracted from the Rest of the World is assumed to be returned to farmers. Even with these two income transfers to U.S. wheat growers, the loss in producers' surplus is still $4.6 billion over the 5-year period.

Table 3—Five-year total gains and losses in U.S. and Rest of the World wheat markets as the form of market conduct changes

Gains and losses	Marketing board vs. competitive	Marketing board vs. single grain exporting firm
	Million dollars	
United States:		
Producers' surplus gain	-11,946.69	9,698.78
Consumers' surplus gain	4,777.65	-4,434.07
Deadweight loss	532.30	-390.23
Marketing board total rent	7,359.63	7,414.30
Extracted from ROW[1]	1,548.97	—
From U.S. producers	5,810.66	—
Gain from increased exports	—	1,817.50
Producers' net gain	-4,587.06	17,113.80
Consumers' net gain	4,777.65	-4,434.07
United States	1,016.67	7,024.07
Grain exporting firm:		
Total profits	—	-10,647.46
Extracted from U.S. producers	—	-3,994.52
From ROW[1]	—	-1,059.01
From U.S. Government	—	-5,596.93
Rest of the World:		
Producers' surplus gain	19,670.25	-17,381.08
Consumers' surplus gain	-21,449.74	18,593.16
Deadweight loss	225.46	-165.42
Loss to marketing board	1,548.97	7,414.30
Loss to firm	—	-1,056.10

— = Not applicable.
[1] ROW is abbreviation for Rest of the World.

Therefore, this analysis suggests the marketing board will not benefit producers if market conduct is competitive prior to the formation of the board. Despite the loss to U.S. wheat producers, the marketing board does benefit the United States since consumers gain through lower prices. Subtracting the deadweight social costs of the policy from the income transfer of the Rest of the World leaves a $1.0 billion 5-year gain for the United States as a whole.

Compared to the competitive scenario, formation of the hypothetical marketing board results in a loss of $21.4 billion in consumers' surplus over 5 years in the Rest of the World. Of that loss, $19.7 billion is a transfer to foreign producers who operate under the price protection created by the U.S. marketing board. The policy causes a $125 million deadweight loss in economic efficiency by the Rest of the World. The income transfer to the United States is $1.5 billion during the 5-year period.

If the world wheat market is dominated by a single exporting firm, the transfer of overseas marketing authority from the firm to the U.S. Government raises the price of wheat in the United States and increases production. Consequently, producers gain $9.7 billion. Of that gain, $4.4 billion represents an income transfer from U.S. consumers to U.S. producers. The cost of inefficiency in the market declines by $390 million. Where the firm had previously profited from its role as sole exporter, the profits accrue to the U.S. Government with formation of the marketing board. The income transfer from foreign consumers to the U.S. Government is $7.4 billion over 5 years, and the Government gains an additional $1.8 billion from increased exports. If the profits from the marketing board are transferred to U.S. wheat producers, their well-being increases by $17.1 billion during the 5 years. In this scenario, the marketing board yields benefits for U.S. wheat growers and for the Nation as a whole while imposing a loss on U.S. consumers.

In the Rest of the World, the replacement of the single exporting firm by a U.S. marketing board lowers producer surplus by $17.4 billion as price levels and production decline. Foreign consumers gain $18.6 billion, and the Rest of the World recovers $164 million in inefficiency costs. Although foreign nations capture $1.1 billion from the firm's previous profits, they lose $7.4 billion to the United States.

The exporting firm is a major victim of the shift in U.S. policy. Its 5-year profits decline $10.7 billion. Of this loss in profits, $4.0 billion is transferred to U.S. wheat growers, $1.1 billion is transferred to the Rest of the World, and $5.6 billion is captured by the U.S. Government.

Compared with the single firm, a marketing board does improve U.S. producer and national welfare, but at the expense of U.S. consumers. Consumers in the Rest of the World gain welfare at the expense of their producers and the firm's profits.

A second objective of the marketing board is "to provide price and supply stability in domestic markets" (*47*). When the marketing board is adopted to replace the competitive market, quantities supplied and demanded in the United States are generally more stable (table 4). Fluctuations in the U.S. wheat carryout stocks decline from a coefficient of variation of 16.6 percent to 8.5 percent. The variability in export volume declines from 21.1 percent to 19.2 percent, while the coefficient of variation in consumption drops to 2.3 percent from 3.4 percent. Since the variability in production is largely the result of random weather patterns, the change in

Table 4—Average annual coefficient of variation for the competitive, marketing board, and single firm scenarios

Item	Competitive	Marketing board	Single firm
		Percent	
United States:			
Beginning stocks	13.46	6.92	4.52
Production	6.38	6.48	6.64
Imports	0	0	0
Consumption	3.44	2.26	1.74
Exports	21.10	19.22	18.12
Ending stocks	16.58	8.46	5.52
Internal price	12.96	14.40	25.50
World price	12.96	14.50	15.42
Rest of the World:			
Beginning stocks	.88	1.06	1.22
Production	4.38	4.38	4.40
Imports	21.10	19.22	18.12
Consumption	2.02	2.56	2.96
Exports	0	0	0
Ending stocks	1.08	1.32	1.52
Internal price	11.54	13.00	13.96
World price	12.96	14.50	15.42

marketing institutions does not significantly affect the coefficient of variation on production.

Compared to the competitive scenario, formation of the marketing board slightly increases price instability in the United States. For the competitive scenario, the average annual coefficient of variation for the U.S. wheat price is 13.0 percent, rising to 14.4 percent under the marketing board scenario.

Increased price instability encourages diversification of production and involves losses in efficiency because farmers do not specialize. Assume that farmers are concerned about the level and variability of their income, and that they receive a fraction of their income from wheat and a fraction from another crop. If the marketing board increases the variance of their income from wheat sales, farmers can reduce their variance in total income by diversifying into crops that are inversely correlated with the variance in wheat prices. Thus, farmers sacrifice some gains from specialization in production because the marketing board has increased the variability of wheat prices.

The shift from a competitive market to a marketing board in the United States increases the instability of all variables in the Rest of the World with the exception of import volume. The instability in carryout stocks rises slightly, as does the variance in consumption. The marketing board tends to destabilize world and foreign market prices compared with the competitive market. The coefficient of variation in world market prices rises from 13.0 percent to 14.5 percent. Wheat price instability in the foreign region rises from 11.5 percent to 13.0 percent.

When the coefficients of variation of the marketing board and single exporting firm are compared, patterns of the previous analysis are reversed. If the marketing board supplants the firm, the quantities in the U.S. market tend to become more variable while prices are less variable. The coefficient of variation for U.S. carryout stocks of wheat rises from 5.5 percent to 8.5 percent due to the marketing board. The variability in U.S. wheat consumption increases from 1.7 to 2.3 percent, while the instability of wheat exports is increased to 19.2 percent versus 18.1 percent. Compared to the single exporting firm, formation of the hypothetical U.S. marketing board is successful in reducing price instability in the United States. The coefficient of variation on U.S. wheat prices with the marketing board is 14.4 percent, compared with 25.5 percent for the single exporting firm scenario. Consequently, formation of the marketing board under such circumstances would encourage U.S. wheat farmers to capture the gains from specialization in production because the uncertainty of income from wheat production is reduced.

In the Rest of the World, adoption of a U.S. marketing board reduces both price and demand instability compared to the single exporting firm. The coefficient of variation in foreign carryout stocks of wheat declines from 1.5 to 1.3 percent, while for consumption the coefficient of variation declines from 3.0 to 2.6 percent. Imports, however, increase in instability from 18.1 to 19.2 percent. In addition to reducing the instability of the U.S. wheat price, establishment of a U.S. wheat marketing board reduces the variation in foreign internal prices, 13.0 percent versus 14.0 percent. Thus, formation of the U.S. marketing board stabilizes producer prices in both the United States and the Rest of the World.

Summary of Simulation Results

The objectives of forming a U.S. marketing board to control wheat exports are: (1) to provide the highest possible price in the export market, or implicitly improve the incomes of U.S. wheat producers, and (2) to stabilize U.S. wheat prices. Whether the marketing board is successful depends largely on the conduct in the wheat market prior to establishment of the board.

If the wheat market is initially competitive, the simulation results suggest that a marketing board with authority limited to the international wheat market would accomplish neither objective. The marketing board would raise the export price, but the U.S. domestic wheat price would decline and U.S. wheat growers would suffer. In addition, when compared to the competitive scenario, the marketing board tends to further increase U.S. and world price instability. If, however, the wheat market is characterized by dominance of a single large grain exporting firm, establishment of a marketing board will benefit producers as the U.S. price rises and will reduce U.S. and world price instability.

Conclusions

Grain marketing boards have two major objectives: (1) increasing producer prices and

implicitly, incomes; and (2) reducing fluctuations in producer prices. This study questions whether a marketing board in the United States would be better able to meet these objectives than the current U.S. marketing system. Because differences in prices may be attributable to product quality rather than market structure, an assessment as to whether Australian and Canadian producers receive more for their grain than do U.S. producers could not be made. However, the degree of variability in real prices received by producers for wheat in each of the three countries was measured and found not to be statistically different among the three nations.

Implementing a U.S. wheat marketing board would require considerable change in producer attitudes in favor of a marketing system which might include production-delivery quotas, collective marketing, and averaged pooled prices. The analysis indicates that many of the objectives of a wheat board may be achieved by government programs without necessarily implementing a wheat board itself.

Comparing a hypothetical U.S. export marketing board to a competitive market using a stochastic simulation model concludes that the formation of a U.S. board would not benefit U.S. producers and would increase price instability. When compared to a market dominated by a single grain exporting firm, the U.S. marketing board would reduce price instability and benefit U.S. producers. Actual conduct in the U.S. market is somewhere between these two extreme scenarios. This analysis implies that producer returns are maximized by encouraging the greatest possible degree of competition.

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