

Effects of the Canadian Wheat Board on the U.S. Wheat Industry

Prepared for U.S. Senator Kent Conrad

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Abstract

The practices of the Canadian Wheat Board (CWB) are an important issue in U.S. - Canada trade disputes and WTO negotiations. This study analyzes the CWB's effect on U.S. producers by reviewing findings from previous research and developing models to analyze CWB wheat exports to the United States and the competitive structure of Canadian wheat exports in the world market. U.S. grain producers could benefit from the removal of the CWB as the United States could become more competitive in export markets. However, elimination of the CWB could also result in an increase in Canadian wheat exports to the United States as Canadian producers near the border could sell directly to the United States to take advantage of market opportunities. The net effect is difficult to quantify. The net benefits may be significant in the short run, but reduced significantly in the long run. Similarly, if Canada reforms its wheat board by eliminating trade-distorting subsidies, the United States may increase its exports and Canadian exports to the United States may increase. The net benefits from reforming the CWB could be greater than those from eliminating it. However, the United States could benefit the most from complete elimination of state trading enterprises (STEs), since they have elements distorting trade flows and the United States competes with several STEs in the world wheat market.

Keywords: Canadian Wheat Board, state trading enterprises, price discrimination, wheat exports

Highlights

The Canadian Wheat Board (CWB) is a state trading enterprise (STE) that acts as the sole exporter of western Canadian wheat, durum, and barley. The practices of the CWB have become an issue in U.S. - Canada trade disputes and WTO negotiations. The recent WTO Doha Round framework agreement addresses the potential trade-distorting practices of exporting STEs. The objective of this study is to analyze the effects in the United States of the CWB's single-desk control on exports. Specific objectives are to examine the findings of previous studies that have analyzed these issues, analyze CWB wheat exports to the United States, and estimate the pricing behavior of the CWB in major export markets.

Three pillars provide the basis of CWB operations: single-desk selling, price pooling, and government guarantees. As a single-desk seller, western Canadian wheat and barley producers sell as one. The CWB claims that a single-desk seller can command a higher return for its grains than multiple sellers could by competing against each other. The CWB benefits from government guarantees. Canadian producers get an initial payment when they deliver their grain, and the Canadian government guarantees this payment, covering CWB losses if it fails to capture the initial prices. The government also provides guarantees on the CWB's borrowing.

Most of the studies that have analyzed a change from the CWB's monopoly export power to multiple sellers have found that Canadian grain exports to the United States would likely increase under a multiple-seller environment. Some argue, however, that the CWB exerts market power in overseas markets and has unfair advantages detrimental to U.S. exports.

Studies have examined the ability of the CWB to price discriminate in export markets for both wheat and barley. Many of these studies have found that the CWB has the ability to engage in some degree of price discrimination, but there is disagreement about the evidence of market power. Some other issues discussed in previous research include transparency, the initial payment guarantee, the pre-payment mechanism, and underselling. The structure of the CWB may allow it to engage in activities that put U.S. exporters at a disadvantage, but studies have not been able to show if such trade-distorting activity has harmed U.S. producers.

Elimination of the CWB could result in an increase in Canadian wheat exports to the United States because individual producers in Canada could export grain to the United States to obtain higher prices. Wheat is being exported into the United States only because the net return to Canadian producers is higher than that obtained from shipping to offshore markets. Any change in transportation costs, either offshore or domestic, or a change in the relationship between world and U.S. domestic wheat price will affect the level of Canadian exports to the United States. The CWB is probably providing a leveling effect on the quantity of Canadian exports. In some years, the U.S. market may provide better returns than offshore markets, and in other years it may not; however, until the recent import duty, the level of Canadian exports to the United States had been relatively constant.

Transportation costs to the United States for Canadian producers near the border are lower than those for other Canadian producers. Without the CWB, most Canadian producers along the border could maximize their profit by shipping their grain to elevators in North Dakota, Montana, and Minnesota. As a result, the elimination of the CWB may increase Canadian exports to the United States.

The CWB could also have an effect on U.S. competitiveness in offshore markets where U.S. exporters compete with the CWB. Canada is the most important competitor in both the U.S. domestic market and the world market. The competitiveness of an exporting country can be analyzed indirectly by observing pricing-to-market (PTM) behavior. Exporters may exercise market power by adjusting prices to different export destinations. This study uses the PTM approach to analyze the competitive structure of Canadian and U.S. wheat exports in the world market.

The results from the PTM analysis highlight several notable points. First, the CWB is found to exercise PTM behavior in some markets. Second, with respect to the bilateral trade between Canada and the United States, Canadian wheat exporters exhibit PTM behavior. Third, findings of PTM behaviors suggest that the international wheat market is imperfectly competitive. These findings are not conclusive, however, because of data limitations for Canadian wheat export prices in each export destination. Actual transaction data from the CWB, which are unavailable, would provide more meaningful results.

U.S. wheat producers could benefit from increased competitiveness abroad if CWB advantages and hidden subsidies are removed, but they could also be harmed from increased Canadian wheat exports to the United States if the CWB is eliminated. The net effect is difficult to quantify, but the net benefits for the U.S. industry could be significant in the short run and then reduced significantly in the long run. The benefits for U.S. exporters could be short-lived as the Canadian industry improves its competitiveness and competition between the United States and other exporting countries increases. Domestically, it is likely that the U.S. and Canadian markets will become more integrated without the CWB. However, because of shipping costs, the market integration may be limited to those Canadian producers located near the border.

If the CWB is reformed by eliminating trade-distorting subsidies, the United States may increase its competitiveness in offshore markets, but Canadian exports to the United States could increase. The net benefit from maintaining the CWB's single-desk authority but eliminating trade-distorting practices may be greater than the benefit from completely eliminating the CWB. Overall, however, the United States could benefit the most from complete elimination of STEs because U.S. exporters also compete with other countries' export trading enterprises.

Since exporting STEs have many elements which may distort trade flows, they should be eliminated under the WTO negotiations. If this is not possible, STEs should be reformed so that they are less market distorting. The reforms should address transparency, government guarantees of initial payments, and the underwriting of losses.

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INTRODUCTION

The practices of the Canadian Wheat Board (CWB) have become an issue in U.S. - Canada trade disputes and the recent WTO negotiations. The CWB is a state trading enterprise (STE) that acts as the sole exporter of western Canadian wheat, durum, and barley. With jurisdiction over Manitoba, Saskatchewan, Alberta, and part of British Columbia, the CWB markets most of the Canadian wheat. In the United States, some producers argue that the CWB has unfair trade advantages. The U.S. Trade Representative (USTR) has targeted the CWB through comprehensive and meaningful reform of monopoly STEs in the WTO negotiations. The recent WTO Doha Round framework agreement calls for the elimination of trade-distorting practices with respect to exporting STEs, including export subsidies provided to or by them, government financing, and the underwriting of losses. The issue of the future use of single-desk authority is also subject to further negotiation.

There is one view that the CWB manipulates prices and unfairly markets Canadian grain, undercutting U.S. prices to make sales. Eliminating the single-desk authority of export trading enterprises could prevent the CWB from engaging in these activities, resulting in a decline in exports to the United States, a more even playing field in offshore markets, and a rise in U.S. prices. Another view, however, suggests that eliminating the CWB's single-desk status would not help, and could actually hurt, U.S. producers. Without the CWB's control on exports, individual Canadian producers could sell grain directly into the United States. Currently, the CWB could actually be restraining exports to the United States because of political concerns. Replacing the single-desk seller with multiple sellers looking to take advantage of U.S. market opportunities could result in increased Canadian exports to the United States and a decline in U.S. prices.

The objective of this study is to analyze the effects in the United States of the CWB's single-desk powers. Specific objectives are to examine the findings of previous studies that have analyzed these issues, analyze Canadian wheat exports to the United States, and estimate the pricing behavior of the CWB in major export markets. The next section of this paper provides an overview of the operations of the CWB. A number of previous studies have analyzed CWB price discrimination and market power, as well as other CWB practices. Studies focusing on barley have also examined the likely effects on exports to the United States from removal of the CWB monopoly. The third section of this paper discusses the findings from these studies. In the fourth section, a partial equilibrium model is used to estimate the impact of transportation costs on Canadian spring wheat exports to the United States. The pricing behavior of the CWB is examined in the fifth section. The competitive structure of the Canadian wheat exports in the world market is analyzed by observing pricing-to-market (PTM) behavior. The final section presents the conclusions from this study.

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OPERATION OF THE CANADIAN WHEAT BOARD¹

The Canadian Wheat Board (CWB) is a single-desk state trading agency responsible for the marketing of all western Canadian wheat and barley sold for human domestic consumption and export. It is one of the largest and longest-standing public export-marketing agencies in the world (Schmitz and Furtan 2000, p. 3), and it describes itself as the single largest seller of wheat and barley in the world. Its mission is to market and provide quality products and services to maximize value to western Canadian grain farmers. Among its goals is to extract the highest possible returns for farmers by effectively leveraging the powers of the single desk. The CWB uses a price pooling system to return its net sales revenue to farmers. A market pool is an arrangement by which producers market their crops collectively. The CWB is a mandatory pool, as producers are required to sell their grain to the CWB.

The CWB was established by the Canadian Wheat Board Act of 1935. This occurred after government involvement in grain marketing after World War I and during the Great Depression. The first CWB was created after World War I to market the 1919 wheat crop. This was meant to be a temporary agency that would not be needed during peacetime, and it was abandoned after one year. This system gained support among farmers, however, which led to farmer-created wheat pools in the three prairie provinces. During the Great Depression, the wheat pools were facing bankruptcy because of low wheat prices. The federal government stepped in and provided support by guaranteeing loans made to the wheat pools and by guaranteeing the initial payments these pools made to the farmers. The government hoped its involvement would be temporary, but when it became apparent that long-term involvement was necessary, the CWB was created.

Three pillars provide the basis of CWB operations: single-desk selling, price pooling, and government guarantees. As a single-desk seller, western Canadian wheat and barley producers sell as one. The CWB claims that a single-desk seller can command a higher return for its grains than would multiple sellers competing against each other. The CWB uses a price pool to ensure that all farmers delivering the same grade of wheat or barley receive the same return at the end of the crop year regardless of when their grain was sold. There are four different pool accounts: wheat, durum wheat, feed barley, and designated barley. The price pool reduces the price risk that producers would otherwise face in marketing their grain.

The CWB also benefits from government guarantees of initial payments and borrowing. Canadian producers get an initial payment when they deliver their grain, and the Canadian government guarantees this payment. The initial payment is meant to represent only a portion of the total expected value of the grain; the CWB claims it is equal to about 75 percent of their best estimate of the average market price for the year. Occasionally, the initial payment will be increased during the course of the year, and adjustment payments will be made to those that had sold grain to the CWB prior to the initial payment increase. An interim payment is made at the end of the crop year as an advance on the final payment. The final payment is the amount remaining that is due to farmers after all the marketing costs have been deducted. If the CWB actually has a deficit, farmers will be assured of receiving their initial payments since the government guarantees those funds. The federal government uses taxpayer money to cover the CWB's losses if it fails to capture the initial prices. In most years, the CWB will have a surplus

¹Much of the information about the Canadian Wheat Board's operation and history was obtained from the Canadian Wheat Board's website: <http://www.cwb.ca>, accessed August 2004.

before making the final payment, but it will occasionally be in deficit. The CWB had a deficit in the wheat pool of C\$85.4 million in 2002/03. The barley pool was in deficit for three years in the late 1980s and early 1990s (Dixit and Josling 1997). The federal government also provides guarantees on the CWB's borrowing, which leads to low interest rates.

The CWB has the role of administering access to western Canada's limited grain transportation and handling resources through quotas and contracts with farmers. Grain sales must be coordinated with internal logistics (i.e., railcar allocation) and farmer deliveries to elevators. These functions, which are market-driven in the United States, are accomplished through non-market (administrative) mechanisms in Canada. The CWB sells grain directly to buyers (whether they are private or government entities) and also makes use of accredited exporters, companies that sell wheat on behalf of the CWB.

The Canadian Wheat Board Act provides the legal basis for CWB operation. Farmers are required by law to market through the CWB. This has been a somewhat contentious issue in Canada, with some farmers and commodity organizations arguing for elimination of the CWB's single-desk authority. In response to public pressures for a more responsive and flexible CWB, a few reforms were instituted in 1998. Among these are the adoption of a board of directors (replacing appointed commissioners), which consist primarily of elected producers, and changes that will facilitate new types of marketing alternatives for producers. Ten of the fifteen directors are now elected by farmers, and five of them, including the president and CEO, are appointed by the federal government.

The CWB may be capable of price discrimination by selling grain at higher prices in markets that are less price sensitive and at lower prices in markets that are more price sensitive. By pricing to market, the CWB may be able to maximize returns to producers. Some economists argue that the CWB obtains price premiums in certain markets where multiple sellers would not (Kraft, Furtan, and Tyrchniewicz 1996), although others argue that significant costs associated with the CWB are to the disadvantage of Canadian producers (Carter and Loyns 1996). While the CWB may be capable of price discrimination, it is not known if the CWB's average selling price is higher or lower than that of U.S. exporters because of a lack of transparency. The CWB does not reveal its transaction prices. If the CWB is able to extract a premium in some markets, it may be able to sell at a discount in others, but without transaction data from the CWB, it is not known if they undersell U.S. exporters in certain markets. The CWB has been shown to give away protein by over-delivering on contract specifications (Carter and Loyns 1996), so they essentially sell high protein wheat for the price of lower protein wheat.

FINDINGS FROM PREVIOUS STUDIES

There has been much debate in both the United States and Canada regarding the behavior and the effectiveness of the CWB. Some in Canada argue that Canadian producers would be better off if multiple sellers could export to the United States or overseas rather than having the CWB as a single-desk seller, while others contend that the CWB is able to exercise market power and extract price premiums beneficial to Canadian producers. In the United States, some argue that the CWB has unfair trade advantages. While reforming the CWB and removing its monopoly export power could make U.S. exporters more competitive, Canadian grain exports to the United

States could increase if the single-desk seller was replaced with multiple sellers. A number of studies have examined these issues, and the following section discusses the findings from many of these studies.

Canadian Exports to the United States under a Multiple-Seller Environment

Most of the studies that have analyzed a change from the CWB's single-desk status to multiple sellers agree that Canadian grain exports to the United States would likely increase under a multiple-seller environment. Many of these studies have focused on barley. Canadian policy reform in August 1993 removed the single-desk selling structure of the CWB on sales to domestic maltsters and to all U.S. consumers for feed and malting barley, creating a continental barley market. This policy was repealed after just six weeks because it was found to violate various Canadian internal laws (Schmitz and Gray 2000). This brief experiment with a continental barley market led to a number of studies examining the economics of multiple sellers as replacements for the CWB's monopoly power.

Dong and Stiegert (2003) quantified the welfare, price, and volume impacts of a change from the CWB single-desk system to a multiple-seller structure with regard to barley. They found that U.S. import volume would be higher no matter the degree of the multiple sellers' market power, and that U.S. import price and the price to U.S. barley producers would decrease. With regards to welfare changes, Dong and Stiegert found that Canadian and U.S. producers would be worse off while consumers in both countries would benefit.

The effects of various government policies, including CWB control over barley sales, on Canada - U.S. barley trade flows were examined by Johnson and Wilson (1995) using a spatial equilibrium model. They found that since U.S. markets are more price elastic than Canada's offshore alternatives, the CWB's optimal selling strategy would be to expand exports to the United States beyond the level that would be consistent with a liberalized marketing system in Canada. These findings contradict Dong and Stiegert and others by concluding that if the CWB pursues its optimal selling strategy, U.S. producers would be worse off with the CWB's control of barley sales than if a liberalized marketing system existed in Canada.

The CWB may not be pursuing its optimal selling strategy to the United States, however. Some argue that the CWB voluntarily restrains exports to the United States, and such restraints would not exist under a multiple-seller environment. Young (1999) suggested that despite increased economic incentives to export grain to the United States, increased exports to the United States may not occur due to the CWB's control of exports and concerns over the political consequences of large flows of grain to the United States.

Johnson (1999) later concluded that a multiple-seller scenario would likely work to the disadvantage of U.S. barley producers. He found that larger amounts of malting barley would be exported to the United States and malting barley price would decline. Johnson suggested that the CWB withholds malting barley from the U.S. market, raising the price above what it would be under a multiple-seller environment. Carter (1993) also suggested that the CWB appears to have used restraint when selling barley to the United States. Johnson's conclusion is different for feed barley, though, as he found that single-desk selling tends to lower the U.S. feed barley price. Schmitz and Gray (2000) obtained the same results, finding that feed barley exports to the United

States could decrease while malting barley exports to the United States could increase, and feed barley price could increase and malting barley price could decrease under multiple sellers.

Gray, Ulrich, and Schmitz (1993) also found that the volume of malting barley exports to the United States would increase under a continental barley marketing system, while feed barley would not be dramatically affected, and Veeman (1993) commented that barley exports to the United States would likely increase if a number of Canadian traders were allowed to seek market opportunities across the border.

These studies refer mostly to barley, but results for wheat would likely be similar. Results from these studies suggest that the CWB has restrained grain exports to the United States, and U.S. imports could increase and prices could decline if multiple sellers were allowed to seek market opportunities in the United States.

Another commodity that was once under the control of the CWB is oats. The CWB lost its marketing authority for oats in 1989, and U.S. imports of oats from Canada have steadily increased since that time (Johnson 1998; Carter and Loyns 1998). While many think that imports from Canada could increase under a multiple-seller environment, some argue that the CWB exerts market power in overseas markets and uses unfair advantages that are detrimental to U.S. exports.

Evidence of the Canadian Wheat Board's Price Discrimination and Market Power

Studies have examined the ability of the CWB to price discriminate in export markets for both wheat and barley. Lavoie (2002) found that the CWB charges different prices to different countries for wheat of the same grade and protein content. Lavoie obtained confidential data from the CWB consisting of monthly average price and total quantity sold of Canadian Western Red Spring (CWRS) wheat of grade 1 and 2, as recorded in CWB contracts from 1982 to 1994. CWB prices to Japan were higher than those to the rest of the world for wheat of the same grade and protein level. This study estimated the factors causing the price differences, taking into consideration transportation costs, grade, protein level, loaf volume, U.S. Export Enhancement Program (EEP) payments, and import duties. Results indicated that the price differences are not completely explained by elements of perfect competition, such as difference in grade or protein content, a difference in handling and shipping cost, or a difference in scarcity rent. Lavoie stated, though, that the results do not provide conclusive evidence regarding the ability of the CWB to obtain a price premium over comparable quality of U.S. wheat that is due to its market power. She commented that the CWB may be able to charge different prices in different markets because Canadian wheat is recognized to be of higher quality than U.S. wheat and different markets may have varying levels of willingness to pay for a higher quality.

Brooks and Schmitz (1999) found evidence of the ability of the CWB to price discriminate among feed barley export markets. They also found that the magnitude and significance of price discrimination increased during the operation of the U.S. EEP program from 1985/86 to 1994/95. Lavoie (2002) and Wilson, Johnson, and Dahl (1999) reached the same conclusion regarding the effect of the EEP subsidy on CWB price discrimination for wheat. EEP played an important role in the ability of the CWB to price discriminate. It created a large price gap between the price paid for U.S. exports to EEP recipient countries and the price paid for U.S. exports to non-recipient countries like Japan (Brooks and Schmitz 1999). The CWB reacted strategically to the EEP subsidies by charging a higher price to the non-recipient countries.

Wilson, Johnson, and Dahl (1999) stated that price discrimination has continued since the elimination of EEP, but at a lesser magnitude, and that it exists to the extent that STEs can exploit market power and differentiate their product from those of competitors. Brooks and Schmitz remarked that the CWB was also able to price discriminate prior to EEP, but the magnitude was smaller, and Schmitz and Furtan (2000, p. 73) also claimed that single-desk sellers can price discriminate even without EEP.

Schmitz and Gray (2000) obtained detailed contract data, under a strict confidentiality agreement, on daily CWB sales of barley by destination from 1985/86 through 1994/95. They also concluded that these data show there is price discrimination. Gray, Ulrich, and Schmitz (1993) also found that the CWB was able to obtain a substantial price premium for malting barley sales. Among the reasons for these price premiums, Gray, Ulrich, and Schmitz stated that as a single seller, the CWB is able to offer large quantities of barley with a guaranteed quality throughout the year, and malting houses are willing to pay a premium for such a service.

Schmitz and Gray (2000) argued that the CWB is able to capture higher prices and additional revenue beyond the amount that would have been generated by competitive multiple sellers of barley through international price discrimination and market power. Carter (1993) argued, however, that price premiums may be due to some quality factor rather than the existence of market power, and such premiums would also be available to private sellers. Carter said that the ability of the CWB to use market power to adjust export prices according to different destinations is debatable since it has a very small share in world feed grains trade and since most CWB exports are handled through the private trade. Brooks (1993) disputed this last point and contends that the CWB can price to market. Using unit value export data from Statistics Canada from 1976 to 1988, data which Brooks claimed are inappropriate, Carter (1993) found no statistical evidence of pricing to market for CWB barley, and he argued that there is no economic evidence that the CWB has significant market power in the world barley market. Clark (1995) confirmed the results of Carter, finding that the CWB single-desk selling has no effect on prices received by Canadian farmers for feedgrains. Dong, Marsh, and Stiegert (2003) concluded that STEs do not have market leadership in the differentiated global malting barley market.

The CWB may not be able to exercise much market power in the barley markets since barley competes with a number of different grains in the feed market such as corn and sorghum, and Canada accounts for just 5 percent of the total world trade in course grains (Carter and Loyns 1998). The CWB has a larger share of the wheat market, though, which may allow it to exercise some market power. Canada accounts for about 15-20 percent of the world trade in wheat. The CWB is the largest seller of wheat in the world, and there are not many close substitutes for wheat (Carter and Loyns 1998). A 1996 study by Kraft, Furtan, and Tyrchniewicz indicated that the CWB has been able to extract a premium of about \$C13/metric ton for wheat, which they attribute to the discriminatory powers of a single seller, taking advantage of markets in countries such as Brazil and China. Gardner (1999) agreed that Canada is not simply a price taker in the international wheat market.

Carter, Loyns, and Berwald (1998), on the other hand, argued that the CWB is essentially a price taker in the wheat market. To support this claim, they pointed out that there is a high degree of substitutability among wheats from various exporters and that 75-80 percent of the wheat is imported by developing countries whose main consideration is price. Carter and Loyns (1998) argued that the world grain market is competitive, given the large number of exporters and

importers and freedom of entry. Young (1999) also noted that since a large percentage of world markets are classified as price sensitive bulk markets for wheat, the ability to price discriminate in the world grain markets is limited.

While many studies agree that the CWB has the ability to engage in some degree of price discrimination, there is disagreement about the evidence of market power. Carter and Loyns (1998) commented that price differences are not necessarily evidence of market power, and that market power tests are not simple. They argued that price differences may exist between markets for many reasons - such as the U.S. EEP subsidies, EU export restitution, quality differences, and particular services provided - and more than an alleged price premium is required to produce evidence of market power. Other economists contend, however, that the CWB can manipulate the market to the benefit of Canadian producers (Kraft, Furtan, and Tyrchniewicz 1996, Schmitz and Gray 2000, Brooks 1993). If the CWB does have market power, it would be able to capture additional economic rents through an optimal pricing strategy.

Another issue of interest to Canadian producers is the potential cost of having a single-desk selling arrangement. Carter and Loyns (1996) concluded that the CWB causes Canadian farmers to be worse off as a result of higher marketing costs. If their conclusion is correct, Schmitz and Furtan (2000, p. 106) theorized that the CWB would be imposing an implicit export tax on Canadian wheat and barley growers that would be trade distorting because it would lead to a reduction in Canadian producer price and output, which would be to the advantage of producers in the United States.

Schmitz and Furtan (2000, p. 106) used the Canadian price premiums estimated by two studies - the Kraft, Furtan, and Tyrchniewicz (KFT) study and a 1997 study by Schmitz, Furtan, Brooks, and Gray - and the costs to Canadian producers calculated by Carter and Loyns, and they estimated the effects of these premiums or costs on trade. Using the KFT results, they found that Canadian wheat production would have increased by 1.45 million metric tons (mmt) because of the premiums earned through price discrimination, increasing Canadian exports by 1.1 percent of world trade. They found that the higher costs reported by Carter and Loyns would have decreased wheat production by 3.29 mmt, reducing Canadian exports by 2.5 percent of world trade. Using the results from Schmitz et al. they found that Canadian feed and malting barley production would increase 0.12 mmt and 0.1 mmt, respectively because of the price premiums earned by the CWB, which would result in a growth in exports equal to 2.7 percent of the world barley trade.

Not many studies have estimated the effect of the CWB on U.S. and Canadian market shares, but some point to changing market shares over time as evidence of the CWB's effectiveness. Schmitz and Furtan (2000, p. 193) noted that the U.S. market share for wheat was over 48 percent in 1982 and dropped to below 30 percent in the late 1990s, while Canada's export share for wheat has been relatively stable over time, ranging from 15 - 20 percent, and Canadian market shares for durum and barley have increased.

Other Issues of Concern that Affect Competitiveness

Transparency

Lack of transparency regarding the operations of the CWB is an important issue. Wilson, Johnson, and Dahl (1999) examined the topic of price transparency in the context of bidding games with asymmetric information. Much of the world grain market is conducted using some form of competitive bidding, and this study developed an analytical model to describe a typical bidding game in exporter competition. They stated that the less transparent player gains an informational advantage, increasing its ability to win relative to more transparent players, which results in the less transparent player under-bidding the more transparent firms. Wilson, Johnson, and Dahl concluded that STEs gain a competitive advantage from divulging less information. However, they found that the magnitude of this advantage is small, in the area of \$1-2/metric ton, and they concluded that because of the small impact, price transparency is not of great significance to international trade.

Initial Payment Guarantee

The initial payment received by farmers upon delivery is guaranteed by the government, which will cover any CWB losses if it fails to capture those initial prices. Johnson (1999) commented that the Canadian government's initial payment guarantee is equivalent to price insurance and represents an implicit subsidy whether or not the pool accounts wind up in deficit. He noted that this is an advantage over U.S. trading firms who must buy price protection by hedging in futures markets. The U.S. General Accounting Office (GAO) (1996) estimated that since the CWB was established in 1935, the Canadian government has provided more than \$1.2 billion (U.S.) to the CWB to cover periodic wheat and barley pool deficits. This estimate was before the 2002/03 deficit of C\$85.4 million in the wheat pool.

Pre-payment Mechanism

Stiegert and Hamilton (1998) examined the strategic impact of the CWB's practice of initially paying below market prices for grain and then reimbursing producers later using a lump-sum transfer payment. They found that this payment system represents an implicit form of an export subsidy which gives the CWB a marginal cost advantage and serves as a credible threat to any competitor challenging the CWB's long-run leadership status in the international durum market. Stiegert and Hamilton concluded that this institutional feature is an important factor explaining why the CWB has been able to exert and maintain its leadership status over the past 30 years. In examination of the world malting barley market, however, Dong, Marsh, and Stiegert (2003) found that the CWB and the Australian Barley Board were not setting their initial payments at optimal levels and did not shift rent from other exporting countries by utilizing a prepayment system as a precommitment. Their conclusion was that the rent-shifting effects of the pre-payment mechanism were dampened in the world barley market.

Government Guarantee of Borrowing and Export Credit Sales

Goodloe (2004) examined the Canadian government's guarantee of CWB borrowings and export credit sales. This is another advantage the CWB has that is not available to private commercial exporters. The government guarantees lead to lower borrowing costs for the CWB. Goodloe concluded that these government guarantees allow the CWB to generate a financial cushion, or non-market based revenue, that it can use to enhance returns to producers, discount export prices, or pay administrative expenses. Goodloe could not estimate the size and use of this financial

cushion because of the lack of CWB transparency and reporting, but the study suggested that these factors likely have an influence on the world grain market.

Underselling

Some studies argue that the CWB has certain advantages that would allow it to undersell grain in export markets. Since the Canadian government guarantees the initial price paid by the CWB to producers, the CWB could sell the grain at lower prices without any risk to the producers. Dixit and Josling (1997) suggested that the government underwriting of losses allows STEs to engage in predatory pricing in an attempt to drive commercial competitors out of the market. There is a lack of evidence, however, to show that the CWB engages in such activities. The initial price in most years is set low enough so that the CWB is not in deficit at the end of the crop year. One exception is the 2002/03 crop year, when a large deficit in the wheat pool had to be covered by the federal government.

The GAO (1996) stated that STEs that have monopoly buying authority can engage in cross-subsidization between domestic and foreign markets or between foreign markets. This occurs when an STE sells a commodity for a loss in one market and finances those losses through highly profitable sales in another country. A study by the GAO was not able to determine if such trade-distorting activities were occurring because complete transaction-level data needed to evaluate CWB activities were unavailable.

However, it has been shown that the CWB tends to sell high quality wheat for the price of lower quality wheat. Carter and Loyns (1996) showed that the protein content of Canadian exports is normally well above the minimum delivery specifications. They found that both the CWB and the Australian Wheat Board (AWB) over-deliver protein, but the United States exporters deliver what the customer purchases. This protein give-away could be viewed as a form of underselling.

The U.S. International Trade Commission (USITC) investigated Canadian exports of hard red spring (HRS) and durum wheat to determine if Canadian wheat was being undersold in the U.S. market (USITC 2003). They found that weighted-average delivered prices for Canadian number 1 and 2 HRS wheat were lower than comparable U.S.-grown HRS wheat in 28 of 40 monthly comparisons from June 2000 to August 2002. They also made company-specific and place-specific comparisons which show Canadian underselling in a slim majority of months. As a result of the USITC investigation, an antidumping duty of 8.87 percent was imposed on Canadian HRS wheat. Two of the USITC commissioners dissented, however, arguing that the evidence of underselling for HRS wheat was mixed. The USITC could not find evidence of underselling by Canadian durum exporters.

Other Advantages for STEs

Dixit and Josling (1997) wrote that governments can provide other advantages to STEs that are not available to commercial exporters, such as tax benefits, transport subsidies, preferential foreign exchange and public utility rates, and capital expansion funds. Another advantage for the CWB is that, unlike U.S. grain trading firms, the CWB does not compete for grain procurement. The CWB's guaranteed supply of grain facilitates long-term marketing strategies and forward sales commitments (Johnson 1999).

CANADIAN WHEAT BOARD EXPORTS TO THE UNITED STATES

The Canadian Wheat Board is involved in arbitrage between U.S. and offshore markets. The CWB exports wheat to the market with the highest price less transportation costs. If $P^{US}-t_{cus} > P^w-t_{cw}$, then Canada will export to the U.S. market to maximize its profits. Canada will ship wheat to the United States as long as the difference in prices in offshore markets and the United States is less than differences in transportation costs. P^{US} will start to decrease when imports from Canada result in additional supplies in the U.S. market. Canadian exports to the United States will end when $P^{US}-t_{cus} = P^w-t_{cw}$.

P^w = price in offshore markets

P^{US} = price in U.S. markets

t_{cw} = transportation cost from Canada producing regions to offshore markets

t_{cus} = transportation cost from Canada producing regions to U.S. markets

The model developed for this study is a partial equilibrium model based on a quadratic programming algorithm. The objective of the model is to maximize consumer and producer welfare for the production of HRS wheat in producing regions in the United States and Canada less the transportation costs of shipping from producing to consuming regions. The model contains two exporting countries and three importing regions.

Canada is divided into five producing regions and three consuming regions to capture the interdependency between the transportation system and agricultural production. The United States is divided into three HRS wheat producing regions and two consuming regions. Modes of transportation used in this study are truck, rail, and barges for inland transportation and ocean vessel for ocean transportation.

HRS wheat moves from producing regions to domestic consuming regions by rail or truck and to export ports by rail, truck, or barges. HRS wheat that is moved to export ports goes to consuming regions in importing countries through import ports. Or, it moves directly from producing regions in exporting countries to consuming regions in importing countries by rail or truck within a continent, if shipping routes exist.

It is assumed that the CWB faces highly competitive markets in the United States and overseas. The objective of the model is to maximize consumer and producer welfare in the exporting countries and importing regions. This objective function is mathematically expressed as follows:

$$\begin{aligned}
W = & \sum_{h=1}^2 \int_0^{Q_h} (\alpha_{ho} - \alpha_{h1} Q_h^W) dQ_h - \sum_{h=1}^2 P_h^W Q_h \\
& + \sum_{j=1}^5 \int_0^{Q_j} (\gamma_{j0} - \gamma_{j1} Q_j^d) dQ_j - \sum_{i=1}^8 \int_0^{Q_i} (\beta_{i0} + \beta_{i1} Q_i^s) dQ_i \\
& - \sum_i \sum_j t_{ij} Q_{ij} - \sum_i \sum_j t_{ih} Q_{ih}
\end{aligned} \tag{1}$$

where

i	=	index for producing regions in the United States and Canada,
j	=	index for consuming regions in the United States and Canada,
h	=	index for offshore import markets,
Q_h	=	the quantity of total imports,
Q_h^W	=	the quantity of imports by offshore markets,
Q_i	=	the quantity produced in the United States and Canada,
Q_j	=	the quantity consumed in the United States and Canada.
Q_{ij}	=	the quantity shipped from production regions to domestic consuming regions
Q_{ih}	=	the quantity shipped from export ports to import ports
t_{ij}	=	transportation from producing regions to domestic consuming regions
t_{ih}	=	transportation from producing regions to importing consuming regions

The first term represents the area under the export demand equation representing total import value in the importing country, and the second term represents the total cost of imported wheat to the offshore markets. Thus, subtracting the import costs from total import value shows social benefits given to consumers in offshore countries. The third term represents the area under the domestic demand equation, and the fourth term represents the area under the domestic supply equation. The final two terms are the transportation costs for domestic and offshore shipments. The four terms in the objective function represent the total social benefits given to domestic producers and consumers in the United States and Canada.

This objective function is optimized subject to the following constraints:

$$Q_h = \sum_i Q_{ih} \quad h=1,2,3 \tag{2}$$

$$Q_j = \sum_i Q_{ij} \quad i=1,2,\dots,5 \tag{3}$$

$$Q_i = \sum_j Q_{ij} + \sum_h Q_{ih} \quad (4)$$

$$P_h^w - P_i \leq t_{hi} \quad (5)$$

$$P_j - P_i \leq t_{ij} \quad (6)$$

The first constraint indicates that demand in each offshore market equals the sum of quantities shipped from all producing regions to the offshore markets. The second constraint requires that the quantity demanded in each consuming region in the United States and Canada equals the sum of quantities from all producing regions to domestic markets. The third constraint shows that total quantity produced in each producing region equals the quantity shipped to all offshore markets or domestic markets in the United States and Canada. The next two constraints indicate the necessary conditions for shipments from producing regions to consuming regions. The constraint shows that offshore wheat price less producer wheat price must be less than or equal to the transportation cost to offshore markets. Domestic wheat price less producer wheat price must be less than or equal to transportation cost to domestic consuming regions.

U.S. and Canadian production data were obtained from the PS&D database from the ERS-USDA website. Wheat exports and imports were obtained from the FAS-USDA website. Ocean shipping rates were obtained from International Grain Council and U.S. domestic rail rates were obtained from the Public Waybill data (Surface Transportation Board). The Canadian rail rates were obtained from Canadian National Railway website.

A baseline model was run to establish the level of Canadian exports to the United States and estimate the price difference between the United States and Canada. Table 1 shows the results as transportation costs to the United States are lowered. The CWB, as a single-desk selling agency in Canada, strives to maximize the net return for Canadian producers. The CWB is involved in arbitrage between markets in the United States and offshore. Wheat will be sold where the selling price less transportation is greatest. In the base model, current transportation costs to the United States will yield 1004.2 thousand metric tons of Canadian wheat into the United States. This level of exports is close to the actual level of Canadian wheat exports to the United States over the last two years.

The transportation costs from Canada to the United States are reduced to \$19.17, \$18.17, \$18.15, and \$18.14 in scenarios 1 through 4, respectively. These transportation costs were chosen to determine the breaking point where exports to the United States would change significantly. In the first three scenarios, the level of Canadian wheat exports to the United States does not change significantly. Scenario 4, however, shows that if transportation costs to the United States are lowered by \$3.03 per metric ton, or about \$0.081 per bushel, 5,353.7 thousand metric tons will be exported to the United States. At this rate, a large amount of wheat produced in Saskatchewan would start to be shipped to the United States. Also, if transportation costs to offshore markets increase by that amount, the results will be the same. The offshore transportation cost includes the cost of Canadian railway, port handling charges, and ocean shipping rates.

Table 1. Estimated Impact of the Reduction of Transportation Costs From Canada to the U.S. Domestic Consuming Regions

	Canadian Production	Canadian Exports	Transportation Cost to U.S.	U.S. Producer Price	Canada Producer Price
	1,000 mt	1,000 mt	\$/mt	\$/mt	\$/mt
Base	30,463.3	1,004.2	21.17	116.34	113.57
Scenario 1	30,491.3	1,061.0	19.17	115.28	114.51
Scenario 2	30,504.6	1,089.4	18.17	114.74	114.97
Scenario 3	30,505.3	1,090.0	18.15	114.73	114.98
Scenario 4	30,506.0	5,353.7	18.14	114.73	114.98

The prices received by U.S. producers decrease slightly as imports increase. However, between Scenario 3 and Scenario 4, prices do not change with the large increase in imports. Wheat from Saskatchewan that is exported to Southeast Asia in Scenario 3 is exported to Minneapolis in Scenario 4, but wheat which was shipped from North Dakota to Minneapolis in Scenario 3 is now shipped to Southeast Asia in Scenario 4. Supplies in the United States, therefore, do not change, and the effect on prices is minimal.

Production in Canada does not change substantially under the various scenarios because exports shift from offshore markets to the United States and there is no increase in export demand. U.S. production does not change substantially, and an increase in U.S. imports is countered by an increase in U.S. exports. The additional imports of wheat from Canada reduces the price of U.S. wheat by \$1.61 per metric ton, or about 4 cents per bushel.

When additional wheat is imported by the United States, the U.S. domestic price falls, reducing the price differential between the two countries. Wheat is being exported into the United States only because the net return to Canadian producers is higher than that obtained from shipping to offshore markets. Any change in transportation costs, either offshore or domestic, or a change in the relationship between world and U.S. domestic wheat price will affect the level of Canadian exports to the United States. The CWB is probably providing a leveling effect on the quantity of Canadian exports. In some years, the U.S. market may provide better returns than offshore markets, and in other years it may not, but until the recent import duty, the level of Canadian exports to the United States had been relatively constant.

The transportation costs used in the model are average costs for each producing region. For example, the shipping costs from Manitoba and Saskatchewan to Minneapolis are \$19.30 and \$21.17 per metric ton, respectively. The shipping cost from North Dakota to Minneapolis is \$18.40 per metric ton. These costs represent the costs of transportation from central points in the producing region to the destination point. The transportation costs to the United States for producing regions in Canada near the international border may be much less. Transportation costs to the United States for Canadian producers near the border could be similar to transportation costs from North Dakota to Minneapolis or lower than the transportation cost for producers in western North Dakota.

The Canadian producer could ship their wheat directly to elevators in the United States if the CWB was eliminated. Currently, all producers in Canada must sell their grain to the CWB, so they do not have any choice where their grain is shipped. Without the CWB, most Canadian producers along the border could maximize their profit by shipping their grain to elevators in North Dakota, Montana, and Minnesota. As a result, the elimination of the CWB's single-desk selling authority may increase Canadian exports to the United States. It would be very difficult to limit Canadian exports under the free trade agreement.

PRICING BEHAVIOR OF THE CANADIAN WHEAT BOARD IN MAJOR MARKETS

As our study and others have shown, the CWB likely has an effect on the level of exports to the United States. The CWB could also have an effect on U.S. competitiveness in offshore markets where U.S. exporters compete with the CWB. The market shares of U.S. wheat in the world market have decreased since the early 1980s. Studies related to wheat trade suggest that decreased U.S. market shares are associated with increased sales by the competing suppliers, such as Australia and Canada (c.f., Jin, Cho, and Koo). Australia and Canada allow their state trading agencies, the Australian Wheat Board (AWB) and the CWB, to act as single-desk delegates for pooling and exporting wheat at the best possible prices. The AWB is Australia's major national grain-marketing organization and is responsible for the management and marketing of all Australian exported bulk wheat. Together with U.S. dollar appreciation, the state trading agency has been an important issue for U.S. wheat trade in the world market. In particular, Canada is the most important competitor in both the U.S. domestic market and the world market.

There is no single direct matrix to show whether an exporting country has competitive power in the world market. However, one can analyze competitiveness of an exporting country indirectly by observing PTM behavior. The PTM approach is in the framework of modeling imperfect competition and focuses on the behavior of an exporting country in the world market. The model consists of an exporter and multiple importers. In particular, we use the Knetter (1989) model to test whether the exporting country can differentiate export prices according to each destination market.

Methodology

Exporters may exercise market power by adjusting prices to different export destinations. This PTM behavior pertains to decisions by exporters to maintain or even increase export prices when facing currency depreciation relative to the importer's currency. Krugman (1987) named PTM behavior after the phenomenon that exchange rate difference induces price discrimination in international markets. PTM generally involves multiple markets and is connected to the notion of markup-pricing over marginal cost and thus imperfect competition. Knetter (1989, 1993) suggested a method to measure the potential markup by exporters in specific destination markets using a firm's PTM behavior in response to exchange rate movements.

Drawing upon his idea, after separating time-varying marginal cost of an exporting firm, one can easily estimate destination-specific markup of the firm. His method is intuitively plausible and easy to apply to empirical works, so the model has become popular for estimating potential markup and imperfect competition in international trade. In agricultural economics, Pick and

Park (1991, 1996) and Pick and Carter (1994) used Knetter's model to investigate PTM behavior by the U.S. agricultural commodity exporters.

In order to test for alternative market structure, Knetter (1989) proposed the following cross-sectional time-series equation:

$$\ln p_{it} = \theta_t + \lambda_i + \beta_i \ln s_{it} + u_{it}, \quad (7)$$

where p_{it} is the export price, θ_t is the time effect, λ_i is the country effect, s_{it} is the exchange rate, and u_{it} is the error term. Equation 7 can be used to distinguish between the following three models of market structure.

The first model pertains to the competitive market structure, in which export prices will be the same for all destinations because there is no country effect, $\lambda = 0$. Changes in the bilateral exchange rates will not affect bilateral export prices, implying $\beta = 0$. The time effects represented by θ_t measure the common price for all destinations.

The second model assumes constant elasticity of demand with respect to the domestic currency price in each of the importing countries, a reasonable approximation for slight movements along the demand curve. In such a model, the markup over marginal cost as given is constant but may vary over time and across destinations, implying $\lambda \neq 0$. Shifts in bilateral exchange rates do not influence export prices to various destinations, implying $\beta = 0$.

The third model is based on price discrimination with varying elasticity of demand. Under this scenario, the demand elasticity may vary with changes in the exchange rate. Consider a depreciation of the importer currency relative to the exporter currency. The price faced by consumers in the importing country increases. If the demand elasticity remains constant, then the second case results in which exporters are faced with a constant elasticity demand schedule. However, if demand elasticity changes, then the optimal markup over marginal cost will change and export price will thus depend on exchange rates. This is PTM behavior because the optimal markup by a price-discriminating monopolist will vary across destinations and with changes in bilateral exchange rates. This case implies $\lambda \neq 0$ and $\beta \neq 0$.

Nonzero coefficients of β are inconsistent with both competition and price discrimination with constant elasticity of demand. The exporter maximizes profit in the home currency, while import demand depends on the local currency price in the importing country. Exchange rate changes drive a wedge between the price paid by the buyer and the price received by the seller in their respective currencies. At a given price in the exporter's currency, a depreciation of the importer's currency raises the local currency price paid by the importer. If demand has constant elasticity with respect to price, the optimal markup charged by the exporter will not change as exchange rate changes increase the price paid by the importer. If, however, demand elasticities change with changes in the local currency price, then export prices will depend on exchange rates.

Data

The data used in this study consist of the unit values of Canadian and U.S. wheat to each destination market and nominal exchange rates between the two exporting countries and

importing countries. The importing countries are 19 major grain importing countries - Algeria, Belgium-Luxembourg, Brazil, Canada, China, Colombia, Ghana, Indonesia, Italy, Japan, Malaysia, Morocco, Mozambique, Pakistan, Philippines, South Korea, Thailand, the United Kingdom, and Venezuela.

The Canadian unit value data were obtained from the OECD bilateral trade data set, named *Trade in Commodities* and the Canadian Wheat Board. The U.S. unit value data were obtained from *Foreign Agricultural Trade of the United States* (FATUS) of Economic Research Services (ERS) of the U.S. Department of Agriculture. Exchange rate data were obtained from *International Financial Statistics* by the International Monetary Fund. Wheat prices are expressed by exporting country dollars per metric tons and are divided into durum and non-durum wheat unmilled.

The frequency of the sample data is annual and ranges from 1988 to 2003 for the Canadian data and from 1989 to 2003 for the U.S. data. Monthly or quarterly data would be more desirable, but such data for Canada could not be obtained. Statistics Canada published monthly data for Canadian export volumes and values of wheat by destinations, but it does not provide the most recent five years of data, and Brooks (1993) argued that most data from Statistics Canada would be inappropriate for such analysis because the export values are based on CWB card prices rather than actual sales prices. Brooks explained that the card price is the CWB's offering price and is set at the level obtainable from the highest-price market, but most sales are made at prices below the card price. Actual transaction data from the CWB are needed to obtain the most reliable results, but such data are not available and have on a few occasions been made available to researchers only on a strict confidentiality agreement.

The OECD data set for Canadian unit values ends in 1997, so samples from 1989 through 2003 were obtained from the CWB. In some cases, when splicing the data from different sources, there is a jump or kink in the time observation before and after the splicing. To ascertain whether this was the case in the Canadian data, we plotted each time series of the panel data, but did not find evidence of any jump or kink during the sample period.

Analysis of Pricing-to-Market Behaviors of U.S. and Canadian Wheat Exporters

Empirical estimation of Equation 7 was performed using a two-way panel model for each exporting country. The time effect and country effect in Equation 7 are treated as fixed, so time and cross-sectional dummies are included in the panel analysis. The results from the panel estimation show that each equation has relatively high fitness of the model to the data set. In particular, the fit for Canadian data is 0.79 and that for U.S. data is 0.74, which are relatively high. The null hypothesis of no-fixed effect was rejected for both equations, indicating that inclusion of country and time-specific effects as fixed is reasonable.

Estimation results from Canadian data show that the CWB exercises PTM behavior in Belgium-Luxemburg, Italy, Mozambique, South Korea, and the United States. This means that the optimal markup charged by CWB depends on the demand schedule for wheat of the importing countries. The CWB's behavior following the second model was found only in China, suggesting that the markup over marginal cost exists, but shifts in bilateral exchange rates do not influence export prices to China. In all other importing countries, the CWB behaves as a perfect competitor.

Estimation results from U.S. data show that the PTM behavior of U.S. private wheat exporters was identified in Algeria, Columbia, Pakistan, and Venezuela. The second model behavior by the U.S. wheat exporters was found in Brazil, China, and the United Kingdom.

The results from this study highlight several notable points. First, while both the CWB and U.S. exporters are found to price-to-market in some markets, one cannot conclude that either the CWB or U.S. wheat exporters have more significant PTM behavior than its competitor in the major wheat importing countries. Second, with respect to the bilateral trade between Canada and the United States, Canadian wheat exporters exhibit PTM behavior, but U.S. exporters have only markup over marginal cost, and exchange rate changes do not influence export prices to Canada. Third, findings of PTM behaviors by the two exporting countries, albeit confined to some importing countries, suggest that the international wheat market is imperfectly competitive.

The finding that the CWB prices-to-market in some countries is consistent with a number of previous studies that show that the CWB can price discriminate. These findings, though, are most consistent with Carter (1993) and Carter, Loyns, and Berwald (1998) who argued that the CWB's ability to price discriminate in the world grains market is limited and its ability to exercise market power is questionable.

POLICY IMPLICATIONS FROM ELIMINATING OR REFORMING THE CANADIAN WHEAT BOARD

The empirical analysis presented in the previous sections found that removal of the CWB could increase Canadian exports of HRS and durum wheat to the United States, while U.S. exports to offshore markets could increase. However, due to data limitations, it is difficult to quantify the net overall effect of removal of the CWB. Price data from the CWB, which are unavailable, are needed for further quantitative analysis. We can, however, provide qualitative analysis on the likely effects from eliminating or reforming the CWB based on our empirical findings. This study examines two scenarios. In the first scenario, the single-desk authority of the CWB is eliminated. Canada maintains the CWB in the second scenario, but it is reformed and its hidden subsidies are removed.

If the CWB's single-desk authority is eliminated, the United States may become more competitive in offshore markets as the advantages enjoyed by the CWB disappear. There would no longer be any hidden subsidies given to farmers through the CWB. Notable among these hidden subsidies is the government guarantee of initial payments. The multiple sellers in Canada would have to compete for grain procurement, as opposed to the single-desk CWB's advantage of a guaranteed grain supply, and the multiple sellers would not give away protein like the CWB. Furthermore, if the CWB has been effective in using market power to price discriminate, as some studies suggest, then the elimination of the single-desk seller would influence Canadian pricing behavior. These changes would make U.S. exports more competitive in offshore markets. The result of this would likely be an increase in U.S. exports.

The increase in U.S. export competitiveness, however, may be a short-run phenomenon. Canada may increase its competitiveness in the long run. Currently, Canada's port facilities may not be as efficient as those in the United States because of a lack of competition. The CWB is the only

supplier of grain, and the Canadian ports do not compete for the handling of grain. The elimination of the CWB would likely lead to the modernization of Canadian ports to compete with ports in the United States. In the long run, Canada is likely to improve its transportation and handling system to make its exports more competitive in offshore markets. Some studies have argued that there are costs to the Canadian producers that are due to the CWB. Removal of the CWB could result, in the long run, in reduced marketing costs for Canadian producers, increased buying competition, and a better price discovery mechanism.

In general, production costs in Canada are lower than those in the United States. This is largely due to lower land costs and lower chemical costs. If CWB subsidies have benefitted Canadian producers, removal of these subsidies would likely lead to lower land values and lower land costs in Canada, which would have a positive effect on Canadian competitiveness.

It is also possible that the United States may not enjoy all of the initial benefits from the removal of the CWB, as there would be increased competition from Australia and other countries. Because of newer mixing technologies, there is a higher degree of substitution of HRS wheat with other types of wheat from Australia and other countries. Therefore, if Canadian competitiveness decreases, the United States must compete with Australia, Argentina, and others to capture Canada's lost market share.

U.S. competitiveness abroad is one issue to consider, the other issue is the level of Canadian exports to the United States. There would likely be negative domestic effects as imports from Canada could increase. Without the CWB, there would be no control on Canadian exports to the United States, and small elevators and multinational companies could export to the United States to take advantage of market opportunities. The level of U.S. imports from Canada would depend on the freight rates. It is likely that U.S. imports from Canada would increase without the CWB, but this could be moderated if Canadian railroads adjust their rates to the west and east ports for exports.

The U.S. and Canadian markets would become more integrated without the CWB. It would be possible for multinational grain companies to buy wheat in Canada and export it from U.S. ports. In an integrated market, it is likely that an increase in U.S. wheat supply will be from Canada. U.S. wheat production is not likely to increase since it is facing pressure from corn and soybean production, which benefit from ethanol and biodiesel programs. Because of the lower wheat production costs in Canada and the pressure in the United States from corn and soybeans, U.S. wheat supply from Canada could increase.

The net benefit from eliminating the CWB's single-desk authority for the U.S. wheat industry could be significant in the short run but reduced significantly in the long run. U.S. wheat producers could benefit from increased competitiveness abroad as CWB advantages and hidden subsidies are removed, leading to an increase in U.S. exports. But U.S. producers could also be harmed from increased wheat imports from Canada as multiple sellers look to take advantage of market opportunities across the border. The benefits for U.S. exporters could be short-lived as the Canadian industry improves its competitiveness and competition between the United States and other exporting countries increases. Domestically it is likely that the U.S. and Canadian markets will become more integrated.

The other scenario is for Canada to maintain the CWB, but for the CWB to reform its practices and remove hidden subsidies. Eliminating subsidies such as the initial payment guarantee and making the CWB transparent could increase U.S. competitiveness in offshore markets. As in the previous scenario, the benefits may decrease in the long run because of competition from substitutes in other countries and a possible decrease in Canadian land values resulting from the elimination of the Canadian subsidies.

Since freight rates from Canada to offshore markets are higher than those to the United States, the CWB could try to export more to the United States to take advantage of lower freight rates under this scenario. However, these exports may be limited, mainly because U.S. producers could be more competitive than Canadian producers in shipping wheat to U.S. mills due to lower shipping costs from U.S. producers to the mills within the country. On the other hand, the CWB may have an advantage because Canadian wheat is cleaner than similarly classified U.S. wheat and contains more protein.

The net benefit from maintaining the CWB's single-desk authority but eliminating trade-distorting practices may be greater than the benefit from completely eliminating the CWB. In both scenarios, the United States would likely become more competitive in offshore markets, and Canadian exports to the United States may increase. Canada would likely improve its competitiveness in the long run by making improvements in the transportation and handling system, but these improvements may not be as likely as long as the CWB maintains single-desk authority. Further, the increase in Canadian exports to the United States could be more limited as long as the CWB is the single-desk seller. Overall, however, the United States could benefit the most from complete elimination of STEs because U.S. exporters also compete with other STEs such as the Australian Wheat Board, and these STEs have many elements distorting free trade. If it is not possible to eliminate them, the next best alternative would be to make them more transparent and eliminate their trade-distorting practices.

CONCLUSIONS

The practices of the Canadian Wheat Board (CWB) are an important issue in U.S. - Canada trade disputes and WTO negotiations. Competing views suggest that removal of the CWB's single-desk authority could either have positive or negative effects on U.S. grain producers. This study analyzes the CWB's effect on U.S. producers by reviewing findings from previous research and developing models to analyze Canadian wheat exports to the United States and the competitive structure of Canadian wheat exports in the world market.

Elimination of the CWB could result in an increase in Canadian wheat exports to the United States because individual producers in Canada could export grain to the United States to obtain higher prices. Wheat is being exported into the United States only because the net return to Canadian producers is higher than that obtained from shipping to offshore markets. Any change in transportation costs, either offshore or domestic, or a change in the relationship between world and U.S. domestic wheat price will affect the level of Canadian exports to the United States. The CWB is probably providing a leveling effect on the quantity of Canadian exports. In some years the U.S. market may provide better returns than offshore markets, and in other years it may not;

however, until the recent import duty, the level of Canadian exports to the United States had been relatively constant.

Transportation costs to the United States for Canadian producers near the border are lower than those for the average Canadian producer. Without the CWB, most Canadian producers along the border could maximize their profit by shipping their grain to elevators in North Dakota, Montana, and Minnesota. As a result, the elimination of the CWB may result in an increase in Canadian exports to the United States.

The CWB is found to exercise PTM behavior in certain markets. However, this finding is not conclusive because of data limitations for Canadian wheat export prices in each export destination. Higher frequency data for Canadian exports and prices or the actual transaction data from the CWB would provide more meaningful results. These data, however, were unavailable. Previous studies have shown that the CWB price discriminates in export markets, but there is disagreement between economists regarding the degree of market power the CWB has and the ability the CWB has to set prices and influence market shares.

The net benefit from eliminating the CWB's single-desk authority for the U.S. wheat industry could be significant in the short run but reduced significantly in the long run. U.S. wheat producers could benefit from increased competitiveness abroad as CWB advantages and hidden subsidies are removed, leading to an increase in U.S. exports. But U.S. producers could also be harmed from increased wheat imports from Canada as multiple sellers look to take advantage of market opportunities across the border. The benefits for U.S. exporters could be short-lived as the Canadian industry improves its competitiveness and competition between the United States and other exporting countries increases. Domestically, it is likely that the U.S. and Canadian markets will become more integrated.

If the CWB reforms its practices and removes hidden subsidies, the net benefits for the U.S. wheat industry could be greater than those from eliminating the CWB. Exporting STEs, in principle, are against the policy of free trade. STEs have many elements which may distort trade flows. In addition, the United States competes with other STEs in addition to the CWB. Thus, the U.S. wheat industry would benefit most from complete elimination of STEs. If it is not possible to eliminate them, the next best alternative would be to eliminate their trade-distorting practices. Among these reforms, subsidies received by STEs should be eliminated, including the government guarantee of initial payments and the underwriting of losses, and STEs should be made more transparent in terms of operations.

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