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Objective
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Changing Structures in the Barley Production and Malting Industries of the United States and Canada

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and Ethan Severson*

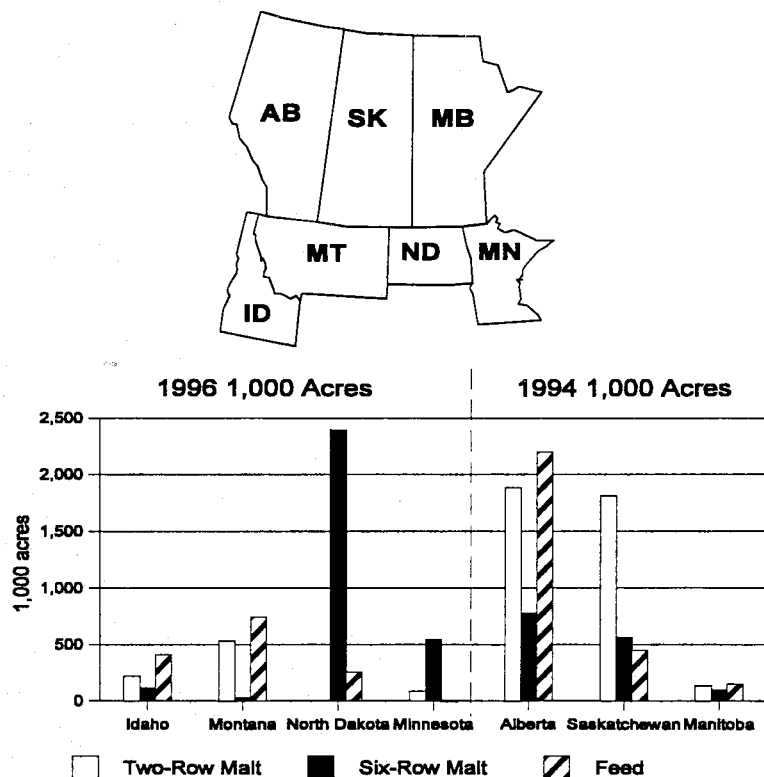
Changes in the regulation of trade have taken place subsequent to the 1988 passage of the Canadian–United States Free Trade Agreement (CUSTA). The effect of these changes on trade in agricultural commodities is pertinent to producers and policymakers in the Northern Plains and Rockies region. In this paper we discuss the malt barley production and the malting industries in light of recent trade agreements. We evaluate the incentives that free trade provides for mergers between malting firms. Then we assess the consequences of these mergers on the realized gains from trade for consumers, barley producers, and malting firms.

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Barley Production

There are two distinct types of malt barley that differ both in yield and production areas. Two-row barley yields more malt per bushel, but it is more prone to disease than six-row malt barley. Planted acres for two-row, six-row, and feed barley varieties are shown for key areas in the United States in 1996 and for Canada in 1994 (see Figure 7).

Figure 7. Barley Varieties, 1,000 Acres Planted



In 1996 North Dakota ranked first in U.S. malt barley acreage and total barley acreage, accounting for 60 percent of the nation's 4 million acres of malt barley. Montana ranks second behind North Dakota in total barley acreage.

The United States produces feed and malt barley, seeding 7.1 million acres in key areas in 1996. Approximately 3.9 million acres were planted to malt barley, with about 19.4 percent of the key United States malt barley areas planted to two-row varieties.

Likewise, Canada produces both feed and malting barley, seeding 9.5 million acres in 1994. Approximately 5.7 million acres were planted to malt barley, with about 70 percent of the Canadian malt barley area planted to two-row varieties.

United States Production

In 1996 North Dakota ranked first in U.S. malt barley acreage and total barley acreage, accounting for 60 percent of the nation's 4 million acres of malt barley. More than 80 percent of North Dakota's 3 million planted acres of barley were in malting varieties. All malt barley acreage in North Dakota was planted to disease-tolerant six-row varieties.

Montana ranks second behind North Dakota in total barley acreage seeded. More than 550,000 Montana upland acres were planted in 1996 to malt barley varieties; two-row varieties dominate the state's malt barley acreage. Montana provides approximately 68 percent of the nation's two-row barley production. Contracting by brewers has a substantial impact on the malt barley varieties planted. Anheuser Busch and Coors contract substantial malt barley acreage with Montana producers, often using proprietary varieties.

Idaho ranks third in the nation in total barley area seeded with 387,000 acres seeded to malting varieties in 1996. Most malt barley acreage in Idaho is planted to two-row varieties. Anheuser Busch and Coors contract substantial malt barley acreage with Idaho producers.

Minnesota accounts for about 13 percent of the nation's malt barley acreage. Minnesota plants approximately 545,000 acres annually to malt barley with 99 percent of this area planted to six-row malting varieties. Minnesota ranks third in the United States in malt barley acreage planted.

Canadian Production

In 1994 there were 2.6 million acres of malt barley planted in Alberta. An estimated 71 percent of this acreage was planted to two-row varieties. In the same year Saskatchewan planted more than 2.3 million acres to malt barley, of which 77 percent of the area was in two-row varieties. Due to Manitoba's growing conditions, the province's proximity to the Minneapolis market, and the demand by Canadian brewers, considerable six-row barley is produced in that province.

Production Over Time

Comparisons of areas planted to six-row, two-row, and feed barley in the United States and Canada in years before, during, and after implementation of CUSTA are presented (see Table 14). Over this period the area of six-row barley varieties planted in Canada has decreased while plantings of

Table 14. Seeded Area of Barley in the United States and Canada

Variety Type	1980		1990		1994	
	Acres (000)	Percent of Total	Acres (000)	Percent of Total	Acres (000)	Percent of Total
<i>United States</i>						
Six-Row	2,865	44.8%	3,260	45.1%	2,618	42.2%
Two-Row	1,037	16.2%	667	9.2%	667	10.8%
Feed	2,495	39.0%	3,310	45.7%	2,915	47.0%
Total	6,397		7,237		6,200	
<i>Canada</i>						
Six-Row	4,570	42.6%	2,050	18.9%	1,692	18.0%
Two-Row	3,532	32.9%	4,619	42.7%	3,890	41.4%
Feed	2,618	24.4%	4,150	38.4%	3,806	40.5%
Total	10,720		10,819		9,388	

Source: Schmitz and Koo 1996, 21.

two-row varieties have increased. These shifts in varieties planted are due to the reduction of trade restrictions and an increase in Canadian brewer demand for two-row varieties concurrent with advances in two-row barley variety development. U.S. shifts in production from six-row to two-row varieties have not paralleled those in Canada. Areas planted to six-row and two-row malting varieties in the United States were lower in 1994 than in 1980. U.S. feed barley variety acreage increased by 16 percent over the 14-year period. While the percent of total barley acreage in six-row varieties remained relatively constant, the decline in the percent of total acreage in two-row varieties was offset by the increased percent of total acreage in feed barley varieties.

A major difference between the United States and Canada is that, on average, selection rates in Canada are much lower (see Table 15). Selection rates are defined as the amount of barley selected for malt divided by the amount of all barley produced. The average Canadian selection rate was 11 percent with little variation during the 1980 to 1995 period. The average U.S. rate was 33 percent during this period. The difference in average selection rates may be due in part to single-desk selling by the Canadian Wheat Board and the cash and contracting system in the United States. The increase in selection rates in Montana in recent years may be an indication of the increasing demand for two-row malt barley by U.S. maltsters and brewers.

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Table 15. Average Produced Selection Rates (Amount Selected/Amount Grown)

	1980	1990	1993	1995	15-Year Average
Canada	9.0%	11.0%	13.0%	na	11.0%
United States	34.0%	35.0%	35.0%	na	33.0%
Montana		22.0%	22.0%	32.0%	na

Source: Schmitz and Koo 1996, 28; and Montana Agricultural Statistics Service

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The Structure of the Malting Industry

Eight firms control 97 percent of the malt production in the United States and Canada. Major maltsters' capacities, subsidiaries, and market shares are identified (see Table 16). The smallest firm, Coors, has a capacity of about 222,000 metric tons of malt. The largest firm, ConAgra, has a capacity of about 815,000 metric tons. Eight firms operate a total of twenty-three plants, ranging in capacity size from 32,253 to 329,042 metric tons of malt, in the two countries.

Over the past twenty years the U.S. malting industry has experienced a large increase in concentration (see Table 17). The number of U.S. firms has decreased from twenty-six to eight, while the four largest firms' market share increased from 51 to 60 percent between 1980 and 1997. The Canadian industry structure has historically been quite concentrated. With the introduction of free trade, there has been considerable merger activity across the border. The number of firms has been cut in half, from sixteen in 1992 to eight in 1997. Malting firms sought to capture gains brought by free trade and lower procurement costs for barley. Through mergers these firms obtained procurement facilities and production expertise in the barley-growing regions.

The end result of these mergers has been purchases of controlling interest in Canadian malting plants by U.S. firms, or joint ventures in these plants. First, Great Western Malting was purchased by Canada Malt. This made Canada Malt the largest maltster in North America. Schreir purchased 51 percent of Prairie Malt in September 1989. Archer Daniels Midland purchased 65 percent of Dominion Malting in September 1990. Cargill and Ladish entered into a joint venture in 1991. Rahr constructed a plant with an annual capacity of 85,000 metric tons in Alix, Alberta, doing business as Westcan Malting. ConAgra acquired 70 percent of Canada Malt in 1996, ConAgra's first entry into the North American malting industry.

We have estimated the effects of mergers within the barley malting industry to capture their impact on malting barley producers and consumers (Buschena and Gray 1997). Potential cost savings from mergers are critical to our analysis of this market, since these potential cost savings offset the losses to society from decreased competition among maltsters. Cost savings are likely to occur between malting plants that have different input procurement areas and overlapping shipping areas. Many of these plants are located near specific local production regions, and these plants have built up reputation and expertise in purchasing barley that annually varies in quality. A merger between firms in different geographic areas, such as across national boundaries, could give each firm access to a wider malt barley production base.

We examined three scenarios for the malting industry, one pre-CUSTA scenario and two post-CUSTA scenarios. In the first post-CUSTA situation we assumed that no mergers took place and that all eleven firms faced one Canadian-U.S. market for malting services. In the second post-CUSTA simulation we incorporated the four mergers that took place after 1985.

Table 16. Capacities of Major U.S. and Canadian Maltsters, 1997

Commercial Maltsters	Subsidiary	Subsidiary Locations	Capacities (MT)		Percent of Malting Capacity
			Before Mergers	After Mergers	
ConAgra				814,857	22.3
	Canada Malt	Canada	461,000		
	Great Western		353,857		
Cargill		U.S.		557,693	15.2
	Ladish	U.S.	557,693		
Rahr		U.S.	329,042	414,042	11.3
	Westcan Malting	Canada	85,000		
ADM		U.S.	297,952	389,952	10.7
	Dominion Malting	Canada	92,000		
Schreir		U.S.	137,878	372,878	10.2
	Prairie Malt	Canada	235,000		
Froedert		U.S.		348,759	9.5
Commercial Total				2,898,181	82.3
<i>Brewer/Maltster</i>					
Anheuser Busch		U.S.		424,483	11.6
Coors		U.S.		222,600	6.1
Brewer/Maltster Total				647,083	17.7
Industry Total			3,545,264	3,545,264	100.0

Source: Industry source

Table 17. Structure of the Canadian and U.S. Malting Industries, 1968–1997

	United States			Canada		Combined	
	1980	1992	1997	1992	1997	1992	1997
Number of Plants	37	23	17	6	6	29	23
Number of Firms	26	13	8	4	4	16	8
Industry Capacity (1000 MT)	178	186	181	39	57	225	237
4-Firm Market Share	51%	59%	60%	100%	100%	60%	60%

Source: Johnson and Wilson 1994, 29; Industry source; and calculations by authors

These mergers reduced the number of firms from eleven to seven. The prices, quantities, and economic surplus measures for malt producers, malt consumers, and barley producers in each of the three scenarios are presented (see Table 18). The pre-CUSTA outcomes define the base case for comparing the post-CUSTA outcomes.

Measurements of the effects of free trade benefits are presented in the third column of Table 18 (see Free Trade Change). The price for malting services (-17.8 percent), the malt price (-5.1 percent), and producer surplus for malting firms (-16.9 percent) decrease as firms within the industry face increased competition. Barley price increases (+3.1 percent) while total quantity malted increases (+6.3 percent). Most of the increased barley malting

Table 18. Effects of Free Trade and Mergers on the North American Malting Industry

Economic Variable	Pre-CUSTA (base case)	Post-CUSTA		
		Free Trade Change	Merger Change	Free Trade Plus Merger Changes
<i>Prices per restriction (US\$1 per MT)</i>				
Malting services	89	-17.8%	12.5%	-7.5%
Malt	222	-5.1%	3.1%	-2.1%
Barley	133	3.1%	-1.8%	1.3%
<i>Quantity malted^a (1000 MT)</i>				
Canadian locations	516	18.3%	-5.1%	12.2%
U.S. locations	1,677	2.6%	-2.8%	-0.3%
Total quantity malted	2,193	6.3%	-3.4%	2.7%
<i>Overall welfare effects (US\$1,000)</i>				
Malt consumer surplus	214,970	11.9%	-6.2%	4.9%
Barley producer surplus	73,089	13.0%	-6.7%	5.4%
Malting firm producer surplus	154,820	-16.9%	48.7%	23.6%
Total welfare	442,878	2.0%	9.3%	11.5%

^aQuantity malted by brewers excluded.

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occurs in Canada, reflecting the relatively lower procurement costs for high-quality two-row barley and the importance of transportation costs for this bulky commodity. Overall, malt consumers, barley producers, and society in general gain from free trade without mergers whereas malting firms lose.

Measures of the effects of the industry mergers and measures of the net effects of CUSTA (free trade plus the resulting mergers) are presented in (see fourth and fifth columns of Table 18). A good deal of the gains from free trade due to price reductions in malt and malting services and the price increases in barley are offset by the reduced number of malting firms due to mergers. Total quantity of barley malted increases but by less than half the level that would occur under free trade without mergers (2.7 percent versus the 6.3 percent free trade effect). Mergers reduce the gains from free trade to malt consumers and malt barley producers. However, the producers' surplus for malting firms increases to levels almost 25 percent larger than the pre-CUSTA levels. Overall, mergers increase the total gains to free trade beyond those without mergers although most of the gains accrue to malting firms.

U.S. malt barley producers lost more from these industry mergers than did Canadian producers. The bulk of these losses are likely to fall on producers of the lower-quality six-row barley in Minnesota and North Dakota. Our estimation results changed very little when we considered different malt demands and different industry cost structures.

Conclusions and Expected Trends

The North American malt barley production industry is characterized by distinct two-row and six-row malt variety production regions and high concentration in the malting and brewing industries. CUSTA (now NAFTA) has had significant impacts on the North American malt barley industry. The most dramatic change has been the mergers between malting firms in the United States and in Canada. Through mergers, the industry has become more concentrated. This merger activity continues.

There is a very large difference in selection rates of the United States and Canada. Two-row producers in the United States, primarily in Montana and Idaho, will likely continue to receive premiums over producers of lower-quality six-row barley but will face increased competition from Canadian production. Given the large production of two-row malting barley in Canada, free trade should cause Canadian selection rates to increase and U.S. selection rates to decrease as U.S. maltsters use more Canadian two-row barley. The acres of malt barley produced under brewer contracts in the United States will likely decline. This increased supply of quality malt barley will lower brewers' incentive to contract with producers.

Beginning in 1993 Anheuser Busch reduced its contract acres in the United States and started to contract for malt barley in Canada. Future changes in contracting arrangements will be particularly important for malt barley producers in Montana.

For malt barley producers in the Northern Plains, consumers, and processors, free trade agreements matter very much. Trade agreements also impact industry structure. What is most striking with respect to malt barley is the speed with which malting firms have captured the cost savings and increased selling opportunities made possible by free trade.

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