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EX-POST COMPETITIVENESS ASSESSMENT OF ALBERTA AGRI-FOOD EXPORTS IN TARGET PRODUCTS AND MARKETS: 1988-96

BY

YUFENG DUAN 

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Dr. Kevin Z. Chen (Supervisor)

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Date approved by thesis committee Sept 8, 99

ABSTRACT

This study attempts to assess the competitiveness of Alberta's agri-food exports during the period 1988-96. This information will help Alberta's agri-food industry and policy makers gain a better understanding of Alberta's competitive position against its main competitors and determine what actions should be taken to maintain and improve its competitiveness in its export markets.

In the thesis, the Constant Market Share(CMS) model is applied to assess the competitiveness of selected target products for Alberta and its main competitors in selected target markets. Three products were chosen, including beef, pork and processed grain. For beef, the United States, Japan, Mexico, South Korea, Taiwan, and Hong Kong were chosen as Alberta's target markets. For pork, three target markets – the United States, Japan and Mexico – were selected. For processed grain, the United States, Japan and South Korea were considered as its target markets.

The CMS results indicate that Alberta's exports performed well in all targeted products and markets chosen for this study during the period 1988-96. In terms of export competitiveness, Alberta was particularly strong in the U.S. beef and pork markets, and in the world beef, pork and processed grain markets. However, its export competitiveness in some other target markets – Mexico and some Asian markets was not as strong.

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CHAPTER 1
INTRODUCTION

1.1 Background

The agri-food industry in Alberta is export-oriented and a significant component of the Alberta economy. In 1996, the total export value of agri-food products in the province reached $4.9 billion, up from $2.4 billion in 1988, accounting for 16 percent of Alberta's total exports of goods (International Trade Review 1996), 38 percent of primary and processed agri-food production (12.9 billion), and 25 percent of the total agri-food exports in Canada, which amounted to $20.7 billion (Agricultural Trade Information Quarterly 1998). As such, export performance of Alberta's agri-food has important economic impacts on the viability of the Alberta economy.

In the past decade, competition among export suppliers has intensified in world markets. Such increased competition is mainly due to two factors. First, the agri-food sector in developed nations such as Australia, New Zealand, Canada, Europe, and the United States increasingly relies on export markets for growth because of their slow-growing domestic food consumption. Second, export suppliers have improved access to foreign markets for agri-food products with trade liberalization. With respect to Alberta, the signing of the two trade agreements CUSTA (Canada-U.S. Trade Agreement, 1989) and NAFTA (North American Free Trade Agreement (NAFTA, 1994) has helped Alberta to be more accessible to the largest market (the United States) as well as the fast-growing market (Mexico). At the same time, however, Alberta has met strong competition from U.S. companies. Besides the big export market in the United States, Asia is the second largest export region for the province of Alberta. A central aspect of Alberta's international export thrust has been its focus on Asia. With fluctuating Asian economies, such competition is likely to be more intensified.

To help Alberta's agri-food industry and policy makers determine what actions should be taken to maintain and improve Alberta's competitiveness in its export markets, there is a need to better understand the competitive position of Alberta's agri-food exports against its main competitors in its export markets.

1.2 Export Competitiveness

There are various definitions of competitiveness, and each of them is associated with a certain competitiveness indicator. The selection of an indicator is key to measuring the competitiveness of a nation, an industry, or a firm. In evaluating export competitiveness, researchers commonly use the change in market share as an acceptable measure of changes in an exporting region's competitiveness. The difficulties associated with explaining the cause of differences in export competitiveness among exporting regions have provided a long-standing problem for policy-makers and researchers. In the absence of analyzing both price and non-price determinants of export competitiveness, one can still analyze changes in an exporting region's market shares as *ex post* reflections of changes in export competitiveness. Although changes in market shares are not entirely determined by changes in export competitiveness, they nonetheless provide an accepted measure of changes in an exporting region's export competitiveness *vis-à-vis* the world market (Bowen and Pelzman 1984).

A market share definition of competitiveness is advanced in the Task Force on Competitiveness in the Agri-food Industry (Agriculture Canada 1990). Competitiveness is described as "the ability to profitably gain and maintain market share in the domestic and/or export market."

According to the framework for analyzing the competitiveness of the agri-food sector advocated by Policy Branch, Agriculture Canada (1993), the analysis of competitiveness can be conducted in three stages. The first stage is the general assessment of the degree of competitiveness and likely changes in competitiveness as indicated by changes in performance measures. The second stage is the identification of the determinants of competitiveness. The third stage is the analysis of policies and programs in terms of their effects on competitiveness and the development of policy options to improve competitiveness. This study focuses on the general assessment of competitiveness in the first stage.

To infer an exporting region's competitiveness from changes in its exports, the Constant Market Share (CMS) model is employed. The CMS model is a popular, simple and frequently employed technique in the studies of export performance and competitiveness. It is consistent with the market share definition of competitiveness, and

ascribes export growth to either structural or competitive forces. It is postulated that if an exporting region's competitiveness stayed at the same level, its market share would have to be constant as well. Therefore, any difference between the actual change in exports of an exporting region and the standard (usually the world trade or the sum of its market competitors) has to be caused by changes in export composition or export competitiveness. Although this model stops short of providing detailed explanations as to why the exports increased the way they actually did, it is useful in numerically splitting the past export growth into different components. In particular, the model also helps identify the areas in which to look for explanations (Banerji 1974).

1.3 Objectives

The overall objective of this thesis is to assess Alberta's competitiveness in agri-food exports in its export markets relative to its main competitors. Two specific objectives are as follows:

1) to assess Alberta's export competitiveness of target agri-food products in target markets in relation to its main competitors; and
2) to identify the areas in which factors responsible for the observed pattern of export competitiveness and performance of Alberta and its main competitors can be found.

1.4 Data

The data were obtained from two trade databases produced by the International Trade Division of Statistics Canada: the Trade Information Enquiry and Retrieval System (TIERS) and the World Trade Analyzer (WTA). TIERS is a data and software package designed to expedite the recovery and manipulation of Canadian merchandise trade information by provinces. TIERS provides provincial level trade data (both value and volume) for the period from 1988 to 1997 in Canada. The provincial export and import data in TIERS are constructed from administrative records of Canadian Customs. When goods are imported into or exported from Canada, declarations must be filled with Customs, giving such information as a description and value of the goods, the origin and port of clearance of commodities and the mode of transport. The provincial export data

are based on the origin of the commodities exported. In addition, TIERS is based on a Harmonized System (HS) and provides data from HS-2 to HS-10 digits. WTA, a replacement product for the previous World Trade Database, is constructed from the trade data that each country reported to the United Nations. The current (1998) WTA contains seventeen years (1980-96) of annual export and import values organized by countries and products. It is based on the Standard International Trade Classification (SITC) and provides data at the total and 1-4 digit SITC levels.

To analyze Alberta's competitive position relative to its main competitors, TIERS and WTA data have to be justified. Consequently, two limitations apply to this empirical investigation. First, only export values from 1988 to 1996 are drawn. Second, export values from the two sources are matchable only at a 4-digit aggregation level or higher.

1.5 Scope

The scope of the research in this thesis is dictated by three considerations – the feasibility of the CMS implementation, the availability of the data, and the priorities of Alberta agri-food exports.

In order to obtain insightful analysis of export competitiveness, this study is confined to specific products and markets. When CMS is employed to measure export competitiveness for Alberta and each of its main competitors, the combination for decomposition of the export competitiveness grows geometrically with the increase in products and markets. There is a need to limit this analysis to selected products/markets. Though it is desirable to have a longer time series to assess the competitive positions of Alberta and its main competitors, the data availability limits the study to the period from 1988 to 1996.

To determine target products and markets, this thesis mainly relies on the priorities of Alberta agri-food exports. The priorities were assessed according to three perspectives – historical export share, historical growth rate, and market potential. Alberta exports a large number of products to many markets. The top ten products from 1988 to 1996 were wheat, rape seed/canola seed, beef, barley, raw hides & skins, pork, canola oil & mustard oil, processed grain products, oil seed cake and meal, and oats. Among the top ten products, beef, pork and processed grain were selected as the target

products for this study based on the three criteria along with some consultation with Alberta Agriculture. In terms of export share, beef, pork and processed grain ranked third, sixth, and ninth in the period of 1988-96 respectively. In particular, the exports of the three products increased greatly during this period according to the average growth rates from 1988 to 1996.

After the selection of the target products, target markets were chosen for the three products based on historical export share, historical growth rate, and market potential. For beef, the United States, Japan, Mexico, South Korea, Taiwan, and Hong Kong were chosen as target markets. For pork, three target markets – the United States, Japan and Mexico – were selected. For processed grain, the United States, Japan and South Korea were considered as the target markets. The United States and Japan represent Alberta's two main markets for its exports of beef, pork and processed grain. Mexico, South Korea, Taiwan and Hong Kong represent fast-growing and potential markets for Alberta's beef exports; Mexico for Alberta's pork exports and South Korea for Alberta's processed grain exports.

1.6 Organization

The thesis is divided into six chapters. This first chapter provides background information, the concept of export competitiveness, the objectives of this study, the data sources, and the research scope. The second chapter presents an overview of Alberta's agri-food exports. In particular, the top ten products, the top ten markets and the basis for selecting target products and markets are explored. In addition, the main competitors for Alberta are identified for each target product and market. The third chapter reviews the origin and application of the CMS model and describes the simple CMS models and their further decomposition models – the traditional CMS model and Jepma's improved CMS model. The application problems of the traditional CMS model and some inherent problems associated with the CMS model are also highlighted. In the fourth chapter, the empirical model and the decomposition results based on the improved CMS model are presented, and competition in each of the target products/markets is outlined. The fifth chapter is devoted to the sensitivity analysis of the CMS results by selecting a new standard, consolidating markets, deflating all export data by Producer Price

Index/Wholesale Price Index (PPI/WPI), and using the export data in US dollars. In the final chapter, the conclusion and limitations of this study are provided, and directions for further study are briefly discussed.

CHAPTER 2

AN OVERVIEW OF ALBERTA AGRI-FOOD EXPORTS: EXPORT PATTERNS, TARGET PRODUCTS/MARKETS AND MAIN COMPETITORS

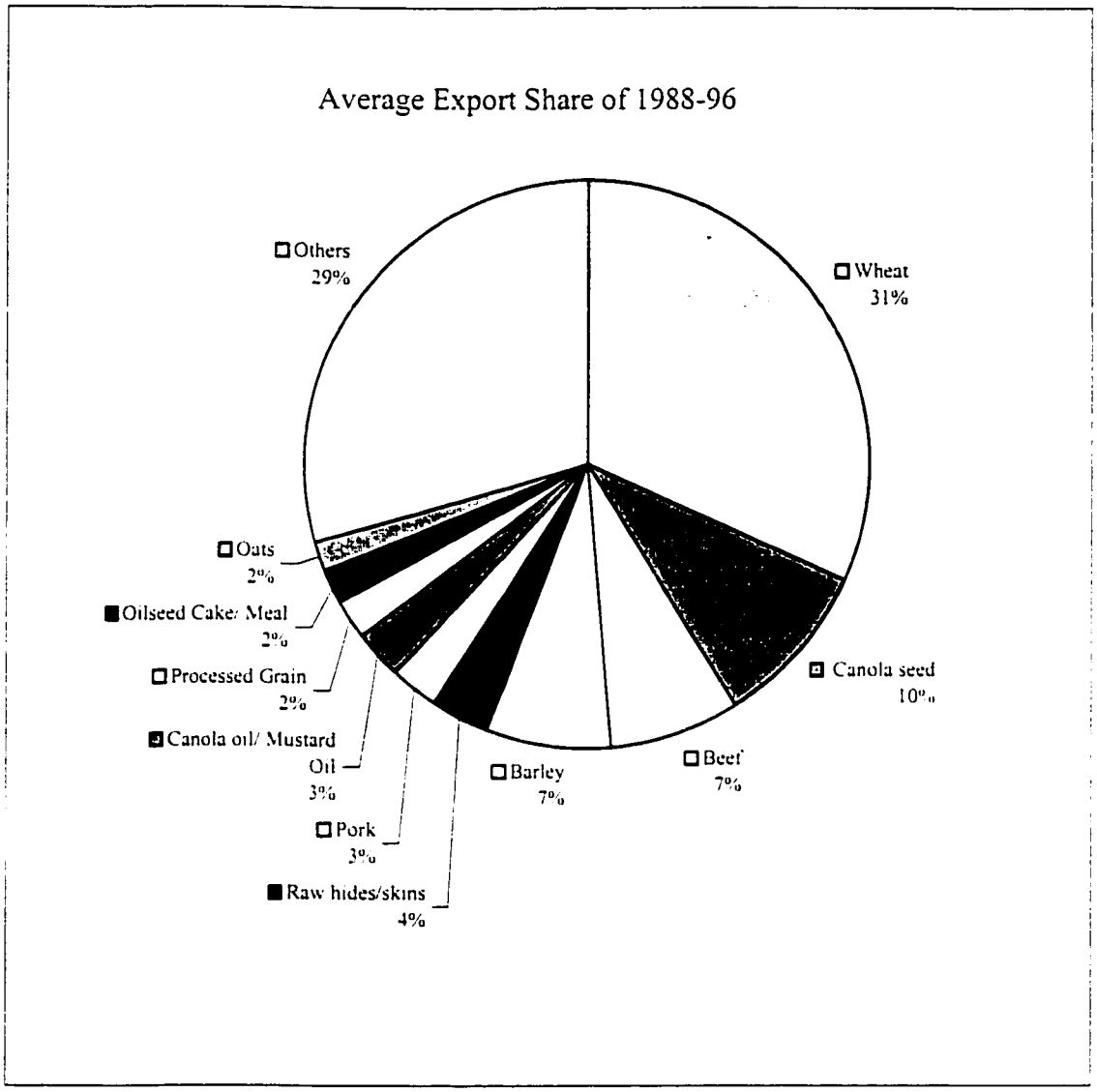
2.1 Introduction

From 1988 to 1996, Alberta exported more than fifty agri-food products to many countries around the world. Approximately 80 percent of its exports, however, went to ten countries, and 70 percent were comprised of ten products. As such, the growth of Alberta's agri-food exports depended greatly on these essential products in their essential markets in which Alberta faced various competitors. Alberta was a relatively small player in most of the essential markets, with the exception in the United States.

2.2 Patterns of Alberta's Agri-food Exports

Alberta exports a variety of products every year. The top ten products, measured by their average shares of total agri-food exports in Alberta from 1988-96 (Figure 2.1), were wheat, canola seed, beef, barley, raw hides & skins, pork, canola oil & mustard oil, processed grain, oil seed cake & meal and oats. Wheat has been the main export product in Alberta, occupying 31.6 percent of total agri-food exports. Canola seed exports accounted for 9.5 percent of total Alberta agri-food exports. Beef exports ranked third with an export share, on average, of 7.4 percent. Barley exports, ranking fourth, occupied 7.2 percent of total agri-food exports in Alberta. The export value of raw hides & skins was around $100 million (Cnd), ranking fifth in Alberta's agri-food exports in the period 1988-96. The export share of pork was 3.6 percent, ranking sixth. The average export share of canola oil & mustard oil in the period of 1988-96 was 2.7 percent, ranking seventh. The exports of processed grain, oilseed cake, and oats ranked eighth, ninth and tenth respectively. The exports of all the other products accounted for 29.3 percent in this period.

Figure 2.1: Export Composition of Alberta's Agri-food by Commodity: 1988-96



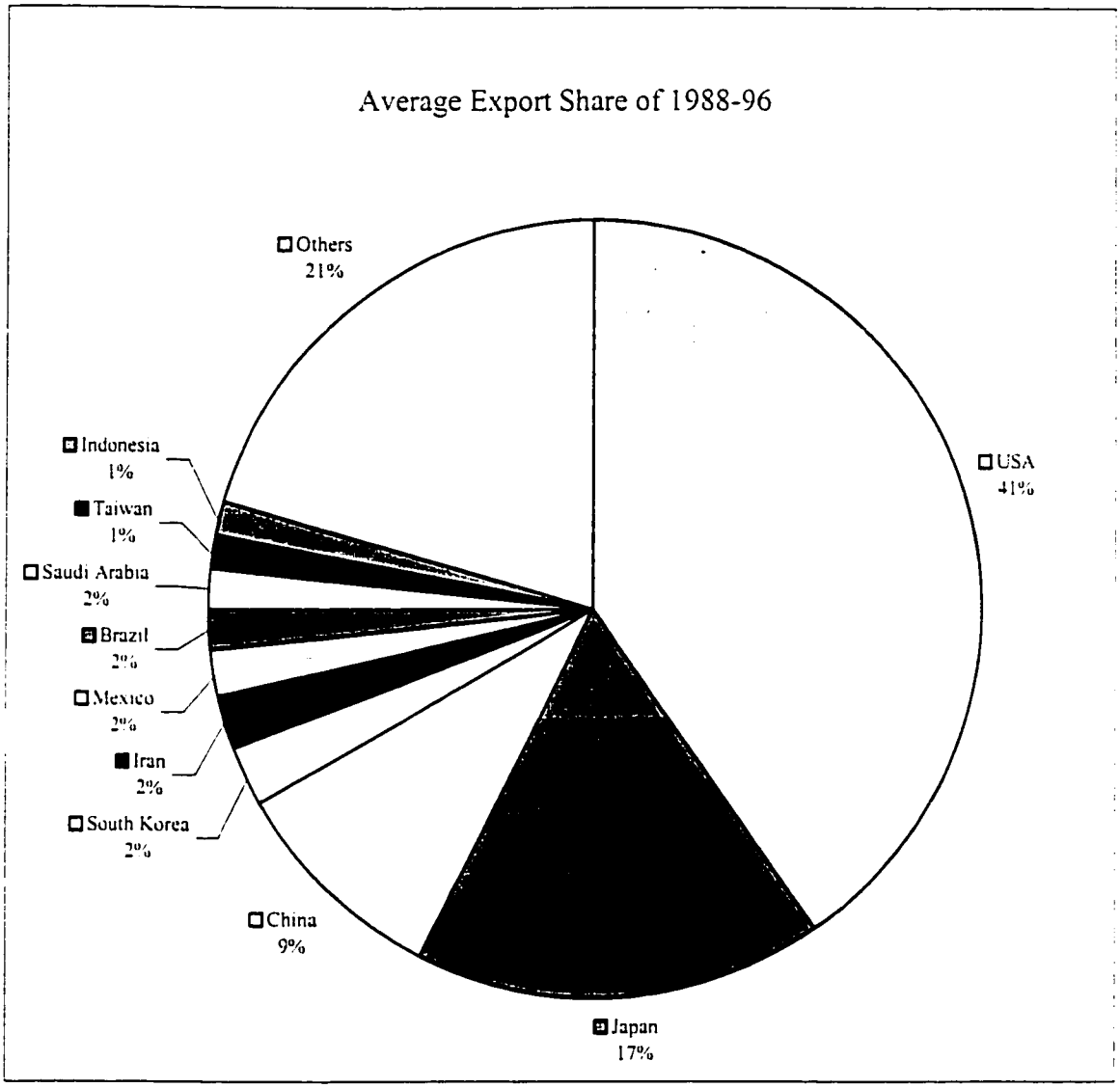
Source: Alberta's Agri-Food Exports, Statistics and Economics Branch, Alberta Agriculture, Food and Rural Development

Alberta exports its agri-food products to many countries and regions. Figure 2.2 shows the average export shares of the top ten markets for Alberta agri-food exports over the period of 1988-96. During this period, the top ten export markets were the United States, Japan, China, South Korea, Iran, Mexico, Brazil, Saudi Arabia, Taiwan and Indonesia. The United States was the largest trade partner for the Alberta agri-food industry. Of the $4.9 billion value of agri-food products exported in 1996, $2.4 billion went to the United States, accounting for 46.4 percent. Japan was Alberta's second largest market, accounting for 17.4 percent of the total agri-food exports over this period. China was Alberta's third most important market after the United States and Japan, accounting for 9.2 percent of the total Alberta agri-food exports from 1988 to 1996. These three countries (the United States, Japan and China) together occupied 66.8 percent of the total of Alberta's agri-food exports. South Korea, Alberta's fourth largest export market, imported 2.4 percent of Alberta's agri-food exports during the period 1988-96. The growth of Alberta's agri-food exports to South Korea was particularly impressive. Alberta's agricultural exports to South Korea totaled $34.7 million in 1988 and rose to $111.1 million in 1996, a net increase of $76.4 million. Iran, Mexico, Brazil, Saudi Arabia, Taiwan and Indonesia ranked fifth, sixth, seventh, eighth, ninth and tenth respectively. Exports to all other markets occupied 20.5 percent of the total of Alberta's agri-food exports over the same period.

2.3 Target Products and Markets

Approximately 70 percent of Alberta's agri-food exports were focused on ten products and 80 percent went to ten markets. The growth of Alberta's agri-food exports depended greatly on these essential products and markets. In order to acquire a more insightful analysis, this study is confined to specific products and markets. In selecting the products and markets to target, this study mainly relies on the priorities of Alberta's agri-food exports. The priorities were assessed in terms of three factors: historical export share, historical growth rate, and market potential. A product's export share, reflecting its importance in Alberta's agri-food exports, was the main consideration. The yearly average growth rate was the second consideration since the growth rates of exports may reflect new market opportunities for Alberta. Final consideration was given to a product

Figure 2.2: Export Composition of Alberta's Agri-food by Destination: 1988-96



Source: Alberta's Agri-Food Exports, Statistics and Economics Branch, Alberta Agriculture, Food and Rural Development

or market which is thought to have market potential by industry experts. Based on these criteria, target products and markets were selected.

The export share for a target product was calculated as a ratio of Alberta's export value in the target product over total Alberta's export values in agri-food products. In terms of export share, wheat and barley ranked first and third respectively. However, they were not chosen as target products for Alberta. The reason was that exports of these two products are controlled by the Canadian Wheat Board rather than by producers in Alberta. Canola seed and oil were not selected, though canola seed and oil ranked second and seventh according to the average export share from 1988 to 1996. The reason was that the WTA does not provide separate information on canola oil and seed. The rest of the products were assessed in terms of the priorities for Alberta agri-food exports by their historical export shares, historical growth rates, and market potentials. As a result, the three products – beef, pork and processed grain – were selected as target products. Table 2.1 shows their export shares and annual growth rates from 1988 to 1996.

During the period 1988-96, beef exports increased tremendously, enjoying the fastest annual growth rate among the top ten products, 26.8 percent on average. The exports of processed grain and pork rose considerably as well, with annual growth rates of 16.0 percent and 14.0 percent respectively over the same period. In terms of average export share, beef exports ranked third, with a 7.4 percent of export share; while pork and processed grain ranked sixth and eighth among total Alberta agri-food exports during 1988-96 period, composing 2.8 percent and 2.3 percent, respectively. Compared with other meats, pork was the most widely produced and consumed meat, but it was the least traded meat in the world. Its exports accounted for 2.9 percent of its production in 1995, whereas, for example, the percentage of beef was 10.5 percent worldwide. Therefore, it is thought that there is potential for increased pork trade in world markets according to a study conducted by Alberta Agriculture (1996). In particular, all these three products are value-added ones. Alberta's exports of value-added products have developed rapidly in recent years. From 1992 to 1996, export revenue from value-added products grew by 96 percent; significantly outpacing the 25 percent increase by raw commodity exports. In 1997, value-added exports accounted for 36 percent of Alberta's total agri-food exports,

up from 25 percent in 1988. It is believed that the agri-food exports in Alberta have been shifting and will continue to shift toward value-added products.

After selecting target products, it is wise to choose the target markets in order to market the selected products efficiently. The same three criteria used in selecting target products (historical export share, historical growth rate, and market potential) were followed in selecting target markets. The export share was calculated as a ratio of Alberta's export value of a target product in the target market over total Alberta's export value of the target product. In terms of beef, most Alberta beef went to the United States, a dominant importer, accounting for 92.2 percent of total beef exports in Alberta from 1988 to 1996 on average. Japan, the second largest market, imported 5.6 percent of Alberta's beef in the period 1988-96. The export shares to South Korea, Taiwan, Hong Kong and Mexico were relatively small. Nevertheless, the exports from Alberta to South Korea, Taiwan, Hong Kong and Mexico increased drastically from 1988 to 1996. Their average growth rates reached 12.7 percent, 43.7 percent, 8.2 percent and 31.3 percent respectively, implying that these four markets were fast growing ones for Alberta beef exports. In terms of market potential, Hong Kong is considered as a potential market for value-added products. Imports of value-added products are very significant in Hong Kong, accounting for more than 90 percent of total agri-food imports with an upward trend. The same goes for Taiwan and South Korea. In addition, given Hong Kong's free and open nature, the Hong Kong market is still playing an important role in re-exporting beef products to southern China. Despite their insignificant export shares for Alberta beef, South Korea, Taiwan, and Hong Kong were selected as target markets. Mexico, a fast-growing market, with the NAFTA and its geographical closeness, becomes a priority market.

With respect to pork, the United States was Alberta's largest market, taking 82.8 percent of total pork exports on average from 1988 to 1996. Japan was the fastest growing and second largest export market for Alberta's pork. The average growth rate of Alberta's pork exports to Japan was 36.5 percent during this period. In terms of export share, Japan accounted for 1.7 percent in 1988 and reached as high as 15.5 percent in 1996. Mexico has been a fast-growing market, with an 8.9 increase between 1988 and

Table 2.1 Shares and Growth Rates of Alberta's Beef, Pork, and Processed Grain Exports: 1988-96

Market	Export Share									Annual Average Export Share (1988-96)	Annual Average Growth Rate of Export Value (1988-96)
	1988	1989	1990	1991	1992	1993	1994	1995	1996		
Beef											
The United States	88.76	70.68	85.75	89.01	94.31	96.79	94.84	90.91	94.43	92.2	27.6
Japan	9.64	13.10	11.20	9.68	5.24	2.70	4.14	6.85	0.14	5.6	14.4
South Korea	0.90	15.63	2.73	0.20	0.23	0.03	0.05	0.88	3.75	1.4	12.7
Mexico	0.01	0.07	0.00	0.00	0.00	0.07	0.05	0.09	0.90	0.1	31.3
Hong Kong	0.42	0.11	0.10	0.56	0.02	0.23	0.49	0.14	0.33	0.2	8.2
Taiwan	0.01	0.09	0.02	0.51	0.06	0.09	0.32	0.97	0.05	0.4	43.7
Others	0.27	0.32	0.20	0.04	0.13	0.09	0.11	0.16	0.41	0.2	27.2
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	26.8
Pork											
The United States	97.55	95.07	96.93	92.97	76.84	77.01	72.97	76.40	78.89	82.8	11.1
Japan	1.72	2.30	1.07	5.71	18.66	20.05	24.09	19.97	15.49	13.9	36.5
Mexico	0.25	1.77	1.47	0.45	2.12	2.67	1.84	0.38	0.24	1.2	8.9
Others	0.48	0.86	0.52	0.87	2.39	0.27	1.11	3.25	5.38	2.1	23.1
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	14.0
Processed Grain											
The United States	11.93	8.73	3.84	5.68	7.55	20.91	32.35	26.33	27.56	18.7	29.7
Japan	77.56	76.74	76.79	70.06	72.84	69.20	41.39	44.08	41.32	58.6	7.8
South Korea	0.00	0.00	0.28	0.11	2.61	1.86	7.22	9.23	1.98	3.1	49.2
Others	10.52	14.54	19.09	24.14	16.99	8.02	19.04	20.36	29.14	19.6	26.7
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	16.0

Sources: Trade Information Enquiry and Retrieval system (TIERS), Statistics Canada

Notes: The growth rate is calculated by the formula $\frac{(E_1 - E_0)}{(E_1 + E_0)/2} \cdot 100\%$, where E_0 and E_1 represent the exports in the initial year and the terminal year, , respectively.

1996, although the share of Alberta pork exports to Mexico was small, 1.2 percent on average. With the NAFTA and its geographical closeness, Mexico was considered as a potential market for Alberta's pork exports.

As for processed grain, Japan was Alberta's largest export market from 1988-96. Alberta exported 58.6 percent of its processed grain to Japan yearly, on average, though the export share was in decline from 77.6 percent in 1988 to 41.3 percent in 1996. The United States was Alberta's second largest export market for processed grain, with an upward trend varying from 11.9 percent in 1988 to 27.6 percent in 1996. South Korea, the niche market for Alberta, started to import processed grain from Alberta with a small share in 1990, 0.3 percent. However, the processed grain exports from Alberta to South Korea increased greatly and enjoyed the fastest growth rate of 49.2 percent yearly from 1988-96.

2.4 Main Competitors in Target Products and Markets

Alberta faces various competitors with respect to different target products and markets. To understand the competition in each marketplace, it is important to identify the main competitors for Alberta in target products/markets. To do so, the study relies on average market shares of the main exporting regions in the period 1988-96. The market share was calculated as a ratio of an exporting region's export value in a target product over the total export value of a target product from all sources to the target market. All other provinces in Canada were lumped together in order to compare Alberta's competitive position to that of the rest of Canada (ROC).[1] Table 2.2 shows the main competitors and their market shares in target markets of beef, pork, and processed grain.

2.4.1 Main Competitors in Target Beef Markets

The United States, Japan, Mexico, South Korea, Hong Kong and Taiwan were regarded as the target markets for Alberta beef exports. Appendix 2 presents the export values and market shares of main export suppliers in each of these target beef markets from 1988-96.

[1] The ROC's export value in Alberta's target products and markets are derived as a difference between Canadian and Alberta export values.

The U.S. Beef Market

From 1988 to 1996, the United States was the second largest beef importer after Japan according to the yearly average import value in the world from 1988 to 1996. The main players in the U.S. beef market were Australia, New Zealand, South & Central America, Alberta and the ROC.

The market shares of Australia and New Zealand, on average, were 41.9 percent and 28.8 percent during the period 1988-96 respectively. However, the market shares of both Australia and New Zealand showed a declining trend from 1988 to 1996. The market shares of Alberta and the ROC went up steadily. In particular, Alberta enjoyed a great increase, from 2.4 percent in 1988 to 26.2 percent in 1996 and has become one of the main players in the U.S. market. The export share of South & Central America was stable, around 10 percent, except in 1992.

The Japanese Beef Market

In the Japanese beef market, the primary suppliers were Australia and the United States. They accounted for 38.7 percent and 57.2 percent of the Japanese beef imports in this period respectively. In particular, their market shares in the Japanese beef market were stable for the period under study.

New Zealand had increased its volume of beef exports to Japan quite considerably but remained a small supplier compared with the United States and Australia. In 1995, New Zealand's market share was approximately 3.8 percent (Chade and Mori). Therefore, New Zealand was not chosen as a main supplier in this study. The market shares of both Alberta and the ROC were 0.4 percent during the same period. Up to 1996, Alberta and the ROC were still small players in the Japanese beef market. The ROC's market share was more volatile than that of Alberta.

The Mexican Beef Market

The main suppliers in this market were the United States, Europe, South & Central America, Alberta and the ROC.

The average market share of the United States was 79.7 percent. Introduced in January 1994, the NAFTA significantly reduced trade barriers on beef in the United

States, Canada and Mexico. As a result, the United States has increased its market shares substantially and become a dominant beef supplier to Mexico since 1994.

Europe, on average, enjoyed 6.9 percent of the Mexican beef imports during the nine years; however, its market share had decreased greatly after 1994 and dropped to zero in 1996. The market share of South & Central America fluctuated enormously, and its market share in 1990 reached as high as 21.8 percent, but dropped to 0.03 percent in 1996.

Both Alberta and the ROC exported a small percentage of beef to Mexico, averaging 0.1 percent and 0.2 percent respectively from 1988-96. In particular, Alberta participated in the Mexican market sporadically. For example, Alberta did not export any beef to Mexico in the years of 1990, 1991, and 1992. Up to 1996, Alberta and the ROC were relatively small exporters in the Mexican beef market.

The South Korean Beef Market

In the South Korean beef market, the identified exporting regions were Australia, New Zealand, the United States, Alberta and the ROC. The United States, a main exporter, accounted for 53.4 percent of beef imports in South Korea between 1988 and 1996. Australia and New Zealand ranked second and third. Alberta and the ROC accounted for only 0.7 percent and 0.6 percent of South Korean beef imports in this period. Until 1996, Alberta and the ROC were small exporters to South Korea. However, an exception is that Alberta occupied about 6.5 percent of South Korean beef imports in 1989.

The Taiwanese Beef Market

In the Taiwanese beef market, the main suppliers were Australia, New Zealand, the United States, Alberta and the ROC. Taiwan imported more than half of its beef from Australia, one quarter from New Zealand, 19.2 percent from the United States, 0.4 percent from Alberta and 0.3 percent from the ROC. Up to 1996, Alberta and the ROC were relatively small suppliers to Taiwan.

Table 2.2 Main Competitors and Their Average Market Shares in Target Products and Markets*

Target Market	Beef	Pork	Processed Grain
The United States	Australia (42%) New Zealand (29%) South & Central America(10%) Alberta (10%) The Rest of Canada (9%)	The Rest of Canada (60%) Denmark (23%) Alberta (12%).	Europe (36%) The Rest of Canada (36%) Asia (17%) South & Central America (10%) Alberta (1%).
Japan	The United States (57%) Australia (39%) Alberta (.42%) The Rest of Canada (.36%)	Taiwan (45%) Denmark (28%) The United States (16%) The Rest of Canada 5%) Alberta (.4%)	Europe (38%) Asia (27%) Oceania (12%) The United States (11%) The Rest of Canada (6%) Alberta (6%)
Mexico	The United States (80%) South & Central America (10%) Europe (7%) The Rest of Canada (.15%) Alberta (.05)	The United States (70%) Europe (13%) The Rest of Canada (16%) Alberta (1%)	N/A
South Korea	The United States (53%) Australia (37%) New Zealand (8%) Alberta (.7%) The Rest of Canada (.6%)	N/A	Europe (36%) Asia (26%) The United States(17%) Oceania (9%) The Rest of Canada (7%) Alberta (3%)
Hong Kong	Oceania (32%) South & Central America (24%) The United States (22%) China (13%) Alberta (.4%%) The Rest of Canada (.3%)	N/A	N/A
Taiwan	Australia (54%) New Zealand (25%) The United States (19%) Alberta (.4%) The Rest of Canada (.3%)	N/A	N/A

*Average market share of each competitor from 1988-96 in target markets is in parentheses. The market share was calculated as a ratio of an exporting region's export value in a target product over the total export value of the target product from all sources to the target market.

The Hong Kong Beef Market

In Hong Kong, beef imports were not so concentrated on a few sources as in the other target markets. The main suppliers were Oceania, South & Central America, the United States, China, Alberta and the ROC.

Oceania was the largest supplier to Hong Kong, averaging 32.3 percent. South & Central America was the second largest supplier, with a 24.2 percent market share. The United States ranked third. Its market share, however, grew quickly, from 12.7 percent in 1988 to 41.2 percent in 1996. China was the fourth largest supplier in the Hong Kong beef market during this nine-year period, accounting for 13.4 percent of Hong Kong's total beef imports. Alberta and the ROC accounted for only 0.4 percent and 0.3 percent respectively and were small suppliers in the Hong Kong beef market.

2.4.2 Main Competitors in Target Pork Markets

The target markets for Alberta pork exports were the United States, Japan and Mexico. Appendix 3 shows the export values and market shares of main export suppliers in each of the three target pork markets from 1988-96.

The U.S. Pork Market

In the pork import market of the United States, the main competitors for Alberta were the ROC and Denmark. The ROC accounted for about 60.2 percent of the total pork imports in the United States during 1988-96. The market share of Denmark was stable at approximately 20 percent over the period 1988-96. Alberta showed an increase in its pork exports to the United States. Its market share increased from 6.9 percent in 1988 to 16 percent in 1996, with an average market share of 11.6 percent over the period of 1988-96.

The Japanese Pork Market

The main pork suppliers to Japan were Taiwan, Denmark and the United States, Alberta and the ROC. Taiwan was the largest supplier to Japan, with an average market share of 44.9 percent between 1988 and 1996. Denmark was the second largest exporter to Japan, enjoying a 27.9 percent market share in this period. The United States and the ROC ranked third and fourth with 15.6 percent and 5.1 percent of market shares during

the same period. Alberta accounted for only 0.4 percent in the Japanese pork market, with an upward trend. Up to 1996, Alberta was still a small supplier to Japan.

The Mexican Pork Market

The main competitors in the Mexican pork market for Alberta were the United States, Europe, and the ROC.

The United States was the dominant exporter to the Mexican pork market, and its average market share in this period was 70.3 percent, showing an upward trend from 51.9 percent in 1988 to 97.6 percent in 1996. The ROC was the second largest exporter to Mexico, averaging 15.8 percent with a tremendous fluctuation. Europe was the third exporter; its market share, however, decreased from 42.9 percent in 1988 to 0.7 percent in 1996. Alberta occupied a relatively small market share, on average, 1.1 percent.

2.4.3 Main Competitors in Target Processed Grain Markets

The target markets for processed grain were the United States, Japan and South Korea. In these import markets, imports of processed grain were from a great variety of countries and regions, rather than a few countries and regions. Appendix 4 indicates the export values and market shares of main export suppliers in the three target processed grain markets.

The U.S. Processed Grain Market

In the U.S. processed grain import market, the main players were Europe, the ROC, Asia, South & Central America, and Alberta.

Europe enjoyed the largest market share, on average accounting for 35.9 percent during the nine-year period. However, it showed a decreasing trend in the period, from 40.7 percent in 1988 to 31.1 percent in 1996. The ROC accounted for almost the same market share as Europe did. Nevertheless, its market share increased from 33.6 percent in 1988 to 40.6 percent in 1996. Asia ranked third, its market shares ranging from 14 to 20 percent. South & Central America was the fourth exporter to the United States, averaging 9.5 percent, and its market share exhibited a steady increase for the period

under study. Alberta's market share was about 1.1 percent, with a relatively large fluctuation during the period.

The Japanese Processed Grain Market

The main competitors in the Japanese processed grain import market were Europe, Asia, Oceania, the United States, the ROC and Alberta.

Europe was the largest supplier, with a market share of 38.3 percent during the nine-year period, showing a small decrease in recent years. Asia was the second largest exporter, with an upward trend. Oceania ranked third in the Japanese import market; however, its exports demonstrated a declining trend. The United States ranked fourth in the Japanese processed grain import market, with a great fluctuation. The average market shares of Alberta and the ROC were almost the same, averaging 5.4 percent and 5.8 percent respectively during this period.

The South Korean Processed Grain Market

In the South Korean processed grain market, the main players were the United States, Asia, Europe, Oceania, the ROC and Alberta.

Europe was the largest exporter, accounting for 35.4 percent of total imports in South Korea. Asia ranked second, averaging 25.5 percent. The United States was the third largest exporter to South Korea, with a market share of 17.2 percent. Oceania ranked fourth, enjoying a market share of 9.3 percent. The ROC was the fifth competitor, with great fluctuations. With respect to Alberta, South Korea started to import processed grain from the province beginning in 1990, and its market shares in South Korea went up rapidly in 1994 and 1995. However, Alberta's market share dropped to 1.6 percent in 1996.

In the three target processed grain markets, Europe was the largest exporter of processed grain. Asia, the United States, Oceania and the ROC were also main players in the three target markets.

CHAPTER 3

CONSTANT MARKET SHARE MODEL(CMS) AND ITS EXTENSIONS

3.1 Introduction

Chapter 3 is organized as follows. First, the origin and applications of the CMS model are reviewed. Second, the simple CMS models and the traditional CMS model are introduced. Third, the application problems of the traditional CMS model are identified. Fourth, Jepma's improved CMS model is presented. Finally, some inherent problems associated with the CMS model are discussed.

3.2 Origin and Applications of the CMS Model

CMS analysis was originally called shift-share analysis. Creamer (1942) was the first to formally apply this method to an economic problem, namely industrial location and regional shifts of manufacturing industries. His analysis provides the basis for all the studies using the shift-share or the CMS technique (Schissel 1988).

When applying Creamer's technique to the study of regional economic growth, researchers divide the regional growth variables (such as income, employment, and output) into three components: national growth rate, compositional mix, and competitive position. Their analysis starts by identifying an aggregate national growth rate of a national variable and asserts that all regions and sectors should have at least this much growth. The difference between the regional growth rate and a national growth rate for a particular variable represents a net gain or loss (or "shift") to the region. The shift can be caused by the compositional mix and/or the competitive position. The compositional mix of a region occurs when the region has a favorable distribution of fast growing industries; i.e. the national growth rates of these industries are higher than the aggregate national growth rate. Finally, the growth in competitive position occurs when the industries of the region are growing faster than those same industries at the national level (Houston 1967).

Tyszynski (1951) was the first to apply this approach to the analysis of export growth. He indicated that a country's share of world trade may decline for one or a combination of two reasons: 1) its share of trade in each group of commodities may remain the same, but the relative importance of the groups may alter; or 2) its share of the

individual groups may decline. The former is a change in the structure of world trade, and the latter is referred to as a change in a country's competitiveness. In order to isolate these two causes, it is assumed that countries continue to maintain their initial market shares (or their initial competitive position) in Year *II*, which is called the hypothetical share in Year *II*. The difference between the hypothetical share in Year *II* and the actual share in Year *I* is attributed to the change in the structure of world trade. And the difference between the hypothetical share and the actual or observed share in Year *II* is attributed to the country's competitiveness.

Since the 1950's, CMS analysis has been extensively used in assessing export performance and competitiveness. Banerji (1974) used the CMS model to analyze the export performance of less developed countries. He indicated that most studies use the average growth of world exports as the standard of reference (norm) for judging a country's past export performance. For the purpose of comparative analysis, it may, however, appear to be more reasonable to use some unbiased norm - for example, the export performance of a country which showed the highest rate of growth in exports in the past. He also stressed that the norm is not appropriate in cases in which the countries being examined exert a heavy weight on the average. In addition, Banerji used not only the absolute values but also the percentage changes to analyze the CMS results.

Bowen and Pelzman (1984) applied CMS to the study of manufactures' export competitiveness in the United States for the period of 1962-77. One of their analytical efforts was to conduct sensitivity analysis in terms of the choice of base year, the level of commodity aggregation, and the definition of the world market. The results of the sensitivity tests showed that the CMS estimates were not severely affected by commodity aggregation, but were very sensitive to both changes in the base year and definition of the world market.

Agarwal (1988) applied the CMS model to a comparative analysis of India's export performance. Compared with other studies, Agarwal's introduced a different formula that decomposed the proportionate change in market shares into three components – the market penetration effect, the market growth effect and the residual. Its usefulness lies in the fact that it permits further analysis of market penetration and market growth terms.

Lloyd and Toguchi (1996) used CMS to analyze East Asian export competitiveness. The major characteristic of their study was that they chose the growth rate of total consumption as the standard for CMS rather than the import share used in previous studies. Lloyd and Toguchi stressed that import shares do not represent true market shares. The true market share is of concern to both the exporting and the importing countries and should include the domestic supplies as well as the imports in all countries. The advantage of using the consumption as standard is that it takes demand factors into consideration.

The above-mentioned studies all employed the traditional CMS method. There are some application problems for the traditional CMS decomposition. To provide more insightful information as well as to overcome some existing application problems, Jepma (1986) proposed an improved CMS model. Ahmadi-Esfahani and Jensen (1994) applied the improved CMS model to study the Chinese wheat market, and Ahmadi-Esfahani (1995) applied it to the Japanese wheat market to analyze the influences of import quotas on each exporter's share. These two studies have adopted a one commodity/market model, which is derived from Jepma's improved multiple commodities/markets model. The one commodity/market model is able to provide specific information as well as avoid the aggregation problem.

3.3 The Simple CMS Model

Assuming all exports are a single commodity, the market share of an exporting region in a given market may be described as:

$$s = \frac{q}{Q} \text{ or } q = s * Q \tag{3.1}$$

where s is the market share of the exporting region, q is the exporting region's exports, and Q is the exports of the standard (here, this is world trade). Differentiation with respect to time, equation 3.1, is converted into:

$$\Delta q = s\Delta Q + Q\Delta s \tag{3.2}$$

where Δ represents the change per period in the variable. When equation 3.2 is applied at discrete intervals, it can be re-written as the following forms:

$$\Delta q = \underset{\text{Structural Effect}}{s^0 \Delta Q} + \underset{\text{Residual Effect}}{Q^1 \Delta s} \tag{3.3}$$

$$\Delta q = \underset{\text{Structural Effect}}{s^1 \Delta Q} + \underset{\text{Residual Effect}}{Q^0 \Delta s} \tag{3.4}$$

where superscript *0* and *1* represent the beginning and the end of the discrete period respectively. Since $s^1 = s^0 + \Delta s$, equation 3.4 can be rewritten as:

$$\Delta q = \underset{\text{Structural Effect}}{s^0 \Delta Q} + \underset{\text{Residua Effect}}{Q^0 \Delta s} + \underset{\text{Second-order Effect}}{\Delta s \Delta Q} \tag{3.5}$$

Equation 3.3, 3.4 and 3.5 represent the simple CMS models. A third component, known as the second-order effect, is established in equation 3.5. In the past applications that were based on equations 3.3 and 3.4, the second-order effects were not separated from the other two effects. Instead, they were incorporated into either of the first two components.

According to equation 3.5, the change of an exporting region's exports is decomposed into three parts:

(1) Structural effect: the change in exports due to the change in exports of the standard, indicating what the exporting region's export growth would have been, assuming it had maintained its market share.

(2) Residual effect: the change in exports due to the change in the exporting region's competitiveness. It shows the ability or inability of an exporting region to maintain its market share of each commodity in each market. A positive sign implies the improved position of exports in terms of competitiveness. A negative sign means that the exporting region lacks competitiveness.

(3) Second-order effect: the change in exports due to the interaction of the change in an exporting region's competitiveness with the change in exports of the standard.

The simple CMS models presented above, however, do not indicate what the influence of the exporting region's export structure on its export performance is. To allow for the effect of the interplay of export structure and changes in the pattern of world exports on the exporting region's export performance, the exporting region's exports have to be disaggregated. This involves splitting the total exports of the exporting region by commodity and destination. As such $q = \sum_i \sum_j q_{ij}$, in which q_{ij} is the exports of the exporting region of commodity i to the destination j. Similarly, $Q = \sum_i \sum_j Q_{ij}$, where Q_{ij} is the exports of the standard of commodity i to destination j; $s_{ij} = \frac{q_{ij}}{Q_{ij}}$, where s_{ij} is the market share of the exporting region for commodity i in market j; The simple CMS models, equation 3.3, 3.4, and 3.5, then become:

$$\Delta q = \sum_i \sum_j s_{ij}^0 \Delta Q_{ij} + \sum_i \sum_j Q_{ij}^1 \Delta s_{ij} \tag{3.6}$$

$$\Delta q = \sum_i \sum_j s_{ij}^1 \Delta Q_{ij} + \sum_i \sum_j Q_{ij}^0 \Delta s_{ij} \tag{3.7}$$

$$\Delta q = \sum_i \sum_j s_{ij}^0 \Delta Q_{ij} + \sum_i \sum_j Q_{ij}^0 \Delta s_{ij} + \sum_i \sum_j \Delta s_{ij} \Delta Q_{ij} \tag{3.8}$$

Based on these simple CMS models, more complicated CMS models can be derived. The traditional CMS model is obtained from equation 3.6 or 3.7, and Jepma's improved CMS model is derived from equation 3.8.

3.4 The Traditional CMS Model – Further Decomposition of the Simple CMS Model

It is interesting to further specify the influence of the exporting region's export structure on the change of total exports of the exporting region. Based on the simple CMS model 3.6 (or 3.7), the traditional CMS model, a more complicated model can be derived:

$$\Delta q = \underbrace{s^0 \Delta Q}_{\text{Growth Effect}} + \underbrace{(\sum_i s_i^0 \Delta Q_i - s^0 \Delta Q)}_{\text{Commodity Commoposition Effect}} + \underbrace{(\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_i s_i^0 \Delta Q_i)}_{\text{Market Distribution Effect}} + \underbrace{\sum_i \sum_j Q_{ij}^1 \Delta s_{ij}}_{\text{Residual Effect}} \quad (3.9)$$

where Q is world total exports, Q_i is world exports for commodity i, Q_{ij} represents world exports of commodity i to market j, q is the exports of the exporting region to the world; s represents the market share of the exporting region in the world market in aggregation; s_i is the market share of the exporting region for commodity i in the world market; and s_{ij} represents the market share of the exporting region for commodity i in market j.

Expansion of equation 3.6 or 3.7 yields two additional terms that measure the commodity composition effect and market distribution effect. That is, total change in exports is attributed to the growth effect, the commodity composition effect, the market distribution effect and the residual effect (or the competitiveness effect).

3.5 Application Problems of the Traditional CMS Model

Some researchers, such as Richardson (1971b) and Jempa (1986), pointed out that traditional decomposition, although still commonly used, has some application problems. The main problems include the order problem, the choice of standard, the index problem and the aggregation problem.

3.5.1 The Order Problem

The order problem is caused by the fact that the commodity composition and the market distribution effects are defined asymmetrically. That is, the size of the commodity composition and the market distribution effects is influenced by the order of their specification (Jempa 1986). Equations 3.10 and 3.11 show the differences resulted from the order of the computation for the two effects. In equation 3.10, the commodity composition effect has been computed before the computation of the market distribution effect, whereas the market distribution effect has been calculated before the computation of the commodity composition effect in equation 3.11. A change in the sequence of the

calculation would modify the values of the individual commodity composition and the market distribution effects.

$$\Delta q = \underbrace{s^0 \Delta Q}_{\text{Growth Effect}} + \underbrace{(\sum_i s_i^0 \Delta Q_i - s^0 \Delta Q)}_{\text{Commodity Composition Effect}} + \underbrace{(\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_i s_i^0 \Delta Q_i)}_{\text{Mraket Distribution Effect}} + \underbrace{\sum_i \sum_j Q_{ij}^1 \Delta s_{ij}}_{\text{Residual Effect}} \quad (3.10)$$

$$\Delta q = \underbrace{s^0 \Delta Q}_{\text{Growth Effect}} + \underbrace{(\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_i s_i^0 \Delta Q_i)}_{\text{Market Distribution Effect}} + \underbrace{(\sum_i s_i^0 \Delta Q_i - s^0 \Delta Q)}_{\text{Commodity Composition Effect}} + \underbrace{\sum_i \sum_j Q_{ij}^1 \Delta s_{ij}}_{\text{Residual Effect}} \quad (3.11)$$

It should be indicated that the magnitude of the residual effect is, nevertheless, invariant in either method of calculation since the sum of the commodity composition and market distribution effects does not change as the order of calculation is changed.

3.5.2 The Choice of Standard

It is important to define an appropriate standard in the analysis of CMS. A different standard, world, or sum of competitors, etc. will cause CMS effects to vary. In principle, the appropriate "world" (i.e., the area to which the denominator of a market share refers) should include only those true competitors. Thus, it should vary from one exporting region to another, and perhaps from one market to another (Richardson 1971b). However, most CMS studies have chosen world trade as the standard, the argument for this choice being that a comparison can be made among different exporting regions only when a uniform world standard is employed. So far, few studies have used a different standard from that of the world.

3.5.3 The Index Problem

The CMS analysis must be performed over a discrete period. It might be written in several ways over a discrete period, including equations 3.3, 3.4, 3.5 and 3.12.

$$\Delta q = \left[\alpha s^0 + (1-\alpha) s^1\right] \Delta Q + \left[(1-\alpha) Q^0 + \alpha Q^1\right] \Delta s \quad (3.12)$$

where 0<a<1. All the four equations above are identities. The difference among them arises from the different "weights" which are applied to the change in world exports (ΔQ) and the change in the exporting region's market shares (Δs).

In fact, none of the four identities has a priority over any other. The problem is that over the period under consideration, both an exporting region's export structure and world exports are continuously changing. Most previous CMS studies have applied the identity of 3.3 (Richardson 1971b). Some studies use both s^0 and Q^0 as the weights for "consistency."

Previous sensitivity analyses (e.g. Richardson 1971b, Bowen and Pelzman 1984) showed that the CMS results vary with the change in the beginning year and the terminal year. To deal with the index problem, Kapur (1991) used compound growth rates and three-year averages as weights. Jepma (1986) suggested carrying out the decomposition yearly so that the end of the period in one decomposition becomes the beginning of the next period, and the average is then taken from them. In this way, the year chosen as the start of the overall period does not dominate the results.

3.5.4 The Aggregation Problem

CMS effects will vary with the level of commodity aggregation and the degree of market consolidation. Most previous studies have been conducted at a more aggregated level, and only some of them are at a more disaggregated level. For example, Jensen and Ahmadi-Esfahani (1994) and Ahmadi-Esfahani (1995) applied the Jepma's CMS model to a single commodity in one market; consequently, the problem is overcome.

3.6 Jepma's Improved CMS Model

To overcome some of these problems, Jepma (1986) developed an improved version of the CMS model, which is based on the simple CMS model in equation 3.8. Assuming an exporting region exports *n* commodities to *m* destinations, and choosing the world as a standard, Jepma's final decomposition of an exporting region's total change in its exports of agri-food products, Δq, is:

$$
\begin{aligned}
\Delta q = & \underbrace{s^0 \Delta Q}_{\text{Growth Effect}} + \underbrace{(\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_i s_i^0 \Delta Q_i)}_{\text{Market Distribution Effect}} + \underbrace{(\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_j s_j^0 \Delta Q_j)}_{\text{Commodity Composition Effect}} \\
& + \underbrace{\left[\left(\sum_i s_i^0 \Delta Q_i - s^0 \Delta Q\right) - \left(\sum_i \sum_j s_{ij}^0 \Delta Q_{ij} - \sum_j s_j^0 \Delta Q_j\right)\right]}_{\text{Structural Interaction Effect}} + \underbrace{\Delta s Q^0}_{\text{Pure Residual}} \\
& + \underbrace{\left(\sum_i \sum_j \Delta s_{ij} Q_{ij}^0 - \Delta s Q^0\right)}_{\text{Static Structural Residual}} + \underbrace{(Q^1 / Q^0 - 1) \sum_i \sum_j \Delta s_{ij} \Delta Q_{ij}^0}_{\text{Pure Second-order Effect}} \\
& + \underbrace{\left[\sum_i \sum_j \Delta s_{ij} \Delta Q_{ij} - (Q^1 / Q^0 - 1) \sum_i \sum_j \Delta s_{ij} Q_{ij}^0\right]}_{\text{Dynamic Structural Residual}}
\end{aligned}
\tag{3.13}
$$

With the improved CMS model, the structural effect in the simple CMS model is further decomposed into the growth effect, the market distribution effect, the commodity composition effect, and the structural interaction effect; the residual effect is split into the pure residual and the static structural residual; and the second-order effect is divided into the pure second-order effect and the dynamic structural residual. The interpretations for these eight decomposition items are provided below.

(1) Growth effect: the change in exports due to an increase in the level of world exports, given that the exporting region's competitiveness and export structure are unchanged. The magnitude of the growth effect shows the potential increase in the exporting region's exports if it maintains its share of world exports (Roy 1991).

(2) Market distribution effect: the change in exports due to the market distribution effect, reflecting the extent of the concentration of exports in the fast-growing (slow-growing) markets that are relevant to that of the 'norm.' It is the weighted sum of the different export commodities going to each market. The weights are the deviations of the growth of a particular market for a particular commodity from the world average or a 'norm.' A positive value indicates that the exporting region has concentrated its exports on faster-growing markets than the world market; whereas a negative value indicates that the exporting region has concentrated its exports on slower-growing markets than the world market. The market distribution effect indicates the efficiency of trade policies and income growth of the import-markets (Biswas 1982).

(3) Commodity composition effect: the change in exports due to the commodity composition effect, given that the exporting region's competitiveness is unchanged. It captures the effect of the differential export growth of commodities. The magnitude of

this term shows that the effect of the commodity-mix of the exporting region differs from that of the 'norm.' It is the weighted sum of the exports of different commodities. The weights are the deviations of the growth rates of individual commodity exports from the growth rate of the standard, which is usually world exports. A positive value demonstrates that the exporting region has concentrated its exports on commodities that are growing in demand at a faster rate than the average rate of other commodities in the world; while a negative value indicates that the exporting region has concentrated its exports on commodities that are growing at a slower rate than the average rate of other commodities in the world. The commodity composition effect shows the nature of the factor endowment of the exporting region and "the income and price elasticities for the products in which it specializes" (Biswas1982).

(4) Structural interaction effect: the change in exports due to the interaction of the specific commodity composition and the market distribution effects of the exporting region, given that the exporting region's competitiveness is unchanged.

(5) Pure residual: the change in exports due to the change in an exporting region's market share in the world given that the exporting region's export structure is unchanged.

(6) Static structural residual: the change in exports due to changes in the exporting region's export structure, given an unchanged pattern of the world's exports or demand. A positive value indicates that the change in the exporting region's export structure has a favorable impact on its export performance; a negative value indicates otherwise.

(7) Pure second-order effect: the change in exports due to the interaction of the changes in the exporting region's exports with the changes in the level of world exports or demand, given that the world's export structure or demand patterns are unchanged. A positive value indicates that the changes in the exporting region's export structure are adaptable to changes in the level of the world's exports or demand; a negative value indicates otherwise.

(8) Dynamic structural residual: the change in exports due to the interaction of changes in the exporting region's export structure with changes in the world's export structure or demand patterns. A positive value indicates that the exporting region has a rapidly growing share in markets (commodities) to which the world's exports are growing relatively rapidly; a negative value indicates otherwise.

Compared with the traditional CMS model, the major advantage of the improved CMS model is that the extended components provide insightful and specific information pertaining to export performance and competitiveness. In addition, the improved CMS model has also solved some application problems, including the order problem and index problem.

3.7 Problems Associated with the CMS Model

As noted earlier, the CMS model has been widely used in studies of export performance and competitiveness. Previous studies have already exhibited its usefulness in identifying the competitive position of an exporting region and splitting export change into various components. However, some researchers have realized that the CMS model has some inherent theoretical deficiencies.

First, the model treats export flows independently from one another. That is, the export of commodity *i* is considered independent from the export of commodity *j* in one country, or exports of the same commodity in different countries are supposed to be independent. However, in reality they are related to each other.

Second, this model lacks the ability of prediction since it is based on identities instead of behavioral relations, which are indispensable for prediction. In other words, it has no probability basis and therefore cannot be used to make valid probability statements about demand parameters or about future events (Leamer 1970). Consequently, the model helps to identify the areas in which the explanations should be looked for and is useful in numerically splitting the past export growth into its different components, but it stops far short of providing any explanations as to why exports increased in the way they actually did (Banerji 1974).

Third, some researchers think that the CMS model lacks theoretical foundation. A study conducted by Leamer (1970) indicated that a country's market share is a function of relative price derived from the basic form of the elasticity of substitution. This implies that the difference between hypothetical export growth and actual export growth may be attributed to price changes. However, the assumption that relative competitiveness depends on the relative price has been questioned frequently in the literature. In this assumption, such factors as quality improvement, improvement in service, shortening of

waiting lines, improved financing arrangements, and changes in discriminatory non-price trade policy are omitted (Richardson 1971). At the same time, one problem occurs as a result of this assumption: quantity data are necessary in order to satisfy the requirement that shares vary directly with relative competitiveness. If export value shares are used, an increase in relative competitiveness (a fall in relative prices) could lead to a decrease in export shares, given an elasticity of substitution of less than one in absolute value. However, the quantity data are not usually available.

Fourth, the CMS model puts more emphasis on demand than on supply factors in 'explaining' the growth of exports. The size of the standard growth effect obviously depends on the growth of the world's demand for exports; however, the size of both the commodity composition effect and the market distribution effect depends more on the patterns of production and imports and the commercial policies of the import countries. The residual effect is the only term that emphasizes the supply side because it is the competitiveness of the exporting region that determines its success in the world market.

Last, the interpretation of the residual effect is very complicated. It is influenced by the interacting forces from both internal supply and external demand decomposed into price and non-price elements. Since it is difficult to separate influences of demand and supply, the interpretation of the residual effect is obviously very complicated because of the nature of the general system that lies behind it (Leamer 1970).

CHAPTER 4
COMPETITIVENESS ASSESSMENT OF ALBERTA'S AGRI-FOOD EXPORTS

4.1 Introduction

In this chapter, the one commodity/market model adopted in this research is presented before the CMS results for each product in each target market are provided. The results are presented in the following sequence: overall competitiveness, its two components (competitiveness in the world market and competitiveness in the target markets), the market distribution and the export performances of Alberta and its main competitors for beef, pork and processed grain in each target market. In order to help Alberta's agri-food export industry to understand the competitive situation, the last section describes competition in target products and markets.

4.2 The One Commodity/Market Model

Based on the Jepma's multiple commodities/markets model in equation 3.13, the one commodity/market CMS model is derived and expressed as follows:

$$\Delta q_{ij} = \underbrace{s_i^0 \Delta Q_i}_{\text{Growth Effect}} + \underbrace{(s_{ij}^0 \Delta Q_{ij} - s_i^0 \Delta Q_i)}_{\text{Market Distribution Effect}} + \underbrace{\Delta s_i Q_i^0}_{\text{Pure Residual}} + \underbrace{(\Delta s_{ij} Q_{ij}^0 - \Delta s_i Q_i^0)}_{\text{Static Structural Residual}}$$

$$+ \underbrace{(Q_i^1 / Q_i^0 - 1)\Delta s_{ij} Q_{ij}^0}_{\text{Pure Second-order Effect}} + \underbrace{\left[\Delta s_{ij} \Delta Q_{ij} - (Q_i^1 / Q_i^0 - 1)\Delta s_{ij} Q_{ij}^0\right]}_{\text{Dynamic Structural Residual}} \qquad (4.1)$$

where q_{ij} is the export value of an exporting region to the target market j for a given commodity i; s_i is the market share of an exporting region for commodity i in the world market; s_{ij} represents the market share of an exporting region for commodity i in the target market j; Q_i is the total world exports of commodity i; Q_{ij} is the total world exports of commodity i to the target market j; Δ represents the change in the two periods; superscript *0* represents the initial year; *1* represents the terminal year; and subscript i and

j refer to target product and target market respectively. The interpretation for each item is summarized in Table 4.1 for reference purposes.

To assess Alberta's competitive position, this study relies on the residual effect and its two components (pure residual and static structural residual) obtained from the CMS decomposition. The residual effect measures the change in an exporting region's exports for commodity *i* in market *j* due to changes in an exporting region's market shares, given that the market distribution of the exporting region and world exports/demand patterns for commodity *i* are unchanged. A positive (or negative) value in the residual effect indicates an increase (or decrease) in overall competitiveness for an exporting region. The pure residual measures the change in an exporting region's exports due to the change in competitiveness in the world market given that an exporting region's market distribution is unchanged. And the static structural residual measures changes in competitiveness in the target market given that demand in the target market is unchanged.

Because the above competitiveness is measured in absolute values, it cannot be used to compare competitors directly due to the different export sizes of competitors. To derive relative measures, the competitiveness was divided by the change in an exporting region's exports. The relative measures indicate the percentage change of an exporting region's competitiveness, assuming the change in an exporting region's exports is 100 percent. An exporting region is regarded as having stronger competitiveness in the target market if the relative measure in competitiveness is positive and larger. A similar procedure is also applied for the rest of the decomposition items to obtain the relative contribution of each component to the change in an exporting region's exports.

The CMS decomposition as in equation 4.1 applies to the change in exports of Alberta and its main competitors to target markets for beef, pork and processed grain over the period 1988-96. The identified target markets for beef are the United States, Japan, Mexico, Hong Kong, Taiwan, and South Korea; for pork, the United States, Japan, and Mexico; and for processed grain, the United States, Japan, and South Korea.

A separate set of decompositions was carried out for Alberta and each of its main competitors for beef, pork and processed grain in each target market. The decomposition was carried out for each year, so that the end of the period in the current decomposition becomes the beginning of the next period in the subsequent decomposition. The

Table 4.1 Interpretations of Decomposition Items for the One Commodity/Market CMS Model

Items	Interpretation
Change in Exports	the change in an exporting region's exports for commodity i in market j
Structural Effect	the hypothetical change in exports for commodity i in market j, given that an exporting region's competitiveness both in the world market and in target market j for commodity i is unchanged
Growth Effect	the change in exports that is attributed to an increase in the level of world exports/demand, given that the exporting region's competitiveness and market distribution are unchanged.
Market Distribution Effect	the change in exports due to the market distribution effect. A positive value represents that the exporting region concentrates its exports on a target market which is a fast-growing one compared with the world; a negative value indicates that the exporting region does not concentrate its exports in a target market which is a fast growing one or that the exporting region exports to a target market which is a slow-growing market.
Residual Effect	the change in exports for commodity i in target market j due to changes in the exporting region's market shares in the world and/or in the target market, reflecting the change in the overall competitiveness of an exporting region.
Pure Residual	the change in exports due to the change in the exporting region's competitiveness in the world market given that the market distribution of the exporting region is unchanged. A positive value indicates that the exporting region's competitiveness in the world is strong; a negative value indicates otherwise.
Static Structural Residual	the change in exports that can be attributed to the change in the exporting region's competitiveness in the target market, given an unchanged pattern of world exports/demand. A positive value indicates that the exporting region's competitiveness in the target market is strong; a negative value indicates otherwise.
Second-order Effect	the change in exports due to the interaction between the change in the exporting region's exports and the demand change both in the world and in the target market for commodity i. It is a measure for an exporting region's exports to adapt to changing demand both in the world market and in the target market for commodity i.
Pure Second-order Effect	the change in exports due to the interaction between the change in an exporting region's exports and the changes in the level of world exports/demand, given that the demand in the target market is unchanged. A positive value indicates that the change in the exporting region's exports is adaptable to the demand change in the world; a negative value indicates the otherwise.
Dynamic Structural Residual	the change in exports due to the interaction between the change in an exporting region's exports and the demand change in the target market. A positive value indicates that the change in the exporting region's exports is adaptable to the demand change in the target market; a negative value indicates otherwise.

decomposition was done using Microsoft Access and Excel, and the decomposition procedure is presented in Appendix 5. In total, 464 decompositions were carried out for the nine years under consideration. The simple average of yearly decomposition results was then used to represent the chosen period. With this method, the year chosen as the beginning of the overall period does not dominate the results. The average results of the yearly decomposition of the change in export value of Alberta and its main competitors for beef, pork and processed grain over this period are provided in Appendices 6-8.

4.3 Competitiveness of Alberta and its Main Competitors in Target Products and Markets

This section presents overall competitiveness and its two components – competitiveness in the world market and competitiveness in the target market for an exporting region. In order to test the statistical significance of overall competitiveness indicated by the residual, a t-test is used. The t-test results (Appendix 9) show that the residual effects of Australia, Alberta and the ROC in the U.S. beef market, of Australia and the United States in the South Korean beef market, of Alberta in the Taiwanese beef market, of Denmark in the Japanese pork market, of Europe and South & Central America in the U.S. processed grain market are statistically significant at a 10 percent significant level, and the other residuals are not significant. The reason that most of the residual effects are not significant might be that the samples are insufficient.

4.3.1 The Overall Competitiveness of Alberta and Its Main Competitors in Target Products and Markets

The overall competitiveness of Alberta and its main competitors is ranked according to sign and magnitude of the percentage changes obtained from the CMS decompositions. Table 4.2 summarizes the competitive positions of Alberta and its main competitors in target products and markets from 1988-96.

In Target Beef Markets

In target beef markets, Alberta was competitive in the United States, Japan, Mexico, Hong Kong, and Taiwan, with the exception in South Korea. The finding that Alberta beef was not very competitive in South Korea is consistent with previous conjecture (e.g. Unterschultz et al. 1996). Alberta was ranked as the most competitive in Japan and Mexico.

The United States and the rest of Canada represented the two strongest competitors to Alberta in target beef markets. It should be indicated that South & Central America was very competitive in the United States but not in Mexico. This is surprising, as one would expect the opposite given South & Central America' geographical closeness to Mexico.

Australia was not competitive in target beef markets, including the United States, Japan, South Korea and Taiwan. It is surprising that Australia exhibited weak competitiveness, particularly in the Japanese beef market since Australia was widely considered by the beef industry as a strong competitor in the Japanese beef market (Alberta Agriculture 1997). However, when the two components of overall competitiveness were examined, it was found that the negative overall competitiveness was caused by its weak competitiveness in the world market, and its competitiveness in the target markets – Japan, South Korea and Taiwan – was actually positive. This indicates that Australia was a strong competitor in the three Asian markets. The conclusion that Australia was competitive according to competitiveness in the target market is consistent with the previous study (Alberta Agriculture 1997). This result highlights one of the major analytical advantages of the improved CMS model. If only the simple CMS model had been examined, it would have be concluded that Australia had been exhibiting weak competitiveness in Japan, South Korea and Taiwan. This is only partly correct. After the further decomposed model was examined, it becomes obvious that Australia was competitive in the Japanese beef market, the South Korean beef market and the Taiwanese beef market.

The same analysis applies to New Zealand in the Taiwanese beef market. When the results of the simple CMS model were examined, it was noted that New Zealand was competitive in South Korea, but not in the United States and Taiwan. However, after the

Table 4.2 Overall Competitiveness of Alberta and Its Main Competitors in Target Products and Markets: 1988-96

Target Markets	Beef	Pork	Processed Grain
The United States	South & Central America(519%) The Rest of Canada (132%) Alberta (127%) New Zealand (-65%) Australia (-98%)	Alberta (85%) The Rest of Canada (-4%) Denmark (-318%)	Alberta (52%) South & Central America(29%) The Rest of Canada (18%) Europe (-34%) Asia (-34%)
Japan	Alberta (40%) The Rest of Canada (26%) The United States (11%) Australia (-15%)	The United States(43%) Alberta (25%) Taiwan (-6%) The Rest of Canada (96%) Denmark (-313%)	Asia (17%) The United States (10%) The Rest of Canada (0.4%) Europe (-11%) Oceania (-26%) Alberta (-53%)
Mexico	Alberta (325%) The Rest of Canada (276%) The United States (40%) Europe (-1,110%) South & Central America (-1,450%)	Alberta (252%) The United States (238%) The Rest of Canada (77%) Europe (-145%)	N/A
South Korea	New Zealand (49%) The United States (30%) The Rest of Canada (-27%) Australia (-87%) Alberta (-246%)	N/A	The United States (16%) Europe (13%) Asia (11%) The Rest of Canada (-6%) Alberta (-81%) Oceania (-203%)
Hong Kong	The United States (80%) The Rest of Canada (59%) Alberta (15%) Oceania (-12%) South & Central America (-208%) China (-647%)	N/A	N/A
Taiwan	The Rest of Canada (125%) Alberta(84%) The United States (56%) New Zealand (-10%) Australia (-43%)	N/A	N/A

results of the improved CMS model were examined, South Korea was found to be competitive both in South Korea and Taiwan, and not competitive only in the United States.

In Target Pork Markets

In target pork markets, Alberta was found competitive in all target markets. Alberta was the most competitive in the United States and Mexico. The United States represented the strongest competitor to Alberta in all target pork markets. It is interesting to observe that the ROC was competitive only in Japan, while not in the United States and Mexico. Denmark was found non-competitive in all three target pork markets. This is surprising, as Denmark was considered very competitive in the Japanese pork market (Brink *et al.* 1997).

In Target Processed Grain Markets

In three target processed grain markets, Alberta was competitive in the United States, while not in Japan and South Korea. In the U.S. market, South & Central America and the rest of Canada represented the two strong competitors to Alberta. In the Japanese market, Asia, the ROC, and the United States represented the three strong competitors to Alberta. In the South Korean market, Europe, Asia, and the United States were the strong competitors to Alberta.

In summary, if only the residual effect in the simple CMS model had been examined, some conclusions might have been biased. In order to reach a complete conclusion, the following section is devoted to the analysis of the two components of the residual effect (overall competitiveness) in the improved CMS model.

4.3.2 Competitiveness Both in the World Market and in the Target Market for Alberta and its Main Competitors

As discussed in the previous section, the changes in overall competitiveness can be further decomposed into two terms: competitiveness in the world market and competitiveness in the target market. This further decomposition provides additional

insights into the nature of competitiveness. Table 4.3 summarizes the rankings of the competitive positions of Alberta and its main competitors both in the world market and in the target market for beef, pork and processed grain from 1988-96.

In Target Beef Markets

Alberta beef exports exhibited strong competitiveness in the world market, which contributed greatly to its overall competitiveness. In terms of competitiveness in the target market, however, Alberta was competitive only in the United States, not in other beef markets – Japan, Mexico, Hong Kong, South Korea and Taiwan. Alberta's competitiveness in the South Korean beef market was particularly weak, resulting in negative overall competitiveness in that market.

The ROC and the United States had the same competitiveness pattern as Alberta's. In contrast, Australia exhibited weak competitiveness both in the U.S. beef market and in the world beef market, but strong competitiveness in Japan, South Korea and Taiwan. New Zealand had the same competitiveness pattern as Australia's. Europe exhibited strong competitiveness in the Mexican beef market, though its overall competitiveness was weak. The same conclusion can be applied to China in the Hong Kong beef market. South & Central America showed very weak competitiveness in target beef markets, despite its strong competitiveness in the world market.

In Target Pork Markets

As for pork exports, Alberta exhibited strong competitiveness in the world market, which contributed greatly to its overall competitiveness in each target market. With respect to competitiveness in the target market, however, Alberta was competitive only in the United States but not in other two markets – Japan and Mexico. This result indicates that Alberta was not a strong competitor as indicated by overall competitiveness in target pork markets other than the United States.

The ROC and the United States had the same competitiveness pattern as Alberta's in target pork markets other than the United States. Though the ROC exhibited strong competitiveness in the United States, its competitiveness in the world market was weak, resulting in negative overall competitiveness in that market.

Again, it is surprising to find that Denmark exhibited weak competitiveness both in the world and in Japan. However, Denmark showed strong competitiveness in the United States. Europe had the same competitiveness pattern in the Mexican pork market as in the Mexican beef market. Though its overall competitiveness was weak in the Mexican pork market, Europe exhibited strong competitiveness in that market. Despite its strong competitiveness in the world market, Taiwan presented weak competitiveness in the Japanese pork market.

In Target Processed Grain Markets

With respect to the exports of processed grain, Alberta exhibited strong competitiveness in the world market but weak competitiveness in all target markets. In the United States, Alberta's competitiveness in the world market was strong enough to offset the negative competitiveness in the United States. Consequently, Alberta enjoyed positive overall competitiveness in the United States. Nevertheless, in other target markets – Japan and South Korea, Alberta's competitiveness in the world market was not strong enough to offset its negative competitiveness in these target markets. Consequently, the overall competitiveness for Alberta was negative in Japan and South Korea. These results indicate that Alberta was not a strong competitor in all target processed grain markets.

Though the ROC had the same competitiveness pattern as Alberta's in these markets, its competitiveness in the world market was much stronger than that of Alberta. Therefore, the ROC exhibited positive overall competitiveness in the United States and Japan, and insignificant negative overall competitiveness in South Korea.

The United States exhibited very strong competitiveness in Japan and South Korea, but weak competitiveness in the world market. It is surprising to observe that the United States was not competitive in the world market because experts usually consider the United States to be very competitive. The change in market share reflects the change in competitiveness in the CMS analysis. When the change in the worldwide market share for the United States was examined, it was found that the worldwide market share of the U.S. processed grain declined dramatically in 1995 as compared to 1994 and in 1996 as compared to 1995, a drop of 1.5 percent and 0.4 percent respectively. During this same

Table 4.3 Competitiveness in the World Market and in the Target Market of Alberta and Its Main Competitors: 1988-96

Target Markets	Beef			Pork			Processed Grain		
	Competitors	Competitiveness in the world market	Competitiveness in the target market	Competitors	Competitiveness in the world market	Competitiveness in the target market	Competitors	Competitiveness in the world market	Competitiveness in the target market
The United States	S & C	3,737%	-3,219%	Alberta	31%	54%	Alberta	81%	-29%
	The ROC	89%	43%	The ROC	-1,630%	1,626%	S & C	240%	-211%
	Alberta	109%	17%	Denmark	-4,778%	4,460%	The ROC	22%	-4%
	N.Zealand	-54%	-11%				Europe	-319%	286%
	Australia	-28%	-71%				Asia	345%	-379%
Japan	Alberta	3,455%	-3,415%	USA	60%	-16%	Asia	204%	-186%
	The ROC	1,672%	-1,645%	Alberta	100%	-75%	USA	-94%	105%
	USA	154%	-144%	Taiwan	12%	-18%	The ROC	287%	-287%
	Australia	-23%	7%	The ROC	-391%	295%	Europe	-415%	405%
				Denmark	-275%	-38%	Oceania	-34%	8%
							Alberta	104%	-157%
Mexico	Alberta	196,813%	-196,488%	Alberta	9,589%	-9,337%			
	The ROC	13,390%	-13,114%	USA	3,383%	-3,146%			
	USA	945%	-905%	The ROC	-10,616%	10,692%			
	Europe	-54,270%	53,160%	Europe	-2,545%	2,401%			
	S & C	10,619%	-12,070%						
South Korea	N.Zealand	-182%	231%				USA	-389%	405%
	USA	519%	-489%				Europe	-1,826%	1,839%
	The ROC	3,241%	-3,268%				Asia	1,427%	-1,415%
	Australia	-108%	21%				The ROC	1,252%	-1,257%
	Alberta	11,607%	-11,853%				Alberta	1,021%	-1,103%
							Oceania	-366%	-163%
Hong Kong	USA	3,180%	-3,099%						
	The ROC	40,671%	-40,611%						
	Alberta	102,307%	-102,292%						
	Oceania	-1,608%	1,596%						
	S&C	1,612%	-1,820%						
	China	-6,921%	6,274%						
Taiwan	The ROC	3,996%	-3,871%						
	Alberta	27,764%	-27,679%						
	USA	3,518%	-3,462%						
	N.Zealand	-374%	364%						
	Australia	-216%	173%						

Notes: The ROC is the Rest of Canada; N. Zealand is New Zealand and S & C is South & Central America

period, world exports of processed grain rose dramatically. As a result, the average competitiveness in the world market was negative for the United States. In addition, the result might be partially due to aggregation. In this research, processed grain products include cereal products, malt products, pasta products, bakery products and milling products. During the period 1988-96, the worldwide market shares of the United States for cereal products, malt products, pasta products, and bakery products increased by 0.2 percent, 0.7 percent, 0.2 percent and 0.4 percent respectively, while the market share of the milling industry decreased by 0.7 percent. If the study had been conducted at a disaggregated level, the conclusion about competitiveness might have been different among different products.

Asia exhibited very strong competitiveness in the world market but weak competitiveness in all target markets. This is surprising, as experts usually consider Asia to be strongly competitive in Japan and South Korea.

In contrast, Europe exhibited the opposite competitiveness pattern to Asia's. Europe exhibited very strong competitiveness in these target markets but weak competitiveness in the world market. Oceania had a competitiveness pattern similar to Europe's in Japan and in South Korea.

4.4 Market Distribution of Alberta and That of Its Main Competitors in Target Products

Export structure is another important factor influencing the export performance of exporting regions with the exception of competitiveness. In one commodity/market model, the commodity composition effect disappears and only the market distribution effect exists. This section is devoted to the analysis of the market distribution effect of Alberta and its main competitors. The market distribution effect of an exporting region reflects the extent of concentration of exports in the fast-growing (slow-growing) markets. In the empirical model, a positive effect indicates that an exporting region tends to concentrate its exports in the target market, which is a fast-growing market compared with the world, and a negative effect means that an exporting region does not concentrate its exports in the fast-growing market or that an exporting region exports to a slow-growing market.

4.4.1 Market Distribution of Alberta's Beef Exports and That of Its Main Competitors' Beef Exports

Among the six beef markets, Japan, South Korea, Hong Kong, Taiwan and Mexico were fast-growing markets, while the United States was a decreasing market compared with the world. The beef imports in Japan, South Korea, Hong Kong, Taiwan and Mexico increased by, on average, 8.8 percent, 27.6 percent, 5.3 percent, 16.6 percent and 17.1 percent respectively over the period of 1988-96, whereas the imports for beef in the United States decreased by 1.9 percent in this period. Over the same period, the beef imports in the world market increased by 3 percent every year, on average. In the six markets, the suppliers include Alberta, the ROC, the United States, Australia, New Zealand, Oceania, South & Central America, Europe and China.

In terms of market distribution of Alberta's beef exports, Alberta exported 92.2 percent of its beef to the United States, 5.6 percent to Japan, 1.4 percent to South Korea, 0.1 percent to Mexico, 0.2 percent to Hong Kong and 0.4 percent to Taiwan, on average, from 1988 to 1996. Alberta recorded a negative market distribution effect in the United States since it concentrated most of its beef exports in the decreasing market. At the same time, it also showed negative market distribution effects in Mexico, Hong Kong and Taiwan as it did not concentrate its exports in these fast-growing markets. However, Alberta exhibited positive market distribution effects in Japan and South Korea since it concentrated relatively more beef exports in the two fast-growing markets than in Mexico, Hong Kong and Taiwan.

The ROC enjoyed a pattern of market distribution similar to Alberta's. The ROC exported 91.2 percent of its beef to the United States, 5.1 percent to Japan, 1.3 percent to South Korea, 0.2 percent to Mexico, 0.2 percent to Hong Kong and 0.3 percent to Taiwan in this period. The market distribution effects of the ROC in all these six markets were negative. This result is surprising given the fact that Alberta and the ROC had similar market shares in Japan as well as export shares to Japan. When the yearly market distribution effects were examined, it was found that all of them were negative from 1989 to 1995 since the two exporting regions exported only around 5 percent of their beef to Japan. In 1996, however, the beef imports both in Japan and in the world market

declined, but the drop in the world beef imports was greater than that in Japan. As a result, the market distribution effects of both Alberta and the ROC were positive in 1996. As the ROC concentrated more of its beef exports to Japan than Alberta did in 1996, the relative positive size in the market distribution effect of the ROC was smaller than that of Alberta, which resulted in, on average, a positive market distribution effect for Alberta and a negative market distribution effect for the ROC.

The United States recorded a positive market distribution effect in Japan and negative market distribution effects in the other four markets. From 1988 to 1996, the United States exported 63.1 of its beef to Japan, 8.9 percent to South Korea, 7.5 percent to Mexico, 1.1 percent to Hong Kong and 1.3 percent to Taiwan. It can be seen that the United States tended to concentrate its beef exports in Japan, a fast-growing market. As a result, its market distribution effect in Japan was positive. In South Korea, Mexico, Hong Kong and Taiwan, its market distribution effects were negative since it did not concentrate its exports in these fast-growing markets.

Like the United States, Australia showed a positive market distribution effect in Japan and negative market distribution effects in other markets, including the United States, South Korea and Taiwan. Australia exported 33.6 percent of its beef to the United States, 44.1 percent to Japan, 6.4 percent to South Korea and 3.9 percent to Taiwan. Compared with the United States, Australia exported more of its beef to other Asian markets except to Japan. In particular, Australia has been adjusting its market distribution, decreasing its exports to North America from 57.6 percent in 1988 to 22.3 percent in 1996 and increasing its exports to Asia from 36.3 percent in 1988 to 72.1 in 1996. The United States was Australia's main export market in North America, and the Australian export share to the United States decreased from 51.6 percent in 1988 to 17.5 percent in 1996; while Japan was Australia's main export market in Asia, and the Australian export share to Japan increased from 31.8 percent in 1988 to 55 percent in 1996.

New Zealand presented negative market distribution effects in the United States, South Korea and Taiwan, exporting 60.3 percent of its beef to the United States, 3.6 percent to South Korea and 4.7 percent to Taiwan. Obviously, New Zealand tended to concentrate its beef exports in the United States, a decreasing market. Consequently, it

recorded a negative market distribution effect in the United States. At the same time, as it did not concentrate its beef exports in South Korea and Taiwan, it showed negative market distribution effects. Similar to Australia, New Zealand decreased its beef exports to North America from 79.3 percent in 1988 to 53.2 percent in 1996 and increased its beef exports to Asia from 15.5 percent in 1988 to 41 percent in 1996.

Oceania presented a negative market distribution effect in Hong Kong since it did not concentrate its exports in this fast-growing market. It exported only 1.2 percent of its beef to Hong Kong over the period of 1988-96. It actually tended to concentrate its beef exports in the United States and Japan.

South & Central America showed negative market distribution effects in the United States, Mexico and Hong Kong. In terms of market distribution, South & Central America did not concentrate its beef exports in the three markets. During the period of 1988-96, it exported 12.9 percent of its beef to the United States, 1.6 percent to Mexico and 2 percent to Hong Kong. In fact, it tended to concentrate its beef exports to Europe, with more than 50 percent of its beef going there.

In the Mexican market, the European market distribution effect was negative, indicating that Europe did not concentrate its beef exports in Mexico, a fast-growing market, exporting 0.2 percent of its beef to Mexico. In fact, 86 percent of beef exports in Europe was within the EU.

The market distribution effect of China in Hong Kong was negative in this period, which indicates that China did not concentrate its beef exports in Hong Kong, exporting 16.3 of its beef to this market from 1988 to 1996.

4.4.2 Market Distribution of Alberta's Pork Exports and That of Its Main Competitors' Pork Exports

Compared with the world, only Japan was a faster growing pork import market, whereas the United States was a slower growing pork import market and Mexico was a decreasing pork import market. The average annual growth rates of the United States, Japan and Mexico for pork imports were 1.1 percent, 11.7 percent and –1.7 percent, while the average growth rate of the world pork imports was 10.8 percent over this period. The negative growth rate for Mexico resulted from the decrease in pork imports

in 1995 and 1996 due to the devaluation of the peso starting in late 1994 and the associated macroeconomic crisis in Mexico. In the three pork markets, the suppliers include Alberta, the ROC, the United States, Denmark, Europe and Taiwan.

The market distribution effect for Alberta was negative in all target markets. Among the three markets, only Japan was a fast-growing market. However, Alberta did not concentrate its pork exports in Japan, exporting 13.9 percent of its pork to this market. 82.8 percent of Alberta's pork exports went to the United States. At the same time, a small percentage, 1.2 percent, went to Mexico.

The ROC recorded negative market distribution effects in all target markets and had a market distribution pattern similar to Alberta's. It exported 25.4 percent of its pork to Japan, 62.7 percent to the United States, and 2.5 percent to Mexico. Obviously, it tended to concentrate its pork exports in the United States over this period.

The United States presented negative market distribution effects both in Japan and in Mexico. During this period, the United States exported 75.8 percent of its pork to Japan and 10.1 percent to Mexico.

Denmark showed negative market distribution effects both in Japan and in the United States. Denmark exported 34.5 percent of its pork to Japan and 5.6 percent to the United States during this period. Meanwhile, 50 percent of its pork exports went to within the EU.

Europe recorded a negative market distribution effect in the Mexican market since Mexico was a decreasing market. Europe exported 0.1 percent of its pork to Mexico. Most of Europe's beef exports, 82.7 percent, were within the EU.

Taiwan had a positive market distribution effect in Japan since it exported 99.6% of its pork to Japan, a faster growing market than the world.

In the three pork markets, all exporting regions in the United States and Mexico presented negative market distribution effects since the United States was a slow-growing market and Mexico was a decreasing market. In Japan, only Taiwan recorded a positive market distribution effect, and all other exporters showed negative market distribution effects. The reason is likely that the growth rate of pork imports in Japan was a little larger than that in the world market. Based on the formula of the market distribution effect, it is easy to have a negative market distribution effect if the growth rate of import

demand in the target market is not significantly larger than that in the world market, and/or if the exports of an exporting region do not considerably concentrate in the target market.

4.4.3 Market Distribution of Alberta's Processed Grain Exports and That of Its Main Competitors' Processed Grain Exports

In the three processed grain target markets, the imports of processed grain in South Korea enjoyed the fastest growth rate, 31.9 percent every year, on average. The imports in the United States (14 percent) increased a little faster than that in the world market (12.5%), while the imports in Japan enjoyed the same growth rate as that in the world market. In the three markets, the main suppliers include Alberta, the ROC, the United States, Asia, Europe, South & Central America and Oceania. All market distribution effects were negative in target processed grain market.

Alberta exported 58.6 percent of its processed grain to Japan, 18.7 percent to the United States, and 3.1 percent to South Korea. It can be seen that Alberta tended to concentrate its exports in Japan.

As opposed to Alberta, the ROC tended to concentrate its exports in the United States, and 74.3 percent of its processed grain exports went to the U.S. market. At the same time, the ROC exported 8.2 percent of its processed grain to Japan and 1.1 percent to South Korea.

Europe focused its processed grain exports within the EU, at 67.1%. Only 3.1 percent of its processed grain exports went to the United States, 0.2 percent to South Korea and 2.2 percent to Japan.

Asia tended to concentrate its processed grain exports within the continent as well, its export share being 64.8 percent. At the same time, 10 percent of processed grain exports in Asia went to the United States, 1.1 percent to South Korea and 10.8 percent to Japan. Both Europe and Asia presented negative market distribution effects since they did not concentrate their exports on fast growing markets such as South Korea and the United States.

In addition, all the other exporters had a very dispersed market distribution and did not focus on fast-growing markets either, so their market distribution effects were

negative.

In summary, the market distribution effects of all exporting regions in Japan were negative since Japan was not a fast-growing market. The negative market distribution effects in South Korea and the United States indicate that these exporting regions did not focus their exports in the two fast-growing markets.

4.5 Export Performance of Alberta and Its Main Competitors in Target Products and Markets

Export performance is different from export competitiveness. The change in an exporting region's exports (or export performance) can be caused by factors other than export competitiveness and market distribution. This section is devoted to the analysis of export performance of Alberta and its main competitors in target products and markets. The other factors responsible for the observed export performance include the growth in world trade(exports/demand), the interaction of the change in an exporting region's exports with the demand change both in world market and in the target market.

4.5.1 In Target Beef Markets

In six target beef markets, the growth effects for all competitors were positive. This shows that the increase in the world's beef trade, a 3 percent annual increase on average, brought benefits to all exporting regions, given that an exporting region's competitiveness and market distribution were unchanged.

The U.S. Beef Market

During the period 1988-96, Alberta and the ROC increased their beef exports to the United States; while Australia, New Zealand, and South & Central America decreased their beef exports to the United States.

The primary factor responsible for the increase in beef exports from Alberta and the ROC to the United States was their strong showing in export competitiveness. The decline in exports from both New Zealand and Australia mainly resulted from their inability to maintain their competitiveness in the United States. The export shares of Australia and New Zealand to the United States decreased by 4.3 percent and 3.5 percent

every year, on average, as they tended to decrease their exports to North America and increase their exports to Asia. As for South & Central America, the main reasons for the decreased exports to the United States were its unfavorable market distribution and weak competitiveness in the United States.

The Japanese Beef Market

All the four main suppliers increased their beef exports to Japan during the period 1988-96.

Increased beef exports from Alberta to Japan were mainly attributed to Alberta's rising export competitiveness in the world market. The increase in beef exports from the ROC to Japan was mainly a consequence of the growth in the world's beef trade and its rising export competitiveness in the world market. A difference between Alberta and the ROC is that while the market distribution effect contributed positively to Alberta's beef exports to Japan, it contributed negatively to the ROC's beef exports to Japan.

The increase in beef exports from Australia to Japan was mainly attributed to the growth in the world's beef trade and its favorable market distribution. The increased beef exports from the United States to Japan were mainly caused by the growth in world trade, the favorable market distribution and its strong competitiveness in the world market. However, while the growth in world trade was more important in explaining the increase in the Australian beef exports to Japan, the market distribution effect and competitiveness in the world market were more important in explaining the increase in U.S. beef exports to Japan.

The Mexican Beef Market

During the period 1988-96, Alberta and the United States increased their beef exports to Mexico, while the ROC, Europe, and South & Central America decreased their beef exports to Mexico.

The primary factors responsible for the increase in beef exports from Alberta to Mexico were Alberta's strong showing of export competitiveness and the growth in the world's beef trade. The market distribution effect, its export competitiveness in Mexico and the interaction of the change in exports with the demand change in Mexico, however,

significantly retarded Alberta's beef exports to Mexico. A similar pattern existed for the United States, except that the interaction of the change in exports and the demand change in Mexico did not play an important role in the United States.

Decreased beef exports from the ROC to Mexico were caused by the unfavorable market distribution, weak export competitiveness in Mexico and the interaction of the change in exports with the demand change both in the world and in the target market. Nevertheless, the ROC increased its competitiveness in the world market and benefited from the growth of the world beef trade during the same period.

South & Central America had a pattern similar to the ROC's. However, decreased beef exports from Europe to Mexico were caused mainly by a dramatic decrease in Europe's export competitiveness in the world beef market and its unfavorable market distribution.

The South Korean Beef Market

All the four main suppliers increased their beef exports to South Korea from 1988-96.

Increased beef exports from Alberta to South Korea were mainly attributed to its favorable market distribution, the increase in the world's beef trade and the interaction of the change in exports with the demand change both in the world and in the target market. Its export competitiveness in South Korea, however, significantly retarded Alberta's beef exports to South Korea. A similar observation applies to the ROC. However, it is interesting to note that only Alberta recorded a positive market distribution effect in South Korea. The market distribution effects for suppliers other than Alberta were negative.

The increase in beef exports from Australia and New Zealand to South Korea was mainly attributed to the increase in world beef trade and their rising export competitiveness in South Korea. However, their unfavorable market distribution and declining export competitiveness in the world market significantly retarded the performance of their beef exports to South Korea.

The increase in beef exports from the United States to South Korea resulted from the growth in the world's beef trade and its strong export competitiveness in the world

market. The United States, nevertheless, exhibited weak export competitiveness in South Korea.

The Taiwanese Beef Market

During the period from 1988-96, all suppliers increased their beef exports to Taiwan.

The primary factors responsible for the increase in beef exports from Alberta to Taiwan were Alberta's strong showing of export competitiveness in the world market, the increase in world beef trade and the interaction of the change in exports with the demand change both in the world and in Taiwan. The ROC showed a pattern similar to Alberta's. The primary factors responsible for the increase in beef exports from the ROC to Taiwan were its strong showing of export competitiveness in the world market and the growth in the world's beef trade. However, the ROC was not able to adapt its exports to the demand change both in the world and in Taiwan.

The increase in beef exports from the United States to Taiwan was entirely a consequence of its rising export competitiveness in the world market and the growth in the world beef trade. However, the unfavorable market distribution and its declining export competitiveness in Taiwan retarded its exports to Taiwan significantly.

The increase in beef exports from Australia to Taiwan was mainly due to its rising export competitiveness in Taiwan, the growth in world beef trade and the interaction of the change in exports with the demand change both in the world and in Taiwan. New Zealand had a pattern similar to Australia's, except that it was not able to adapt its exports to the demand change both in the world and in Taiwan.

The Hong Kong Beef Market

From 1988-96, Alberta, the ROC, the United States and Oceania increased their beef exports to Hong Kong, while China and South & Central America decreased their beef exports to Hong Kong.

The primary factors responsible for the increase in beef exports from Alberta, the ROC, and the United States to Hong Kong were the growth in world beef trade and their rising competitiveness in the world beef market. The main factors that retarded their

export performance in Hong Kong were the unfavorable market distribution and declining competitiveness in Hong Kong.

The increase in Oceania's beef exports to Hong Kong was largely a result of the growth in world beef trade and its rising export competitiveness in Hong Kong. Factors such as the market distribution effect and export competitiveness in the world market retarded its export performance significantly.

The decline in exports from China to Hong Kong mainly resulted from China's inability to maintain its competitiveness in the world beef market and the unfavorable market distribution, though China showed strong export competitiveness in Hong Kong.

South & Central America decreased its exports to Hong Kong in the period 1988-96. The decline was due to its weak export competitiveness in Hong Kong and the unfavorable market distribution.

4.5.2 In Target Pork Markets

In three target pork markets, the growth effects for all exporting regions were positive. This shows that the increase in the world's pork trade, an increase of 10.8 percent on average, brought benefits to all these exporting regions, given that an exporting region's competitiveness and market distribution were unchanged.

The U.S. Pork Market

During the period 1988-96, Alberta and the ROC increased their pork exports to the United States, while Denmark decreased its pork exports to the United States.

The primary factors responsible for the increase in pork exports from Alberta to the United States were its rising export competitiveness both in the world and in the United States and the growth in the world's pork trade. The market share of Alberta pork in the United States increased by 1.1 percent, on average, during the period 1988-96.

Interestingly, the ROC exhibited a different competitiveness pattern compared with Alberta's. The increase in pork exports from the ROC to the United States was mainly attributed to the growth in world pork trade and its rising export competitiveness in the United States. However, its competitiveness in the world market declined, resulting in a negative overall competitiveness in its pork exports to the United States. The large

negative dynamic structural residual indicates that unlike Alberta, the ROC was not able to adapt its exports to the demand change in the United States.

The drop in pork exports from Denmark to the United States mainly resulted from its declining export competitiveness in the world pork market and the unfavorable market distribution. However, Denmark exhibited strong export competitiveness in the U.S. pork market.

The Japanese Pork Market

All five exporting regions increased their pork exports to Japan from 1988 to 1996.

Increased pork exports from Alberta to Japan were mainly attributed to Alberta's strong export competitiveness in the world market and the growth in the world's pork trade. However, the unfavorable market distribution and its weak export competitiveness in Japan brought negative impacts on its export performance.

The United States exhibited a pattern similar to Alberta's in the Japanese pork market. The unfavorable market distribution and declining export competitiveness in Japan significantly retarded its pork exports to Japan.

The increase in pork exports from the ROC to Japan was mainly a consequence of the growth in world pork trade and its rising export competitiveness in Japan. It is somewhat surprising to observe that the ROC had a different export performance pattern as compared to Alberta's.

Denmark increased its exports to Japan mainly because of expanding world pork trade. Its declining export competitiveness both in the world and in Japan, together with the unfavorable market distribution, significantly retarded Denmark's export performance in Japan.

Taiwan also increased its exports to Japan because of the growth in the world's pork trade as well as its favorable market distribution. In fact, only Taiwan recorded a positive market distribution effect, while the other exporters presented negative market distribution effects in Japan.

The Mexican Pork Market

From 1988-96, Alberta and the United States increased their pork exports to Mexico, while the ROC and Europe decreased their pork exports to Mexico. In terms of the change in market share, Alberta's and the US' increased by 5.7 percent and 0.1 percent, on average, whereas the ROC's and Europe's decreased by 5.3 percent and 0.5 percent respectively.

The primary factors responsible for the increase in pork exports from Alberta to Mexico were Alberta's strong competitiveness in the world market and the growth in the world's pork trade. The unfavorable market distribution, weak competitiveness in Mexico and the interaction of the change in exports with the demand change in Mexico, however, significantly retarded Alberta's pork exports to Mexico. A similar pattern existed for the United States, except that a negative market distribution effect was strong enough to offset the growth effect.

Decreased pork exports from the ROC to Mexico were mainly caused by its weak competitiveness in the world pork market and the unfavorable market distribution, though the ROC recorded rising competitiveness in Mexico.

Decreased pork exports from Europe to Mexico were caused by its declining competitiveness in the world pork market and the unfavorable market distribution, though it exhibited rising competitiveness in Mexico.

4.5.3 In Target Processed Grain Markets

From 1988-96, all the exporting regions increased their processed grain exports to the three target processed grain markets. In the target markets, the growth effects of all exporting regions were positive. This shows that the expansion of the world's processed grain trade, a 12.5 percent increase on average, brought benefits to all these exporting regions, given that an exporting region's competitiveness and market distribution were kept unchanged, though the relative contribution to the export performance varied across exporting regions.

The U.S. Processed Grain Market

The primary factors responsible for the increase in processed grain exports from

Alberta to the United States were Alberta's strong export competitiveness in the world market and the growth in world trade. The unfavorable market distribution and weak export competitiveness in the United Sates, however, significantly retarded Alberta's beef exports to the United States.

A similar pattern existed for the ROC and South & Central America except that the negative market distribution effect in the ROC was not as strong as in Alberta because the ROC concentrated more of its processed grain exports in the United States than Alberta did.

The increase in exports from Asia to the United States was mainly caused by the growth in world trade and its rising export competitiveness in the world market. The increased exports from Europe to the United States were attributed to the growth in world trade and its rising export competitiveness in the United States. Asia and Europe exhibited a different pattern in export competitiveness. Asia was competitive in the world but not in the United States, while Europe was competitive in the United States but not in the world.

The Japanese Processed Grain Market

In the Japanese processed grain market, all suppliers increased their exports during the period 1988-96.

The primary factors responsible for the increase in processed grain exports from Alberta to Japan were Alberta's strong export competitiveness in the world market and the growth in world trade. The unfavorable market distribution effect and weak export competitiveness in Japan, however, significantly retarded Alberta's processed grain exports to the United States. In fact, the negative export competitiveness in the United States was strong enough to offset the positive export competitiveness in the world market, resulting in the negative overall export competitiveness. A similar pattern existed for the ROC except that the negative export competitiveness in the United States roughly offset the positive export competitiveness in the world market.

Increased processed grain exports from Asia to Japan were mainly caused by the growth in world trade and rising export competitiveness in the world market. Increased processed grain exports from Europe to Japan were a result of the growth in world trade

and rising export competitiveness in Japan. The increased processed grain exports from Oceania to Japan were mainly caused by the growth in world trade.

The South Korean Processed Grain Market

All the exporting regions increased their exports to South Korea during the period 1988-96.

As in the Japanese market, the primary factors responsible for the increase in processed grain exports from Alberta to South Korea were Alberta's strong export competitiveness in the world market and the growth in world trade. The unfavorable market distribution and its weak export competitiveness in South Korea, however, significantly retarded Alberta's beef exports to South Korea. In fact, the negative export competitiveness in South Korea was strong enough to offset the positive export competitiveness in the world market, resulting in the negative overall export competitiveness. A similar pattern existed for the ROC.

Increased processed grain exports from Asia to South Korea were mainly caused by the growth in world trade and Asia's rising export competitiveness in the world market. Europe showed a different pattern in export competitiveness compared with Asia's in the South Korean market, the U.S. market and the Japanese market. The increase in exports from Europe to South Korea was attributed to the growth in world trade and its rising export competitiveness in South Korea.

Increased processed grain exports from Oceania to South Korea were mainly caused by the growth in world trade, its rising export competitiveness in South Korea and the interaction of the change in exports with the demand change in South Korea. Its declining export competitiveness in the world market contributed negatively to Oceania's export performance in South Korea.

4.6 Competition in Target Products and Markets

In order to help the Alberta agri-food export industry understand its target markets and strong competitors in these target markets for its exports of beef, pork and processed grain, the section provides a general description of the competition.

4.6.1 Competition in Target Beef Markets

The U.S. Beef Market

In the U.S. beef market, Alberta and the ROC represented two strong competitors, who might benefit from the GATT/Uruguay round of negotiations and the NAFTA. Prior to the GATT/Uruguay negotiations, the U.S. Meat Import Act of 1979 (which was an amendment of the 1964 act) restricted U.S. beef imports with import quotas, which were divided among beef exporting regions. With the GATT/Uruguay negotiations, the GATT/Uruguay Round established a U.S. tariff-rate quota of 656,621 metric tons, which is divided among Australia, New Zealand and several other countries. However, imports from Canada and Mexico are not counted towards the tariff-rate quota due to the NAFTA. In addition, the NAFTA reduced or eliminated tariffs and many technical barriers to beef trade among the three countries.

South & Central America showed strong competition in terms of overall competitiveness, which might be due to geographical closeness.

Australia and New Zealand have been two main beef suppliers to the United States, but they were not competitive; and their market shares declined during this period. In particular, the United States has negotiated voluntary restraint agreements (VRAs) with Australia and New Zealand to keep beef imports levels within the specified limits prescribed by the Meat Import Act of 1979 (the USMIA).

The Japanese Beef Market

In the Japanese beef market, Australia was the strongest competitor in terms of competitiveness in Japan. The United States, the ROC and Alberta were competitive in Japan according to overall competitiveness.

Japan has traditionally relied on imports to meet its domestic beef requirements and has become the largest beef importer in the world market according to the total import value since 1992. In the summer of 1988, Japan started to liberalize beef imports after signing the Beef Market Access Agreement (BMAA) with the United States and soon after with Australia. Under the BMAA, in 1991, Japan agreed to provide greater market access for imported beef by initially increasing import quotas and replacing them

by tariffs. Consequently, beef imports in Japan have increased substantially since 1991.

Australia and the United States were two dominant suppliers in the Japanese beef market, together accounting for more than 95 percent of Japanese beef imports during the period 1988-96. In order to maintain their competitive positions, the two main suppliers have been adjusting their beef products to adapt to the change in the Japanese consumers' preferences. For example, the United States had to develop its expertise in chilled products within a relatively short period and Australia had to modify its beef production system to service the Japanese market with grain-fed beef. As a result, more than 40 percent of Australian chilled beef exported to Japan in 1995 was grain fed (Chade and Mori).

The Mexican Beef Market

The strong competitors in the Mexican beef markets were the United States, the ROC and Alberta, according to overall competitiveness. The NAFTA might be responsible for this since tariffs were eliminated with the NAFTA implementation. While the NAFTA gave the United States and Canada free access to the Mexican market for most meat and livestock products, its main competitors still faced tariffs of between 20 and 25 percent on these commodities. Mexican beef imports in 1995 and 1996 (compared to 1994) decreased, largely due to the peso devaluation starting in late 1994 and the associated macroeconomic crisis, but the U.S. share of Mexico's total beef imports increased. This was largely because of the preferential tariffs benefiting the United Sates under the NAFTA (Coleman). The ROC and Alberta were small suppliers, but they were strong competitors. In Mexico, competitiveness of Alberta and the ROC ranked first and second respectively.

It is surprising to find that South & Central America was not competitive. This might be the impacts of the NAFTA since the market shares of South & Central America have decreased greatly with the increase of the market shares of the United States in the Mexican beef market since 1994.

The South Korean Beef Market

South Korea began to import beef in 1988 with quota restrictions, which will

continue until 2001 when complete liberalization will begin to occur. The quota system is administered by the Livestock Product Marketing Organization (LPMO). South Korea, nevertheless, has also developed a private market system, the Simultaneous Buy / Sell system (SBS), which allows authorized groups (super groups) to purchase beef independent of government control.

With the exception of quota restrictions, food safety and phytosanitary regulations were often used to keep imported products out of the market. As in the Japanese beef market, consumers preferred high-quality beef in the South Korean beef market. Competition in the market was mainly among New Zealand, Australia and the United States. The two strong competitors – New Zealand and the United States, especially the United States – increased their market shares gradually; whereas Australia was not able to maintain its market share over the period 1988-96. It has been predicted that as long as imported grassfed beef is not allowed to compete freely with domestic beef in the wholesale market, Australian and New Zealand suppliers will lose market share to US suppliers (Reynolds.R, I. Shaw etc.).

South Korea is a fast-growing beef market, but it will not be easy for Alberta's beef to enter this market. On the one hand, there are tariff and non-tariff trade barriers; on the other hand, there is intense competition in the market.

The Hong Kong Beef Market

The Hong Kong beef market was supplied entirely by imports. In particular, Hong Kong is considered a market for re-exports to southern China. As a result, competition in the Hong Kong beef market is extremely intense. Most competitors conducted active promotion campaigns. Price competition was especially keen since traders attributed the shift in sourcing largely to price differences among alternative suppliers. As well, beef quality was also a key to competition. As in Japan and South Korea, consumers preferred high-quality beef cuts. The strong competitors in the market were the United States, Oceania, China, the ROC and Alberta.

The Taiwanese Beef Market

Beef imports in Taiwan increased steadily from 1988 to 1996. According to

overall competitiveness, the United States, the ROC and Alberta were competitive, whereas Australia and New Zealand were competitive according to competitiveness in Taiwan.

The competition was mainly among the United States, Australia and New Zealand. Currently, Taiwan favors U.S. beef in tariffs and grants a preferential tariff rate to Special Quality Beef (SQB). USDA-graded prime of choice beef is considered SQB. The market for SQB steak cuts is virtually all supplied by the United States, while Australia dominates the market for shin, shank and intercostal (S/S/I) cuts and New Zealand is the leading supplier of cheaper steak cuts (non-SQB). At the same time, the three exporters has been active in promotion. The U.S. Meat Export Federation has conducted many promotions. Australia is also very active in promoting its beef in Taiwan with activities similar to those conducted by the USMEF. New Zealand has been featuring the cleanliness and purity of its beef through traders.

Canada has asked for equivalent treatment with U.S. beef while pressuring the Taiwanese to not provide preferential tariff treatment for lower quality Australian beef (Canada wants tariff differences to remain on High Quality and Lower Quality beef, thus hoping to compete against Australian / New Zealand beef.) (Alberta Agriculture, April 1998). If the requirement can be accepted, it will be helpful for Alberta's beef exports to Taiwan.

4.6.2 Competition in Target Pork Markets

The U.S. Pork Market

In the U.S. pork market, only Alberta was competitive in terms of overall competitiveness. However, in terms of competitiveness in the target market, all three exporting regions were competitive. The market shares among Alberta, the ROC and Denmark fluctuated during this period.

The Japanese Pork Market

Japan was the largest pork import market in the world and represented one of the most promising markets for pork exporters. However, Japanese pork imports were restricted by a complex combination of variable levies and an *ad valorem* import tariff. It

is surprising to find that only the United States, Alberta and the ROC were competitive. The United States was competitive because supermarket chains in particular seem to favor U.S. chilled pork, with the US' ability to supply specific cuts in large volume and a positive consumer image about the country of origin similar as is the case with beef.

It is surprising to find that Denmark and Taiwan were not competitive. With respect to Denmark, it might be because Denmark was shifting its marketing focus from Japan and the United States to within the EU. Its export share to Japan decreased from 43.9 percent in 1988 to 28. 2 percent in 1996, and to the United States from 8.4 percent in 1988 to 3.9 percent in 1996, while its export share to within the EU increased from 45.5 percent in 1988 to 60.1 percent in 1996. With respect to Taiwan, its might be due to that Taiwan tried to diversify its pork exports. After 1989, its pork exports did not completely concentrate on Japan, with the exception of 1993. It should be indicated that the restriction on Taiwanese pork exports to Japan in 1997 benefited other exporters. In March 1997, Taiwan reported an outbreak of foot and mouth (FMD) disease. Shortly thereafter, Japan announced that it would no longer accept pork exports from Taiwan.

The Mexican Pork Market

Similar to beef imports, pork imports in Mexico decreased substantially in 1995 and 1996 (compared with 1994). Nevertheless, the market share of the United States in the Mexican pork market increased significantly, accounting for 97.6 percent of the total Mexican pork imports in 1996. The United States, the ROC and Alberta were strong competitors according to overall competitiveness, which might have been partially due to the NAFTA.

4.6.3 Competition in Target Processed Grain Markets

The U.S. Processed Grain Market

The United States has been the largest processed grain import market in the world, which was mainly supplied by Europe, Asia, South & Central America, the ROC and Alberta.

South & Central America, the ROC and Alberta were strong competitors according to overall competitiveness, and Europe was a strong competitor in terms of competitiveness in the United States. Only Asia showed weak export competitiveness. In terms of import composition of processed grain, the imports of processed grain in the Unites states were comprised of 5.8 percent milling products, 8.4 percent cereal products, 7.4 percent malt products, 24.3 percent pasta products and 54.2 percent bakery products. The imports of bakery products accounted for more than 50 percent of total processed grain imports. Alberta exported a variety of processed grain products to the United States, including 12.2 percent milling products, 33.1 percent cereal products, 34.9 percent malt products, 0.9 percent pasta products and 19 percent bakery products respectively.

The Japanese Processed Grain Market

Asia, the United States and the ROC were competitive according to overall competitiveness, whereas Europe and Oceania were competitive in terms of competitiveness in the Japanese market. Therefore, only Alberta was not competitive in the market. The export composition of processed grain might be responsible for this. Most processed grain exports from Alberta to Japan were malt products, occupying 98.6 percent of processed grain exports, on average, from 1988 to 1996. Its export share of malt products to Japan, however, decreased by an average of 4.9 percent per year over the period 1988-96.

The South Korean Processed Grain Market

The United States, Europe and Asia presented strong competitiveness, while Oceania, the ROC and Alberta showed weak competitiveness. Alberta started to export its processed grain to South Korea in 1990. All exports of processed grain from Alberta to South Korea were malt products during the period 1988-96.

4.7 Summary of Results

4.7.1 Alberta's Export Competitiveness

In Target Beef Markets: According to overall competitiveness, Alberta was

found to be competitive in the United States, Japan, Mexico, Hong Kong, and Taiwan, while not in South Korea. In terms of competitiveness in target markets, Alberta exhibited strong competitiveness only in the United States, not in Japan, Mexico, Hong Kong, South Korea and Taiwan. Nevertheless, Alberta was competitive in the world beef market.

In Target Pork Markets: Similarly as for the case of beef, Alberta was found to be competitive in the United States, Japan, and Mexico according to overall competitiveness. In terms of competitiveness in target markets, Alberta was competitive only in the United States, while not in Japan and South Korea. However, it was competitive in the world pork market.

In Target Processed Grain Markets: In terms of overall competitiveness, Alberta was found to be competitive in the United States, while not in Japan and South Korea. In terms of competitiveness in target markets, Alberta was not competitive in all three markets. However, Alberta was competitive in the world processed grain market.

4.7.2 Main Competitors for Alberta

In Target Beef Markets: In terms of overall competitiveness, the United States showed strong competition to Alberta in all the target markets, and the ROC presented strong competition to Alberta in all the target markets with the exception of South Korea. However, in terms of competitiveness in target markets, Australia and New Zealand posed strong competition to Alberta in the Asian markets. China also represented strong competition to Alberta in Hong Kong, while Europe exhibited strong competition to Alberta in Mexico.

In Target Pork Markets: In terms of overall competitiveness, the United States represented the strongest competition to Alberta in Japan and Mexico, and the ROC showed strong competition in Mexico. However, in terms of competitiveness in target markets, the ROC represented strong competition to Alberta in the United States, Japan, and Mexico. Denmark also posed strong competition to Alberta in the United States, while Europe exhibited strong competition to Alberta in Mexico.

In Target Processed Grain Markets: In terms of overall competitiveness, Asia was a strong competitor to Alberta in Japan and South Korea; the ROC posed

competition to Alberta in the United States and Japan; the United States was a strong competitor to Alberta both in Japan and South Korea; and South & Central America presented strong competition to Alberta in the United States. According to competitiveness in target markets, Europe was a strong competitor to Alberta in the three target markets, the United States was a strong competitor to Alberta in Japan and South Korea, and Oceania posed strong competition against Alberta in Japan and South Korea.

4.7.3 Export Performance

From 1988-96, in terms of export value, Alberta increased its beef, pork and processed grain exports to all target markets. This positive export performance was largely due to its rising competitiveness in the world marketplace and the growth in world trade. In the U.S. beef market, export competitiveness in the United States played an important role except for the growth effect and competitiveness in the world market.

Like Alberta, the United States also increased its beef, pork and processed grain exports to all target markets (other than the United States). The positive export performance of beef and pork in the United States was largely due to the growth in world trade and the rising competitiveness in the world market. The positive export performance of processed grain in the United States, however, was mainly caused by the growth in world trade and the rising competitiveness in target markets.

The ROC increased its exports to all target markets except Mexico. In terms of beef exports, the increase in exports to all the target markets except Mexico was mainly attributed to the growth in world trade and the rising competitiveness in the world market. In addition, competitiveness in the U.S. beef market played an important role in the export performance of the ROC in the United States like that in Alberta. In the Mexican beef market, however, the decrease in beef exports was mainly caused by unfavorable market distribution, weak competitiveness in Mexico and the interaction of the change in exports with the demand change in Mexico. As for the pork exports of the ROC, the increase in the United States and Japan was caused by the growth in world trade and competitiveness in the two target markets, while the decrease in pork exports from the ROC to Mexico was attributed to the unfavorable market distribution and weak competitiveness in the world pork market.

While Australia decreased its beef exports to the United States, it increased its beef exports to Southeast Asian markets. The increased beef exports from Australia to Southeast Asia were largely due to Australia's rising competitiveness in these markets and the favorable market distribution effect in Japan. New Zealand's trade pattern was the same as Australia's.

While Denmark decreased its pork exports to the United States, it increased its pork exports to Japan. The increased exports from Denmark to Japan were largely due to the growth in the world's pork trade.

Asia increased its processed grain exports to all three target markets. The positive export performance was largely due to its strong competitiveness in the world market and the growth in world trade. In the U.S. processed grain market, South & Central America's performance was similar to Asia's.

In contrast, competitiveness in the three target markets was responsible for the positive export performance in Europe except for the growth effect. The same conclusion as Europe applies to Oceania in the Japanese and South Korean processed grain markets.

CHAPTER 5
SENSITIVITY ANALYSIS

5.1 Introduction

As indicated in Chapter Three, the CMS model is subject to some problems in empirical application, which could lead to estimates whose values are sensitive to underlying assumptions. In addition, when the value data are used, some factors might have impacts on the results of the CMS results, such as export prices of exporting regions and exchange rates. In order to investigate the stability of the CMS results, the sensitivity tests are detailed in this chapter.

5.2 Sensitivity Analysis with Respect to the Change in Underlying Assumptions

5.2.1 Variations Due to Changes in Standards

Most previous studies have used total world exports as the standard. Such a practice has ignored the fact that if we are examining competitiveness, a more appropriate standard is the sum of all competitors of an exporting region in question (Richardson 1971a). As such, a new standard, the sum of all competitors, is used. The new standard is different across target markets because the competitors are different in different target markets. However, there is a uniform standard for all exporting regions in one target market. To be comparable, only the percentage changes of each term in CMS decomposition are used. Appendices 9, 10 and 11 present the results along with the original CMS results using the world as the standard. It can be seen that changes in the choice of standard do not affect the decompositions of the simple CMS model but do affect the decompositions of the improved CMS model.

In the six beef target markets, no sign for all the CMS decomposition effects changed in the Mexican market and the Taiwanese market. Few signs changed in the other four target markets. A comparison of the growth effects shows that they were not sensitive to changes in standards since no sign changed. With respect to market distribution effects, the signs changed for Australia, Alberta and the United States in the Japanese market and for Alberta in the South Korean market.

As for the sign of the competitive effect, it changed for South & Central America in the Hong Kong market. Using the new standard – the sum of all competitors, South & Central America was competitive in the Hong Kong market but not in the world market. This conclusion is the opposite to that when the world standard was used. The other change in sigh occurred for New Zealand in the U.S. beef market. Using the new standard – the sum of all competitors, New Zealand was competitive in the U.S. beef market, but it was not competitive in the U.S. beef market while using the total world exports as the standard.

In the three pork markets, no change in sign occurred in the Mexican market. In the other two target pork markets, the sign of some dynamic structural residuals changed but the change in size was not significant. The only change in sign of competitiveness was for Denmark in the U.S. pork market. Using the new standard, the sum of all competitors (here, Alberta and the ROC), Denmark was competitive in the world market but not in the U.S. market. The conclusion is opposite when the world standard was used.

As for processed grain, the change in size and sign for all the effects was insignificant except the change in the static structural residual for Oceania in South Korea. The variation in the CMS results of processed grain was not as sensitive to the change in standards as beef and pork. The reason might be that most of the exporters of processed grain were regions, and the sum of exports of these exporters was almost the same as the total world exports. In terms of the change in sign of competitiveness, it changed for Oceania in the Japanese market and in the South Korean market. When using the world as the standard, Oceania was competitive in the two markets. However, it was not competitive when using the sum of its competitors as the standard.

In summary, the variation was moderate in terms of changes in size and sign of the CMS effects with the change in the choice of standard. Compared with either the world or the sum of all competitors, the effects of the CMS for an exporting region did not change significantly, with a few exceptions. This conclusion is consistent with that reached by Richardson (1971 b).

5.2.2 Variations Due to Changes in Market Definition

CMS effects may vary with the change in market definition. In order to test the sensitivity of the CMS results to changes in the definition of the market, different levels of consolidation of importing regions were chosen. With respect to beef, Asia 4 – Japan, South Korea, Taiwan and Hong Kong – were consolidated as one market; the United States and Mexico were combined as one market; and all six target markets were consolidated as one market. As for pork, the United States and Mexico were consolidated as one market; and all three target markets were combined into one market. For processed grain, Japan and South Korea were combined into one market; and all three target markets were consolidated into one market.

The sensitivity analysis was conducted only for some exporters because the CMS analyses for other exporters with the exception of Alberta and the ROC were conducted only in some of the target markets. For example, the CMS analysis in the market of Asia 4 was conducted only for Alberta, the ROC and the United States. The results of varying the definition of the market along with the estimates in each single market are shown in Appendices 12, 13 and 14. The export size of an exporting region was different across the markets; therefore, only the percentage changes were used for comparison.

In target beef markets, a comparison in sign for the growth effect and the pure residual reveals that they were not sensitive to changes in the definition of the market. The conclusion that the increase in world trade contributed positively to the increase in exports for all exporting regions and that all exporting regions except the ROC were competitive in the world market remains unchanged. The other four terms – market distribution effect, static structural residual, pure second-order effect and dynamic structural residual – were relatively sensitive in terms of frequency of sign changes.

In the three pork markets, the signs of the world trade effect, the market distribution effect and the pure residual did not change. This shows that the world trade effect contributed positively to the growth in pork exports for Alberta and the ROC in the combined markets of the United States and Mexico, and of the three target markets. The conclusion about the market distribution effect and the pure residual for Alberta and the ROC is the same as that in each separate market. In terms of competitiveness in these combined markets, the sign changed for Alberta, but unchanged for the ROC. Some

slight changes in sign and size occurred for the pure second-order effect and the dynamic structural residual.

In the processed grain markets, the signs of the growth effect, the market distribution effect, the pure residual and the static structural residual in the consolidated markets were completely consistent with the signs in each separate market. Some slight changes in sign and size occurred for the pure second-order effect and the dynamic structural residual.

It can be seen that the sign of each item in the consolidated market is consistent with that in each separate market if all the signs of one item in each separate market were the same. Otherwise, the sign in the consolidated market depends on the impacts from all these separate markets. It can be concluded that the CMS results in a combined market are weighted averages of these effects in each region/country of the combined markets. This illustrates that the markets that are consolidated should be as homogeneous as possible.

In summary, the CMS results were sensitive to the change in market definition. The competitiveness varied substantially across different markets. This conclusion supports that reached by Bowen and Pelzman (1984).

5.3 Variation Due to Prices and Exchange Rates

In the CMS model, the change in market share reflects the change in competitiveness. But what is the appropriate measure of market share? In theory, market shares can be measured both in value terms and in quantity terms. However, in practice, it does matter whether quantity data or value data are used. If the CMS analysis were conducted based on both export values and export quantities, it should not be surprising to find cases where the commodity, market, and competitive effects were of opposite signs. In particular, the price changes may hamper interpretation of the CMS estimates when value data are used (Bowen and Pelzman). Most CMS studies have used export value shares, largely, because of the absence of reliable quantity data. This study used value data, as most previous studies did because of a paucity of quantity data. The following is an analysis of the impacts of price and exchange rate on the estimates.

5.3.1 Variation Due to Prices

In order to investigate the impacts of differential rates of growth in export prices, Producer Price Index /Wholesale Price Index (PPI/WPI) of an exporting region was used to deflate the data of export values. The CMS results of deflated export values are presented in Appendices 15, 16 and 17. To be comparable, only the percentage changes were employed.

Two points should be clarified. One is that if an exporter is a region, such as Europe, South & Central America, Asia or Oceania, it was not included in the analysis because the PPI/WPI of a region is not available. The other point is that the world exports either to all destinations in the world or to the target market were deflated by PPI/WPI of total industrial countries because the main exporting regions in the world market were industrialized countries. With respect to beef, 90 percent of the world exports from 1988-96 were from the United States, Canada, Australia, New Zealand, and Europe. As for pork, 96 percent of world pork exports were from the United States, Canada, Europe and Taiwan. As for processed grain, 85 percent of world exports of processed grain were from the United States, Canada, Europe and Oceania. Therefore, the PPI/WPI of the industrial countries is thought to be representative.

In the three beef markets, the only change in sign of competitiveness occurred for the United States in the Hong Kong market. No sign of competitiveness changed in the three pork markets. In the three processed grain markets, the sign of competitiveness changed for the ROC in the U.S. market, but the change in size was not significant. In terms of changes in size for all the effects, it was rather moderate. The reason could be that price movements were similar among exporting regions.

5.3.2 Variation Due to Exchange Rates

Exchange rates might have influences on the CMS results when the data in value terms were employed. In this study, the value data for the Canadian dollar have been employed. During the period 1988-96, the Canadian dollar was depreciating against the US dollar. As a result, the export values could be overvalued when using the Canadian dollar, whereas the export values may be undervalued while using the US dollar. In order to examine the sensitivity of the CMS results to the exchange rate, all the export values

including the export values of both the world and the exporting region were transferred into those for the US dollar. As a result, the impacts of exchange rates between the Canadian dollar and the US dollar were explored, and this shed light on the effects of exchange rates on CMS results. The results are provided in Appendices 18, 19 and 20.

It can be seen that the variation in the CMS results was rather moderate with the exception of the ROC in the U.S. pork market. Among the three markets, the variation in the pork markets was greater than that in the beef and processed grain markets. A comparison between the results in Canadian dollars and in US dollars shows that the exchange rates did have impacts on CMS results, but the variation was not sufficient to alter the conclusions.

5.4 Summary

Sensitivity analysis showed that the change in standards did have impacts on the CMS estimates, but the impacts were moderate. However, the CMS results were sensitive to changes in the definition of the market. The competitiveness of an exporting region was different across markets. Prices and exchange rates did have influences on the CMS results, but the change in sign was not frequent and the change in size was not significant. Consequently, the inferences based on the CMS results are basically reliable.

CHAPTER 6
CONCLUSIONS AND MARKETING IMPLICATIONS, LIMITATIONS AND RECOMMENDATIONS FOR FURTHER STUDY

6.1 Conclusions and Marketing Implications

The CMS model is useful in the analysis of export performance and competitiveness, and numerically splits the past export growth into different components. Most previous studies have employed the traditional CMS model. However, there are some application problems when using the traditional CMS model. For this reason, Jepma proposed an improved multiple commodities/markets model. This study has used a one commodity/market CMS model derived from Jepma's improved multiple commodities/markets CMS model.

The results of the one commodity/market model show that Alberta performed well in all targeted products and markets in terms of exports from 1988 to 1996. Its export performance was particularly promising in the United States. In terms of export competitiveness, Alberta was strong in the world beef, pork and processed grain markets and in the U.S. beef and pork markets, but weak in the Mexican market and major Asian markets. This might have been caused by the lack of strategic importance of these markets to Alberta industries, compared to the U.S. markets Consequently, less marketing efforts were focused on these markets during this period. In contrast, though their export competitiveness in the world marketplace was down, Australia, New Zealand, and Europe increased their export competitiveness in major Asian markets. If Alberta put more effort into these Asian markets as well as the Mexican market, Alberta's export competitiveness in these markets might be improved in the future. Such a shift would require Alberta's industries to recognize the challenge and allocate marketing resource accordingly.

6.2 Limitations

The study period from 1988 to 1996 is relatively short, and only value data were used because of the limitation of data availability. A longer study period and quantity data are desirable.

This study applies one commodity/market model in an attempt to help Alberta's agri-food export industry understand its competitive position concerning a specific product in a specific market. However, it is easy to have a negative market distribution effect using the empirical model. Inferring the market distribution of an exporting region based only on the sign of the CMS results will lead to biased findings. As such, the study has analyzed the market distribution of Alberta and its main competitors.

6.3 Recommendations for Further Study

It is important to explore the factors behind the competitiveness patterns of Alberta and its main competitors for each target product in each target market based on this study.

A one commodity/multiple markets analysis will be desirable to form a complement to this study of one commodity/market model. Based on the CMS model of one commodity/multiple markets, the market distribution effect will be more reasonable than that derived from the CMS model of one commodity/ market model.

With respect to the study of processed grain, a disaggregated study would be more meaningful. For example, a competitiveness assessment of Alberta's malt products in the Japanese and South Korean markets will provide more valuable information for Alberta's agri-food export industry.

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Appendix 1

4-Digit Harmonized System (HS) Codes in TIERS and Standard International Trade Classification (SITC) Codes in WTA

Products	4-Digit HS Codes in Trade Information Enquiry and Retrieval System (TIERS)	4-Digit SITC Codes in World Trade Analyzer (WTA)
Beef	0201-Meat of bovine animals, fresh or chilled 0202-Meat of bovine animals, frozen	0111-Meat of bovine animals, fresh, chilled or frozen
Pork	0203-Meat of swine, fresh, chilled or frozen	0113-Meat of swine, fresh, chilled or frozen
Processed Grain	1101-Wheat or meslin flour 1102-Cereal flours other than of wheat or meslin 1103-Cereal groats, meal and pellets 1104-Cereal grains otherwise worked (for example, hulled, rolled, flaked, pearled, sliced or Kibbled), except rice of heading No. 10.06; germ of cereals, whole, rolled, flaked or ground 1107-Malt, whether or not roasted 1109-Wheat gluten, whether or not dried 1901-Malt extract; food preparation of flour, meal, starch or malt extract, not containing cocoa or containing less than 40 percent by weight of cocoa calculated on a totally defatted basis; not elsewhere specified or included; food preparations of goods of heading Nos. 04.01to 04.04, not containing cocoa or containing less than 5 percent by weight of cocoa calculated on a totally defatted basis, not elsewhere specified or included. 1902-Pasta, whether or not cooked or stuffed (with meat or other substances) or otherwise prepared, such as spaghetti, macaroni, noodles, lasagna, gnocchi, ravioli, cannelloni; couscous, whether or not prepared. 1905-Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty cachets of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products.	0460-Meal and flour of wheat and flour of meslin 0470-Other cereal meals and flours 0481-Cereal grains, worked/prepared, (breakfast foods) 0482-Malt,roasted or not (including malt flour) 0483-Macaroni,spaghetti and similar products 0484-Bakery products (e.g., bread, biscuits, cakes) ETC 0488-Malt extract; prep.of flour etc, for infant food 048X-Res: Cereal prepar. & preps. of flour of fruits of VEG

Sources: Canadian Export Classification, 1996 and World Trade Database on CD-ROM User Guide, 1980-1995, Statistics Canada.

Appendix 2

Export Values and Market Shares of Main Export Suppliers in Target Beef Markets:1988-96 (CND $000)

Suppliers	1988		1989		1990		1991		1992		1993		1994		1995		1996		Average (1988-96)	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
The U.S. Market																				
Australia	941,546	49.8	779,596	43.4	1,045,348	50.8	1,036,305	49.3	1,050,853	47.3	944,196	40.5	753,846	35.7	527,218	31.1	396,637	24.3	830,616	41.9
N.Zealand	591,699	31.3	594,494	33.1	593,665	28.9	644,620	30.7	647,999	29.2	631,338	27.1	571,956	27.1	484,183	28.5	387,185	23.8	571,904	28.9
S & C	181,992	9.6	215,209	12.0	181,840	8.8	187,574	8.9	145,607	6.6	261,295	11.2	246,612	11.7	169,779	10.0	175,729	10.8	196,182	9.9
Alberta	44,827	2.4	68,396	3.8	73,792	3.6	77,713	3.7	165,341	7.4	254,245	10.9	326,775	15.5	322,695	19.0	427,750	26.2	195,726	9.9
The ROC	119,522	6.3	135,684	7.5	156,112	7.6	141,207	6.7	206,762	9.3	224,914	9.6	199,403	9.4	185,237	10.9	238,281	14.6	178,569	9.0
Others	12,930	0.7	3,858	0.2	5,141	0.3	12,694	0.6	6,357	0.3	15,960	0.7	12,474	0.6	7,990	0.5	4,660	0.3	9,118	.5
Total	**1,892,515**	**100**	**1,797,236**	**100**	**2,055,899**	**100**	**2,100,114**	**100**	**2,222,919**	**100**	**2,331,948**	**100**	**2,111,067**	**100**	**1,697,101**	**100**	**1,630,243**	**100**	**1,982,116**	**100**
The Japanese Market																				
Australia	580,819	32.6	750,941	34.6	818,978	38.7	857,894	42.9	988,039	39.3	1,304,139	42.3	1,634,625	43.8	1,624,691	37.4	1,249,637	34.5	1,089,974	38.7
USA	1,093,969	61.5	1,297,950	59.7	1,202,245	56.8	1,078,483	54.0	1,455,277	57.9	1,682,924	54.6	1,960,645	52.5	2,520,983	58.1	2,213,869	61.2	1,611,816	57.2
Alberta	4,868	.3	12,673	.6	9,636	.5	8,455	.4	9,185	.4	7,086	.2	14,264	.4	24,320	.6	16,973	.5	11,940	.4
The ROC	11,253	.6	15,561	.7	6,600	.3	3,338	.2	5,419	.2	1,322	.0	7,386	.2	22,120	.5	17,610	.5	10,068	.4
Others	88,383	5.0	95,594	4.4	78,239	3.7	49,687	2.5	55,715	2.2	89,542	2.9	115,076	3.1	148,751	3.4	122,101	3.4	93,676	3.3
Total	**1,779,291**	**100**	**2,172,720**	**100**	**2,115,698**	**100**	**1,997,858**	**100**	**2,513,635**	**100**	**3,085,014**	**100**	**3,731,996**	**100**	**4,340,865**	**100**	**3,620,191**	**100**	**2,817,474**	**100**
The Mexican Market																				
USA	53,032	88.3	104,329	81.3	107,923	67.2	233,682	65.3	308,258	78.8	177,923	65.5	357,300	88.5	139,167	97.5	235,872	99.3	190,832	79.7
Europe	3,994	6.6	8,011	6.2	17,714	11.0	63,409	17.7	30,428	7.8	16,907	6.2	7,488	1.9	11	.0	0	.0	16,440	6.9
S & C	2,272	3.8	15,754	12.3	34,971	21.8	54,054	15.1	44,036	11.3	53,642	19.7	14,036	3.5	108	.1	68	.0	24,327	10.2
Alberta	5	.0	65	.1	0	.0	0	.0	0	0	186	.1	184	.0	316	.2	217	.1	108	.0
The ROC	743	1.2	204	.2	47	.0	0	.0	72	.0	222	1	234	.1	1,678	1.2	-51	.0	350	.1
Others	27	.0	0	.0	15	.0	6,549	1.8	8,449	2.2	22,737	8.4	24,575	6.1	1,466	1.0	1,422	.6	7,249	3.0
Total	**60,073**	**100**	**128,362**	**100**	**160,670**	**100**	**357,694**	**100**	**391,242**	**100**	**271,619**	**100**	**403,816**	**100**	**142,747**	**100**	**237,529**	**100**	**239,306**	**100**
The South Korean Market																				
Australia	18,642	37.1	144,930	62.6	167,242	54.0	226,810	48.1	229,610	43.8	137,481	35.9	156,249	28.3	179,017	25.3	158,192	26.8	157,575	37.1
N.Zealand	725	1.4	4,699	2.0	14,457	4.7	32,696	6.9	22,504	4.3	36,813	9.6	63,415	11.5	74,051	10.5	60,978	10.3	34,482	8.1
USA	30,255	60.3	67,963	29.1	125,231	40.4	212,101	44.9	271,526	51.8	207,522	54.1	323,162	58.6	441,021	62.4	362,775	61.5	226,840	53.4
Alberta	457	0.9	15,125	6.5	2,349	0.8	173	0.0	408	0.1	76	0.0	189	0.0	3,125	0.4	4,060	0.7	2,885	0.7
The ROC	76	0.2	974	0.4	568	0.2	13	0.0	39	0.0	828	0.2	7,801	1.4	8,432	1.2	3,355	0.6	2,454	0.6
Others	33	0.1	94	0.0	56	0.0	110	0.0	163	0.0	698	0.2	798	0.1	981	0.1	323	0.1	362	0.1
Total	**50,188**	**100**	**233,784**	**100**	**309,903**	**100**	**471,903**	**100**	**524,250**	**100**	**383,418**	**100**	**551,613**	**100**	**706,627**	**100**	**589,684**	**100**	**424,597**	**100**
The Taiwanese Market																				
Australia	0	.0	97,679	58.3	106,155	69.8	112,020	65.0	129,567	66.3	113,182	58.1	126,458	56.0	114,294	45.0	69,630	35.1	96,554	54.1
N.Zealand	26,896	60.3	36,374	21.7	29,606	19.5	38,846	22.6	37,429	19.2	51,501	26.4	57,056	25.3	69,661	27.4	56,210	28.3	44,842	25.1
USA	16,846	37.8	32,755	19.5	15,169	10.0	19,832	11.5	24,433	12.5	28,504	14.6	39,907	17.7	64,579	25.4	65,942	33.3	34,219	19.2
Alberta	3	0.0	91	0.1	21	0.0	447	0.3	109	.1	235	1	1,097	.5	3,448	1.4	1,510	.8	773	.4
The ROC	414	0.9	88	0.1	2	0.0	103	0.1	158	1	101	1	397	2	474	.2	3,074	1.6	534	.3
Others	454	1.0	620	0.4	1,124	0.7	973	0.6	3,740	1.9	1,372	7	937	.4	1,774	.7	1,920	1.0	1,435	.8
Total	**44,613**	**100**	**167,608**	**100**	**152,076**	**100**	**172,220**	**100**	**195,436**	**100**	**194,895**	**100**	**225,853**	**100**	**254,229**	**100**	**198,286**	**100**	**178,357**	**100**
The Hong Kong Market																				
China	17,969	16.7	17,533	18.8	18,807	18.2	18,599	16.7	10,422	8.6	9,519	7.7	22,030	15.1	20,968	12.5	16,636	10.1	16,943	13.4
USA	13,701	12.7	16,566	17.7	16,083	15.6	20,904	18.8	29,763	24.5	25,910	21.0	26,249	18.0	33,736	20.1	68,019	41.2	27,881	22.0
Oceania	35,479	32.9	30,065	32.2	37,154	36.0	33,481	30.1	40,164	33.1	41,826	33.9	39,721	27.3	58,255	34.7	51,746	31.4	40,877	32.3
S& C	32,578	30.2	22,444	24.0	24,796	24.0	29,193	26.3	31,210	25.7	33,737	27.3	40,260	27.7	42,754	25.5	18,058	10.9	30,559	24.2
Alberta	210	0.2	109	0.1	86	0.1	487	0.4	41	0	614	5	1,682	1.2	495	.3	619	.4	483	.4
The ROC	565	0.5	292	0.3	196	0.2	402	0.4	434	4	252	2	243	2	316	.2	827	.5	392	.3
Others	7,239	6.7	6,385	6.8	6,148	6.0	8,057	7.3	9,447	7.8	11,517	9.3	15,260	10.5	11,451	6.8	9,017	5.5	9,391	7.4
Total	**107,741**	**100**	**93,395**	**100**	**103,271**	**100**	**111,123**	**100**	**121,480**	**100**	**123,374**	**100**	**145,445**	**100**	**167,975**	**100**	**164,920**	**100**	**126,525**	**100**

Sources: Trade Information Enquiry and Retrieval System TIERS and World Trade Analyzer (WTA), Statistics Canada

Notes: N. New Zealand is New Zealand, S&C is South & Central America, and the ROC is the Rest of Canada

Appendix 3

Export Values and Market Shares of Main Export Suppliers in Target Pork Markets:1988-96

(CND $000)

Suppliers	1988		1989		1990		1991		1992		1993		1994		1995		1996		Average (1988-96)	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
The U.S. Market																				
Denmark	139,494	21.9	86,062	17.4	149,517	23.4	156,020	28.5	94,427	18.8	156,658	26.0	199,053	29.8	145,946	21.2	127,837	18.4	139,446	22.9
Alberta	44,247	6.9	39,995	8.1	81,310	12.7	75,418	13.8	62,422	12.4	65,118	10.8	67,493	10.1	90,154	13.1	111,099	16.0	70,806	11.6
The ROC	421,598	66.2	340,723	68.9	380,585	59.6	298,745	54.5	320,923	64.0	346,355	57.4	358,658	53.7	388,099	56.4	438,003	63.1	365,965	60.2
Others	31,545	5.0	27,949	5.6	27,323	4.3	17,646	3.2	23,774	4.7	35,286	5.8	42,259	6.3	64,069	9.3	17,262	2.5	31,901	5.3
Total	**636,883**	**100**	**494,728**	**100**	**638,735**	**100**	**547,828**	**100**	**501,545**	**100**	**603,417**	**100**	**667,463**	**100**	**688,268**	**100**	**694,202**	**100**	**608,119**	**100**
The Japanese Market																				
Denmark	729,030	36.6	690,147	36.7	597,294	31.8	694,108	31.4	877,634	31.0	978,457	31.1	1,101,784	28.7	1,132,600	23.4	931,556	18.2	859,179	27.9
Taiwan	772,602	38.8	622,156	33.1	790,154	42.0	1,121,422	50.7	1,301,130	45.9	1,413,432	44.9	1,894,368	49.3	2,364,073	48.8	2,185,833	42.8	1,385,019	44.9
USA	239,870	12.0	289,085	15.4	283,350	15.1	242,050	10.9	390,282	13.8	452,144	14.4	514,635	13.4	842,424	17.4	1,074,935	21.0	480,975	15.6
Alberta	781	.0	969	.1	901	0	4,636	.2	15,158	.5	16,954	.5	22,279	.6	23,568	.5	21,815	.4	11,896	.4
The ROC	147,761	7.4	161,127	8.6	139,473	7.4	105,377	4.8	142,234	5.0	154,995	4.9	154,181	4.0	201,945	4.2	216,199	4.2	158,143	5.1
Others	101,764	5.1	118,227	6.3	68,278	3.6	45,823	2.1	106,015	3.7	134,652	4.3	154,396	4.0	282,129	5.8	681,271	13.3	188,062	6.1
Total	**1,991,807**	**100**	**1,881,711**	**100**	**1,879,450**	**100**	**2,213,414**	**100**	**2,832,453**	**100**	**3,150,635**	**100**	**3,841,642**	**100**	**4,846,739**	**100**	**5,111,610**	**100**	**3,083,273**	**100**
The Mexican Market																				
USA	31,819	51.9	66,709	68.7	42,882	59.2	74,364	72.1	86,636	84.2	68,341	61.2	116,989	68.7	40,641	79.3	46,557	97.6	63,882	70.3
Europe	26,254	42.9	21,195	21.8	15,569	21.5	16,069	15.6	1,680	1.6	8,653	7.7	14,187	8.3	555	1.1	322	.7	11,609	12.8
Alberta	111	.2	744	.8	1,234	1.7	365	.4	1,721	1.7	2,257	2.0	1,700	1.0	444	.9	331	.7	990	1.1
The ROC	3,000	4.9	8,401	8.7	12,623	17.4	12,326	12.0	12,898	12.5	32,471	29.1	37,437	22.0	9,596	18.7	482	1.0	14,359	15.8
Others	78	.1	45	.0	131	.2	14	.0		.0		.0	16	.0	10	.0		.0	33	.04
Total	**61,263**	**100**	**97,094**	**100**	**72,439**	**100**	**103,137**	**100**	**102,935**	**100**	**111,723**	**100**	**170,329**	**100**	**51,245**	**100**	**47,691**	**100**	**90,873**	**100**

Sources: Trade Information Enquiry and Retrieval System (TIERS) and World Trade Analyzer (WTA), Statistics Canada
Notes: N. New Zealand is New Zealand, S&C is South & Central America, and the ROC is the Rest of Canada

Appendix 4

Export Values and Market Shares of Main Export Suppliers in Target Processed Grain Markets: 1988-96 (CND $000)

Suppliers	1988		1989		1990		1991		1992		1993		1994		1995		1996		Average (1988-96)	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
The U.S. Market																				
Asia	116,318	18.2	132,585	18.3	142,956	18.4	165,839	20.2	194,415	19.3	215,628	17.6	262,161	16.8	275,042	15.7	284,065	14.5	198,779	17.1
Europe	259,115	40.7	316,593	43.6	325,130	41.8	308,223	37.5	363,827	36.2	442,848	36.1	541,336	34.7	597,047	34.0	609,541	31.1	418,184	35.9
S & C	38,266	6.0	60,720	8.4	63,251	8.1	65,769	8.0	92,545	9.2	108,274	8.8	157,646	10.1	187,252	10.7	220,440	11.2	110,463	9.5
Alberta	2,978	0.5	4,306	0.6	2,117	0.3	2,491	0.3	3,878	0.4	12,802	1.0	25,745	1.7	26,660	1.5	36,608	1.9	13,065	1.1
The ROC	213,975	33.6	195,573	27.0	236,336	30.4	272,445	33.2	345,234	34.3	441,557	36.0	561,891	36.1	660,187	37.6	794,928	40.6	413,569	35.6
others	6,739	1.1	15,535	2.1	8,586	1.1	6,258	.8	5,876	.6	5,456	.4	9,525	.6	10,323	.6	14,537	.7	9,204	.8
Total	**637,390**	**100**	**725,312**	**100**	**778,375**	**100**	**821,024**	**100**	**1,005,775**	**100**	**1,226,564**	**100**	**1,558,304**	**100**	**1,756,511**	**100**	**1,960,119**	**100**	**1,163,264**	**100**
The Japanese Market																				
USA	38,311	8.2	71,034	11.8	44,944	7.6	42,974	7.1	52,151	7.7	86,141	10.9	156,144	15.8	137,704	12.1	150,038	11.7	86,605	10.9
Asia	96,870	20.6	120,124	19.9	121,090	20.4	136,737	22.7	171,815	25.3	233,467	29.4	335,783	33.9	345,237	30.4	381,230	29.7	215,817	27.2
Europe	196,243	41.8	241,061	39.9	258,205	43.4	256,245	42.6	282,508	41.6	300,797	37.9	307,756	31.0	429,358	37.8	465,838	36.3	304,224	38.3
Oceania	82,338	17.5	81,806	13.6	84,076	14.1	79,597	13.2	77,533	11.4	84,325	10.6	111,725	11.3	127,819	11.3	158,238	12.3	98,606	12.4
Alberta	29,282	6.2	49,836	8.3	46,271	7.8	43,471	7.2	40,844	6.0	43,078	5.4	32,423	3.3	44,555	3.9	55,576	4.3	42,815	5.4
The ROC	26,714	5.7	39,698	6.6	39,617	6.7	42,540	7.1	53,388	7.9	45,084	5.7	46,224	4.7	49,268	4.3	71,994	5.6	46,059	5.8
Others	49	.0	128	.0	112	.0	73	0	243	.0	490	.1	1,258	.1	2,058	.2	1,999	.2	712	.1
Total	**469,807**	**100**	**603,687**	**100**	**594,315**	**100**	**601,638**	**100**	**678,481**	**100**	**793,382**	**100**	**991,314**	**100**	**1,135,997**	**100**	**1,284,914**	**100**	**794,837**	**100**
The South Korean Market																				
USA	2,079	19.1	5,416	15.1	4,917	12.0	9,258	13.1	11,994	17.0	19,422	21.9	22,978	23.5	24,456	13.8	29,180	17.9	14,411	17.2
Asia	3,657	33.7	5,703	15.9	8,494	20.8	25,061	35.5	22,803	32.4	19,963	22.5	22,265	22.8	40,383	22.7	44,226	27.1	21,395	25.5
Europe	4,458	41.0	11,964	33.5	14,452	35.4	23,066	32.7	19,329	27.5	30,973	34.9	31,165	31.9	66,824	37.6	65,751	40.2	29,776	35.4
Oceania	661	6.1	12,369	34.6	10,462	25.6	8,475	12.0	5,459	7.8	5,395	6.1	4,087	4.2	15,985	9.0	7,747	4.7	7,849	9.3
Alberta	0	.0	0	.0	170	.4	70	.1	1,481	2.1	1,203	1.4	5,881	6.0	9,480	5.3	2,681	1.6	2,329	2.8
The ROC	7	.1	309	.9	2,335	5.7	4,627	6.6	7,284	10.4	5,534	6.2	7,641	7.8	16,934	9.5	10,392	6.4	6,118	7.3
Others	0	.0	0	0	33	.1	42	.1	2,012	2.9	6,247	7.0	3,830	3.9	3,458	1.9	3,423	2.1	2,116	2.5
Total	**10,863**	**100**	**35,762**	**100**	**40,862**	**100**	**70,598**	**100**	**70,362**	**100**	**88,736**	**100**	**97,846**	**100**	**177,520**	**100**	**163,400**	**100**	**83,994**	**100**

Sources: Trade Information Enquiry and Retrieval System (TIERS) and World Trade Analyzer (WTA), Statistics Canada

Notes: N. New Zealand is New Zealand, S&C is South & Central America, and the ROC is the Rest of Canada.

Appendix 5

The Use of Access and Macro Functions in Excel

As there are a great number of repeated calculations in the CMS decomposition, the task was automated with the use of Macro function in Microsoft Excel. A macro is a series of commands and functions that are stored in a Visual Basic module and that can be run whenever one needs to perform the task. Before recording a macro, one plans the steps and commands one would like the macro to perform. For this project, we conducted the calculation in 12 sheets. They are for the American beef, Japanese beef, Mexican beef, South Korean beef, Hong Kong beef, Taiwanese beef, American pork, Japanese pork, Mexican pork, American processed grain, Japanese grain and South Korean grain respectively. For example, the first sheet is for the American beef. In this sheet, the nine-year CMS decomposition results of Alberta and all its competitors were calculated. Before doing the calculation in this sheet, a new Macro was selected. The calculation process was recorded automatically. In all the other sheets, the calculation process was conducted through running the Macro recorded in the first sheet.

Appendix 6

The Average Results of the Yearly Decomposition of the Change in Export Value of Beef for Alberta and its Main Competitors in Target Markets During the Period of 1988-1996

Competitors	Australia		New Zealand		Alberta		The Rest of Canada		The United States		South & Central America		Europe	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%		
The U.S. Market														
Change in Export Value	-68,114	-100	-25,564	-100	47,865	100	14,845	100			-783	-100		
Structural Effect	**-7,326**	**-11**	**-6,627**	**-26**	**-9,881**	**-21**	**-4,055**	**-27**			**-4,496**	**-574**		
Growth Effect	76,549	112	29,055	114	316	1	5,091	34			35,208	4,498		
Market Distribution Effect	-83,875	-123	-35,682	-140	-10,197	-21	-9,145	-62			-39,704	-5,072		
Residual Effect	**-66,922**	**-98**	**-16,594**	**-65**	**60,632**	**127**	**19,652**	**132**			**4,060**	**519**		
Pure Residual	-18,813	-28	-13,710	-54	52,279	109	13,283	89			29,256	3,737		
Static Structural Residual	-48,108	-71	-2,884	-11	8,353	17	6,369	43			-25,196	-3,219		
Second-order Effect	**6,134**	**9**	**-2,344**	**-9**	**-2,886**	**-6**	**-753**	**-5**			**-347**	**-44**		
Pure Second-order Effect	-659	-1.0	844	3	641	1	-233	-2			-549	-70		
Dynamic Structural Residual	6,793	10	-3,188	-12	-3,527	-7	-520	-4			201	26		
The Japanese Market														
Change in Export Value	83,602	100			1,513	100	795	100	139,988	100				
Structural Effect	**97,454**	**117**			**532**	**35**	**202**	**25**	**125,547**	**90**				
Growth Effect	76,549	92			316	21	5,091	641	39,542	28				
Market Distribution Effect	20,905	25			216	14	-4,889	-615	86,005	61				
Residual Effect	**-12,658**	**-15**			**608**	**40**	**210**	**26**	**14,724**	**11**				
Pure Residual	-18,813	-23			52,279	3,455	13,283	1,672	215,895	154				
Static Structural Residual	6,155	7			-51,670	-3,415	-13,073	-1,645	-201,171	-144				
Second-order Effect	**-1,194**	**-1**			**373**	**25**	**383**	**48**	**-283**	**-.2**				
Pure Second-order Effect	2,676	3			141	9	42	5	-2,817	-2				
Dynamic Structural Residual	-3,869	-5			233	15	341	43	2,533	2				
The Mexican Market														
Change in Export Value					27	100	-99	-100	22,855	100	-276	-100	-499	-100
Structural Effect					**25**	**96**	**250**	**252**	**11,820**	**52**	**7,268**	**2,638**	**3,540**	**709**
Growth Effect					316	1,189	5,091	5,132	39,542	173	35,208	12,780	283,371	56,754
Market Distribution Effect					-291	-1,094	-4,840	-4,879	-27,722	-121	-27,940	-10,142	-279,831	-56,045
Residual Effect					**86**	**325**	**274**	**276**	**9,035**	**40**	**-3,996**	**-1,450**	**-5,542**	**-1,110**
Pure Residual					52,279	196,813	13,283	13,390	215,895	945	29,256	10,619	-270,968	-54,270
Static Structural Residual					-52,192	-196,488	-13,009	-13,114	-206,861	-905	-33,252	-12,070	265,426	53,160
Second-order Effect					**-85**	**-321**	**-624**	**-629**	**2,001**	**9**	**-3,548**	**-1,288**	**1,503**	**301**
Pure Second-order Effect					9	35	60	61	912	4	-333	-121	-714	-143
Dynamic Structural Residual					-95	-356	-684	-689	1,088	5	-3,215	-1,167	2,217	444

Appendix 6

(Continued)

Competitors	Australia		New Zealand		Alberta		The Rest of Canada		The United States		South & Central America		Oceania		China	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
The South Korean Market																
Change in Export Value	17,444	100	7,532	100	450	100	410	100	41,565	100						
Structural Effect	**30,110**	**173**	**3,879**	**52**	**913**	**203**	**255**	**62**	**32,215**	**78**						
Growth Effect	76,549	439	29,055	386	316	70	5,091	1,242	39,542	95						
Market Distribution Effect	-46,439	-266	-25,175	-334	597	133	-4,835	-1,180	-7,327	-18						
Residual Effect	**-15,147**	**-87**	**3,697**	**49**	**-1,108**	**-246**	**-112**	**-27**	**12,668**	**30**						
Pure Residual	-18,813	-108	-13,710	-182	52,279	11,607	13,283	3,241	215,895	519						
Static Structural Residual	3,666	21	17,407	231	-53,386	-11,853	-13,395	-3,268	-203,227	-489						
Second-order Effect	**2,481**	**14**	**-45**	**-1**	**645**	**143**	**266**	**65**	**-3,318**	**-8**						
Pure Second-order Effect	-1,375	-8	144	2	-124	-28	142	35	1,194	3						
Dynamic Structural Residual	3,856	22	-189	-3	770	171	124	30	-4,512	-11						
The Hong Kong Market																
Change in Export Value					51	100	33	100	6,790	100	-1,815	-100	2,033	100	-167	-100
Structural Effect					**50**	**97**	**11**	**35**	**1,456**	**21**	**1,828**	**101**	**2,200**	**108**	**940**	**564**
Growth Effect					316	618	5,091	15,587	39,542	582	35,208	1,940	105,807	5,204	6,465	3,878
Market Distribution Effect					-266	-521	-5,079	-15,551	-38,085	-561	-33,381	-1,839	-103,606	-5,095	-5,524	-3,314
Residual Effect					**7**	**15**	**19**	**59**	**5,458**	**80**	**-3,774**	**-208**	**-248**	**-12**	**-1,079**	**-647**
Pure Residual					52,279	102,307	13,283	40,671	215,895	3,180	29,256	1,612	-32,691	-1,608	-11,538	-6,921
Static Structural Residual					-52,271	-102,292	-13,264	-40,611	-210,437	-3,099	-33,030	-1,820	32,444	1,596	10,458	6,274
Second-order Effect					**-6**	**-12**	**2**	**6**	**-125**	**-2**	**132**	**7**	**81**	**4**	**-28**	**-17**
Pure Second-order Effect					-5	-11	-16	-50	-738	-11	511	28	183	9	7	4
Dynamic Structural Residual					-1	-1	18	55	614	9	-380	-21	-102	-5	-34	-20
The Taiwanese Market																
Change in Export Value	8,704	100	3,664	100	188	100	332	100	6,137	100						
Structural Effect	**3,558**	**41**	**9,982**	**272**	**-65**	**-35**	**139**	**42**	**5,419**	**88**						
Growth Effect	76,549	879	29,055	793	316	168	5,091	1,531	39,542	644						
Market Distribution Effect	-72,991	-839	-19,073	-521	-381	-202	-4,952	-1,490	-34,122	-556						
Residual Effect	**-3,729**	**-43**	**-367**	**-10**	**159**	**84**	**416**	**125**	**3,424**	**56**						
Pure Residual	-18,813	-216	-13,710	-374	52,279	27,764	13,283	3,996	215,895	3,518						
Static Structural Residual	15,084	173	13,343	364	-52,120	-27,679	-12,868	-3,871	-212,471	-3,462						
Second-order Effect	**8,874**	**102**	**-5,950**	**-162**	**95**	**50**	**-222**	**-67**	**-2,706**	**-44**						
Pure Second-order Effect	651	7	-182	-5	48	25	-81	-24	-441	-7						
Dynamic Structural Residual	8,223	94	-5,768	-157	47	25	-141	-42	-2,266	-37						

Appendix 7

The Average Results of the Yearly Decomposition of the Change in Export Value of Pork for Alberta and its Main Competitors in Target Markets During the Period of 1988-1996

Competitors	Denmark		Alberta		The Rest of Canada		Europe		The United States		Taiwan	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
The U.S. Market												
Change in Export Value	-1,457	-100	8,357	100	2,051	100						
Structural Effect	**341**	**23**	**787**	**9**	**5,268**	**257**						
Growth Effect	279,690	19,195	9,101	109	63,820	3,112						
Market Distribution Effect	-279,350	-19,172	-8,315	-99	-58,552	-2,855						
Residual Effect	**-4,636**	**-318**	**7,143**	**85**	**-84**	**-4**						
Pure Residual	-69,622	-4,778	2,632	31	-33,418	-1,630						
Static Structural Residual	64,986	4,460	4,511	54	33,334	1,626						
Second-order Effect	**2,838**	**195**	**427**	**5**	**-3,133**	**-153**						
Pure Second-order Effect	-1,979	-136	933	11	797	39						
Dynamic Structural Residual	4,817	331	-506	-6	-3,930	-192						
The Japanese Market												
Change in Export Value	25,316	100	2,629	100	8,555	100			104,383	100	176,654	100
Structural Effect	**115,310**	**455**	**1,744**	**66**	**18,405**	**215**			**53,516**	**51**	**186,446**	**106**
Growth Effect	279,690	1,105	9,101	346	63,820	746			62,477	60	153,881	87
Market Distribution Effect	-164,380	-649	-7,358	-280	-45,415	-531			-8,960	-9	32,565	18
Residual Effect	**-79,132**	**-313**	**668**	**25**	**-8,177**	**-96**			**45,234**	**43**	**-11,249**	**-6**
Pure Residual	-69,622	-275	2,632	100	-33,418	-391			62,329	60	20,508	12
Static Structural Residual	-9,510	-38	-1,964	-75	25,241	295			-17,095	-16	-31,756	-18
Second-order Effect	**-10,862**	**-43**	**218**	**8**	**-1,673**	**-20**			**5,633**	**5**	**1,456**	**1**
Pure Second-order Effect	-10,933	-43	117	4	-846	-10			6,303	6	554	0.3
Dynamic Structural Residual	71	0.3	101	4	-827	-10			-670	-1	903	1
The Mexican Market												
Change in Export Value			27	100	-315	-100	-3,242	-100	1,842	100		
Structural Effect			**64**	**232**	**-470**	**-149**	**1,408**	**43**	**-2,708**	**-147**		
Growth Effect			9,101	33,161	63,820	20,273	903,774	27,880	62,477	3,391		
Market Distribution Effect			-9,038	-32,929	-64,290	-20,422	-902,366	-27,837	-65,185	-3,538		
Residual Effect			**69**	**252**	**242**	**77**	**-4,685**	**-145**	**4,379**	**238**		
Pure Residual			2,632	9,589	-33,418	-10,616	-82,511	-2,545	62,329	3,383		
Static Structural Residual			-2,563	-9,337	33,660	10,692	77,825	2,401	-57,949	-3,146		
Second-order Effect			**-105**	**-384**	**-87**	**-28**	**36**	**1**	**171**	**9**		
Pure Second-order Effect			13	47	-259	-82	-833	-26	1,079	59		
Dynamic Structural Residual			-118	-431	173	55	869	27	-907	-49		

Appendix 8

The Average Results of the Yearly Decomposition of the Change in Export Value of Processed Grain for Alberta and its Main Competitors in Target Markets during the Period of 1988-96

Suppliers	Asia		Europe		Alberta		ROW		USA		Oceania		S & C	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
The U.S. Market														
Change in Export Value	20,968	100	43,803	100	4,204	100	72,619	100					22,772	100
Structural Effect	**29,640**	**141**	**60,473**	**138**	**1,510**	**36**	**57,661**	**79**					**14,918**	**66**
Growth Effect	239,845	1,144	1,699,455	3,880	8,614	205	65,498	90					65,007	285
Market Distribution Effect	-210,205	-1,002	-1,638,982	-3,742	-7,104	-169	-7,838	-11					-50,089	-220
Residual Effect	**-7,196**	**-34**	**-14,826**	**-34**	**2,191**	**52**	**13,424**	**18**					**6,626**	**29**
Pure Residual	72,344	345	-139,937	-319	3,422	81	16,245	22					54,597	240
Static Structural Residual	-79,540	-379	125,112	286	-1,231	-29	-2,821	-4					-47,971	-211
Second-order Effect	**-1,476**	**-7**	**-1,844**	**-4**	**503**	**12**	**1,708**	**2**					**1,228**	**5**
Pure Second-order Effect	-1,008	-5	-1,779	-4	229	5	1,708	2					7,480	33
Dynamic Structural Residual	-468	-2	-65	-1	274	7	-174	-2					2,344	10
The Japanese Market														
Change in Export Value	35,545	100	33,699	100	3,287	100	5,660	100	13,966	100	9,488	100		
Structural Effect	**28,288**	**80**	**39,022**	**116**	**5,241**	**159**	**5,801**	**102**	**10,878**	**78**	**12,578**	**133**		
Growth Effect	239,845	675	1,699,455	5,043	8,614	262	65,498	1,157	191,877	1,374	44,401	468		
Market Distribution Effect	-211,557	-595	-1,660,433	-4,927	-3,373	-103	-59,697	-1,055	-181,000	-1,296	-31,823	-335		
Residual Effect	**6,187**	**17**	**-3,574**	**-11**	**-1,751**	**-53**	**20**	**0.4**	**1,459**	**10**	**-2,476**	**-26**		
Pure Residual	72,344	204	-139,937	-415	3,422	104	16,245	287	-13,191	-94	-3,241	-34		
Static Structural Residual	-66,157	-186	136,363	405	-5,173	-157	-16,225	-287	14,650	105	766	8		
Second-order Effect	**1,070**	**3**	**-1,749**	**-5**	**-203**	**-6**	**-161**	**-3**	**1,629**	**12**	**-615**	**-6**		
Pure Second-order Effect	812	2	-19	-1	-348	-11	-37	-1	-15	-1	-417	-4		
Dynamic Structural Residual	258	1	-1,730	-5	145	4	-124	-2	1,645	12	-198	-2		
The South Korean Market														
Change in Export Value	5,071	100	7,662	100	335	100	1,298	100	3,388	100	886	100		
Structural Effect	**4,777**	**94**	**6,332**	**83**	**584**	**174**	**1,136**	**88**	**3,872**	**114**	**1,863**	**210**		
Growth Effect	239,845	4,730	1,699,455	22,182	8,614	2,571	65,498	5,046	191,877	5,663	44,401	5,014		
Market Distribution Effect	-235,069	-4,635	-1,693,123	-22,099	-8,030	-2,396	-64,362	-4,959	-188,005	-5,549	-42,539	-4,804		
Residual Effect	**569**	**11**	**985**	**13**	**-273**	**-81**	**-76**	**-6**	**530**	**16**	**-1,798**	**-203**		
Pure Residual	72,344	1,427	-139,937	-1,826	3,422	1,021	16,245	1,252	-13,191	-389	-3,241	-366		
Static Structural Residual	-71,776	-1,415	140,923	1,839	-3,695	-1,103	-16,321	-1,257	13,721	405	1,443	163		
Second-order Effect	**-274**	**-5**	**344**	**4**	**25**	**7**	**238**	**18**	**-1,015**	**-30**	**821**	**93**		
Pure Second-order Effect	3	0.1	74	1	26	8	76	6	4	1	-194	-22		
Dynamic Structural Residual	-277	-5	271	4	-1	-.4	161	12	-1,019	-30	1,016	115		

Appendix 9 T-test Value of the Overall Competitiveness

Destination & Exporters	t-value	Significant Level
The U.S. Beef Market		
Australia	-2.090	0.075
New Zealand	-0.959	0.369
South & Central America	0.216	0.835
Alberta	3.652	0.008
The ROC	1.949	0.092
The Japanese Beef Market		
Australia	-0.297	0.775
The United States	0.379	0.716
Alberta	0.398	0.702
The ROC	0.096	0.926
The Mexican Beef Market		
The United States	0.678	0.520
Europe	-1.105	0.306
South & Central America	-0.499	0.633
Alberta	0.865	0.416
The ROC	0.426	0.683
The South Korean Beef Market		
Australia	-2.332	0.052
New Zealand	0.878	0.409
The United States	2.214	0.062
Alberta	-0.602	0.566
The ROC	-0.126	0.903
The Hong Kong Beef Market		
China	-0.576	0.583
The United States	1.205	0.267
Oceania	-0.112	0.914
South & Central America	-1.210	0.266
Alberta	0.033	0.975
The ROC	0.226	0.828
The Taiwanese Beef Market		
Australia	-0.556	0.595
New Zealand	-0.112	0.914
The United States	0.813	0.443
Alberta	2.046	0.080
The ROC	0.943	0.377

Appendix 9 (Continued)

Destination & Exporters	t-value	Significant Level
The U.S. Pork Market		
Denmark	-0.333	0.749
Europe	-0.427	0.682
Alberta	1.575	0.159
The ROC	-0.006	0.995
The Japanese Pork Market		
Denmark	-2.272	0.057
Taiwan	-0.196	0.850
The United States	1.458	0.188
Alberta	0.556	0.595
The ROC	-0.987	0.357
The Mexican Pork Market		
The United States	0.900	0.398
Europe	-1.736	0.126
Alberta	0.226	0.827
The ROC	0.077	0.941
The U.S. Processed Grain Market		
Asia	-1.715	0.130
Europe	-2.025	0.083
South & Central America	2.425	0.046
Alberta	1.564	0.162
The ROC	1.409	0.202
The Japanese Processed Grain Market		
The United States	0.168	0.871
Asia	0.790	0.455
Europe	-0.284	0.785
Oceania	-0.720	0.495
Alberta	-0.581	0.580
The ROC	0.006	0.995
The South Korean Processed Grain Market		
The United States	0.310	0.765
Asia	0.345	0.740
Europe	0.752	0.476
Oceania	-1.240	0.255
Alberta	-0.259	0.803
The ROC	-0.076	0.941

Appendix 10
Variation Due to Changes in Standards for Beef

Suppliers	Standard	**Structural Effect**	Growth Effect	Market Effect	**Residual Effect**	Pure Residual	Static Structural Residual	**Second-order Effect**	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Australia	the world	**-11**	112	-123	**-98**	-28	-71	**9**	-1	10
	Sum of Competitors	**-11**	139	-150	**-98**	-61	-37	**9**	-1	10
New Zealand	the world	**-26**	114	-140	**-65**	-54	-11	**-9**	3	-12
	Sum of Competitors	**-26**	144	-170	**-65**	-91	26	**-9**	-5	-4
Alberta	the world	**-21**	1	-21	**127**	109	17	**-6**	1	-7
	Sum of Competitors	**-21**	7	-27	**127**	97	30	**-6**	4	-10
The ROC	the world	**-27**	34	-62	**132**	89	43	**-5**	-2	-4
	Sum of Competitors	**-27**	47	-75	**132**	67	66	**-5**	1	-6
S & C	the world	**-574**	4,498	-5,072	**519**	3,737	-3,219	**-44**	-70	26
	Sum of Competitors	**-574**	6,136	-6,710	**519**	1,081	-562	**-44**	18	-62
The Japanese Market										
Australia	the world	**117**	92	25	**-15**	-23	7	**-1**	3	-5
	Sum of Competitors	**117**	236	-119	**-15**	-157	142	**-1**	3	-4
Alberta	the world	**35**	21	14	**40**	3,455	-3,415	**25**	9	15
	Sum of Competitors	**35**	580	-545	**40**	2,661	-2,620	**25**	14	11
The ROC	the world	**25**	641	-615	**26**	1,672	-1,645	**48**	5	43
	Sum of Competitors	**25**	1,776	-1,751	**26**	433	-406	**48**	7	41
The United States	the world	**90**	28	61	**11**	154	-144	**0**	-2	2
	Sum of Competitors	**90**	113	-23	**11**	63	-52	**0**	-2	1
The Mexican Market										
Alberta	the world	**96**	1,189	-1,094	**325**	196,813	-196,488	**-321**	35	-356
	Sum of Competitors	**96**	3,871	-3,775	**325**	193,817	-193,492	**-321**	42	-363
The ROC	the world	**252**	5,132	-4,879	**276**	13,390	-13,114	**-629**	61	-689
	Sum of Competitors	**252**	5,709	-5,457	**277**	12,858	-12,581	**-629**	71	-700
The United States	the world	**52**	173	-121	**40**	945	-905	**9**	4	5
	Sum of Competitors	**52**	212	-160	**40**	908	-869	**9**	6	3
S & C	the world	**2,638**	12,780	-10,142	**-1450**	10,619	-12,070	**-1288**	-121	-1,167
	Sum of Competitors	**2,638**	14,378	-11,740	**-1450**	9,535	-10,985	**-1288**	-172	-1,116
Europe	the world	**709**	56,754	-56,045	**-1110**	-54,270	53,160	**301**	-143	444
	Sum of Competitors	**709**	63,814	-63,105	**-1110**	-59,699	58,589	**301**	-191	492

Appendix 10 (Continued)

The South Korean Market										
Australia	the world	**173**	439	-266	-87	-108	21	**14**	-8	22
	Sum of Competitors	**173**	971	-798	-87	-623	536	**14**	-8	23
New Zealand	the world	**52**	386	-334	49	-182	231	**-1**	2	-3
	Sum of Competitors	**52**	875	-824	49	-657	706	**-1**	3	-3
Alberta	the world	**203**	70	133	-246	11,607	-11,853	**143**	-28	171
	Sum of Competitors	**203**	1,615	-1,412	-246	9,295	-9,541	**143**	-24	167
The ROC	the world	**62**	1,242	-1,180	-27	3,241	-3,268	**65**	35	30
	Sum of Competitors	**62**	2,963	-2,901	-27	1,270	-1,297	**65**	30	35
The United States	the world	**78**	95	-18	30	519	-489	**-8**	3	-11
	Sum of Competitors	**78**	321	-243	30	267	-237	**-8**	3	-11
The Hong Kong Market										
Alberta	the world	**97**	618	-521	14 618	102,307	-102,292	**-12**	-11	-1
	Sum of Competitors	**97**	14,718	-14,621	14 618	81,548	-81,534	**-12**	9	-21
The ROC	the world	**35**	15,587	-15,551	59 038	40,671	-40,611	**6**	-50	55
	Sum of Competitors	**35**	33,513	-33,478	58 966	19,084	-19,025	**6**	-36	42
The United States	the world	**21**	582	-561	80.386	3,180	-3,099	**-2**	-11	9
	Sum of Competitors	**21**	1,784	-1,763	80 386	1,817	-1,737	**-2**	-5	3
S & C	the world	**101**	1,940	-1,839	-208	1,612	-1,820	**7**	28	-21
	Sum of Competitors	**101**	4,508	-4,408	-208	-1,271	1,063	**7**	9	-2
China	the world	**564**	3,878	-3,314	-647 5	-6,921	6,274	**-17**	4	-20
	Sum of Competitors	**564**	4,818	-4,254	-647 5	-8,393	7,745	**-17**	41	-58
Oceania	the world	**108**	5,204	-5,095	-12 19	-1,608	1,596	**4**	9	-5
	Sum of Competitors	**108**	10,174	-10,066	-12 19	-6,601	6,589	**4**	2	2
The Taiwanese Market										
Australia	the world	**41**	879	-839	-42 84	-216	173	**102**	7	94
	Sum of Competitors	**41**	1,946	-1,905	-42 84	-1,248	1,205	**102**	8	94
New Zealand	the world	**272**	793	-521	-10 02	-374	364	**-162**	-5	-157
	Sum of Competitors	**272**	1,799	-1,527	-10 02	-1,351	1,341	**-162**	-11	-152
Alberta	the world	**-35**	168	-202	84 175	27,764	-27,679	**50**	25	25
	Sum of Competitors	**-35**	3,863	-3,898	84 175	22,234	-22,149	**50**	19	32
The ROC	the world	**42**	1,531	-1,490	125 02	3,996	-3,871	**-67**	-24	-42
	Sum of Competitors	**42**	3,654	-3,612	125 02	1,566	-1,441	**-67**	-14	-53
The United States	the world	**88**	644	-556	55 792	3,518	-3,462	**-44**	-7	-37
	Sum of Competitors	**88**	2,174	-2,085	55 792	1,809	-1,753	**-44**	-5	-39

Appendix 11
Variation Due to Changes in Standards for Pork

Suppliers	Standard	**Structural Effect**	Growth Effect	Market Effect	**Residual Effect**	Pure Residual	Static Structural Residual	**Second-order Effect**	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Denmark	the world	**23**	19,195	-19,172	**-318**	-4,778	4,460	**195**	-136	331
	Competitors	**23**	13,235	-13,212	**-318**	570	-888	**195**	-66	261
Alberta	the world	**9**	109	-99	**85**	31	54	**5**	11	-6
	Competitors	**9**	77	-68	**85**	66	19	**5**	3	2
The ROC	the world	**257**	3,112	-2,855	**-4**	-1,630	1,626	**-153**	39	-192
	Competitors	**257**	2,138	-1,881	**-4**	-675	671	**-153**	9	-162
The Japanese Market										
Denmark	the world	**455**	1,105	-649	**-313**	-275	-38	**-43**	-43	.3
	Competitors	**455**	1,089	-633	**-313**	-258	-55	**-43**	-37	-6
Alberta	the world	**66**	346	-280	**25**	100	-75	**8**	4	4
	Competitors	**66**	352	-285	**25**	109	-84	**8**	8	1
The ROC	the world	**215**	746	-531	**-96**	-391	295	**-20**	-10	-10
	Competitors	**215**	719	-504	**-96**	-340	244	**-20**	-21	1
USA	the world	**51**	60	-9	**43**	60	-16	**5**	6	-1
	Competitors	**51**	57	-5	**43**	67	-23	**5**	3	2
Taiwan	the world	**106**	87	18	**-6**	12	-18	**1**	0	1
	Competitors	**106**	84	22	**-6**	12	-19	**1**	4	-3
The Mexican Market										
Alberta	the world	**232**	33,161	-32,929	**252**	9,589	-9,337	**-384**	47	-431
	Competitors	**233**	31,303	-31,070	**252**	11,600	-11,348	**-385**	86	-471
The ROC	the world	**-149**	20,273	-20,422	**77**	-10,616	10,692	**-28**	-82	55
	Competitors	**-149**	19,257	-19,406	**77**	-9,793	9,870	**-28**	-81	53
Europe	the world	**43**	27,880	-27,837	**-145**	-2,545	2,401	**1**	-26	27
	Competitors	**43**	26,326	-26,283	**-145**	-1,154	1,010	**1**	-27	28
USA	the world	**-147**	3,391	-3,538	**238**	3,383	-3,146	**9**	59	-49
	Competitors	**-147**	3,223	-3,370	**238**	3,532	-3,294	**9**	60	-51

Appendix 12
Variation Due to Changes in Standards for Processed Grain

Suppliers	Standard	**Structural Effect**	Growth Effect	Market Effect	**Residual Effect**	Pure Residual	Static Structural Residual	**Second-order Effect**	Pure Second-order Effect	Dynamic Structural Residual
The Japanese Market										
USA	the world	**78**	1,374	-1,296	**10**	-94	105	**12**	-.1	12
	Competitors	**78**	1,357	-1,279	**10**	-61	72	**12**	-.1	12
Asia	the world	**80**	675	-595	**17**	204	-186	**3**	2	1
	Competitors	**80**	667	-588	**17**	222	-205	**3**	2	1
Europe	the world	**116**	5,043	-4,927	**-11**	-415	405	**-5**	-.1	-5
	Competitors	**116**	4,989	-4,873	**-11**	-261	251	**-5**	.0	-5
Oceania	the world	**133**	468	-335	**-26**	-34	8	**-6**	-4	-2
	Competitors	**133**	463	-331	**-26**	-19	-7	**-6**	-5	-2
Alberta	the world	**159**	262	-103	**-53**	104	-157	**-6**	-11	4
	Competitors	**159**	262	-103	**-53**	103	-156	**-6**	-9	3
The ROC	the world	**102**	1,157	-1,055	**.4**	287	-287	**-2.9**	-1	-2
	Competitors	**102**	1,161	-1,059	**.4**	285	-284	**-2.9**	-1	-2
The U.S. Market										
Asia	the world	**141**	1,144	-1,002	**-34**	345	-379	**-7**	-5	-2
	Competitors	**141**	1,181	-1,040	**-34**	337	-372	**-7**	-5	-2
Europe	the world	**138**	3,880	-3,742	**-34**	-319	286	**-4**	-4	-.1
	Competitors	**138**	3,979	-3,841	**-34**	-321	288	**-4**	-4	.0
South & Central America	the world	**66**	285	-220	**29**	240	-211	**5**	4	1
	Competitors	**66**	296	-230	**29**	233	-204	**5**	4	1
Alberta	the world	**36**	205	-169	**52**	81	-29	**12**	5	7
	Competitors	**36**	214	-178	**52**	74	-22	**12**	5	7
The ROC	the world	**79**	90	-11	**18**	22	-4	**2**	2	-.2
	Competitors	**79**	94	-15	**18**	19	-.5	**2**	3	-1
The South Korean Market										
USA	the world	**114**	5,664	-5,550	**16**	-389	405	**-30**	.1	-30
	Competitors	**114**	5,592	-5,478	**16**	-253	269	**-30**	-.0	-30
Asia	the world	**94**	4,730	-4,635	**11**	1,427	-1,415	**-5**	.1	-5
	Competitors	**94**	4,676	-4,582	**11**	1,558	-1,546	**-5**	-.3	-5
Europe	the world	**83**	22,182	-22,099	**13**	-1,826	1,839	**4**	1	4
	Competitors	**83**	21,942	-21,860	**13**	-1,150	1,163	**4**	1	3
Oceania	the world	**210**	5,013	-4,802	**-203**	-366	163	**93**	-22	115
	Competitors	**210**	4,962	-4,752	**-203**	-202	-1	**93**	-20	113
Alberta	the world	**174**	2,639	-2,465	**-81**	982	-1,064	**7**	8	-.4
	Competitors	**174**	2,570	-2,396	**-81**	1,006	-1,087	**7**	6	2
The ROC	the world	**88**	5,105	-5,018	**-6**	1,060	-1,066	**18**	6	12
	Competitors	**88**	5,064	-4,976	**-6**	1,242	-1,248	**18**	5	13

Appendix 13
Variation Due to Changes in Market Definition for Beef

Suppliers	Market	Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
The United States										
	The Japanese Market	90	28	61	11	154	-144	-0.2	-2	2
	The South Korean Market	78	95	-18	30	519	-489	-8	3	-11
	The Hong Kong Market	21	582	-561	80	3,180	-3,099	-2	-11	9
	The Taiwanese Market	88	644	-556	56	3,518	-3,462	-44	-7	-37
	The Asia4's Market	85	81	3	16	444	-428	-1	-1	1
Alberta										
	The U.S. Market	-21	1	-21	127	109	17	-6	1	-7
	The Mexican Market	96	1,189	-1,094	325	196,813	-196,488	-321	35	-356
	The United States+Mexico	-18	1	-19	126	218	-93	-8	3	-10
	The Japanese Market	35	21	14	40	3,455	-3,415	25	9	15
	The South Korean Market	203	70	133	-246	11,607	-11,853	143	-28	171
	Hong Kong Market	97	618	-521	15	102,307	-102,292	-12	-11	-1
	The Taiwanese Market	-35	168	-202	84	27,764	-27,679	50	25	25
	The Asia4's Market	31	57	-27	23	9,492	-9,469	46	5	41
	Six Target Markets	10	4	7	88	626	-538	1	-3	4
The ROC										
	The U.S. Market	-27	34	-62	132	89	43	-5	-2	-4
	The Mexican Market	252	5,132	-4,879	276	13,390	-13,114	-629	61	-689
	The United States+Mexico	-12	69	-81	124	180	-56	-12	1	-12
	The Japanese Market	25	641	-615	26	1,672	-1,645	48	5	43
	The South Korean Market	62	1,242	-1,180	-27	3,241	-3,268	65	35	30
	The Hong Kong Market	35	15,587	-15,551	59	40,671	-40,611	6	-50	55
	The Taiwanese Market	42	1,531	-1,490	125	3,996	-3,871	-67	-24	-42
	The Asia4's Market	35	1,297	-1,263	31	3,385	-3,354	34	6	28
	Six Target Markets	65	187	-122	43	488	-446	-8	-10	2
South & Central America										
	The U.S. Market	-574	4,498	-5,072	519	3,737	-3,219	-44	-70	26
	The Mexican Market	2,638	12,780	-10,142	-1450	10,619	-12,070	-1288	-121	-1,167
	The United States+Mexico	-89	6,653	-6,742	17	5,528	-5,511	-28	-65	37

Appendix 14
Variation Due to Changes in Market Definition for Pork

Suppliers	Market	Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
Alberta	The U.S. Market	9	109	-99	85	31	54	5	11	-6
	The Mexican Market	232	33,161	-32,929	252	9,589	-9,337	-384	47	-431
	The United States+Mexico	7	217	-210	95	63	32	-2	14	-16
	The Japanese Market	66	346	-280	25	100	-75	8	4	4
	Three Target Markets	84	248	-164	20	72	-52	-4	2	-6
The ROC	The U.S. Market	257	3,112	-2,855	-4	-1,630	1,626	-153	39	-192
	The Mexican Market	-149	20,273	-20,422	77	-10,616	10,692	-28	-82	55
	The United States+Mexico	224	7,353	-7,129	-1	-3,850	3,849	-124	64	-187
	The Japanese Market	215	746	-531	-96	-391	295	-20	-10	-10
	Three Target Markets	516	1,861	-1,345	-362	-974	612	-54	-46	-8

Appendix 15
Variation Due to Changes in Market Definition for Processed Grain

Suppliers	Market	Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
Asia	The Japanese Market	**80**	675	-595	**17**	204	-186	**3**	2	1
	The South Korean Market	**94**	4,730	-4,635	**11**	1,427	-1,415	**-5**	.1	-5
	Asia 2	**82**	**1,181**	**-1,099**	**17**	**356**	**-340**	**2**	**2**	**-.3**
	The U.S. Market	**141**	1,144	-1,002	**-34**	345	-379	**-7**	-5	-2
	Target	**101**	**1,168**	**-1,067**	**-1**	**352**	**-353**	**0**	**-.4**	**-.0**
Europe	The Japanese Market	**116**	5,043	-4,927	**-11**	-415	405	**-5**	-.1	-5
	The South Korean Market	**83**	22,182	-22,099	**13**	-1,826	1,839	**4**	1	4
	Asia 2	**110**	**8,218**	**-8,107**	**-8**	**-677**	**669**	**-3**	**.0**	**-3**
	The U.S. Market	**138**	3,880	-3,742	**-34**	-319	286	**-4**	-4	-.1
	Target	**125**	**5,987**	**-5,862**	**-21**	**-493**	**472**	**-4**	**-2**	**-1**
Alberta	The Japanese Market	**159**	262	-103	**-53**	104	-157	**-6**	-11	4
	The South Korean Market	**174**	2,571	-2,396	**-81**	1,021	-1,103	**7**	8	-.4
	Asia 2	**167**	**476**	**-309**	**-64**	**189**	**-253**	**-3**	**-10**	**6**
	The U.S. Market	**36**	205	-169	**52**	81	-29	**12**	5	7
	Target	**100**	**330**	**-230**	**-2**	**131**	**-133**	**2**	**-2**	**4**
The ROC	The Japanese Market	**102**	1,157	-1,055	**0**	287	-287	**-3**	-1	-2
	The South Korean Market	**88**	5,046	-4,959	**-6**	1,252	-1,257	**18**	6	12
	Asia 2	**102**	**1,883**	**-1,780**	**1**	**467**	**-466**	**-3**	**1**	**-4**
	The U.S. Market	**79**	90	-11	**18**	22	-4	**2**	2	-.2
	Target	**82**	**247**	**-165**	**18**	**61**	**-44**	**1**	**2**	**-2**
The United States	The Japanese Market	**78**	1,374	-1,296	**10**	-94	105	**12**	-.1	12
	The South Korean Market	**114**	5,664	-5,550	**16**	-389	405	**-30**	.1	-30
	Asia 2	**80**	**2,211**	**-2,131**	**12**	**-152**	**164**	**8**	**-.0**	**8**
Oceania	The Japanese Market	**133**	468	-335	**-26**	-34	8	**-6**	-4	-2
	The South Korean Market	**210**	5,013	-4,802	**-203**	-366	163	**93**	-22	115
	Asia 2	**141**	**856**	**-715**	**-35**	**-62**	**28**	**-6**	**-5**	**-1**

Appendix 16
Variation Due to Prices for Beef

Suppliers		Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Australia	Before Deflate	-11	112	-123	-98	-28	-71	9	-1	10
	After Deflate	-25	43	-67	-83	-36	-47	8	-.3	8
New Zealand	Before Deflate	-26	114	-140	-65	-54	-11	-9	3	-12
	After Deflate	-42	33	-75	-51	-51	-	-7	1	-8
Alberta	Before Deflate	-21	1	-21	127	109	17	-6	1	-7
	After Deflate	-28	-4	-24	135	115	20	-7	-.1	-7
The ROC	Before Deflate	-27	34	-62	132	89	43	-5	-2	-4
	After Deflate	-61	25	-86	167	103	65	-6	-5	-1
The Japanese Market										
Australia	Before Deflate	117	92	25	-15	-23	7	-1	3	-5
	After Deflate	128	61	67	-25	-52	27	-3	4	-6
Alberta	Before Deflate	35	21	14	40	3,455	-3,415	25	9	15
	After Deflate	33	-136	169	45	3,860	-3,815	22	6	16
The ROC	Before Deflate	25	641	-615	26	1,672	-1,645	48	5	43
	After Deflate	15	584	-569	11	2,394	-2,383	74	3	71
The United States	Before Deflate	90	28	61	11	154	-144	0	-2	2
	After Deflate	95	3	93	5	194	-189	-1	-2	2
The Mexican Market										
Alberta	Before Deflate	96	1,189	-1,094	325	196,813	-196,488	-321	35	-356
	After Deflate	93	-7,182	7,275	345	203,338	-202,994	-338	26	-364
The ROC	Before Deflate	252	5,132	-4,879	276	13,390	-13,114	-629	61	-689
	After Deflate	219	2,496	-2,276	233	10,229	-9,996	-553	42	-594
The United States	Before Deflate	52	173	-121	40	945	-905	9	4	5
	After Deflate	50	14	35	40	1,023	-983	10	4	6

Appendix 16 (Continued)

The South Korean Market										
Australia	Before Deflate	**173**	439	-266	**-87**	-108	21	**14**	-8	22
	After Deflate	**185**	241	-56	**-104**	-206	102	**19**	-8	27
New Zealand	Before Deflate	**52**	386	-334	**49**	-182	231	**-1**	2	-3
	After Deflate	**47**	180	-133	**53**	-278	332	**0**	1	-1
Alberta	Before Deflate	**203**	70	133	**-246**	11,607	-11,853	**143**	-28	171
	After Deflate	**225**	-435	660	**-312**	12,310	-12,622	**187**	-24	211
The ROC	Before Deflate	**62**	1,242	-1,180	**-27**	3,241	-3,268	**65**	35	30
	After Deflate	**59**	721	-662	**-27**	2,956	-2,983	**68**	37	31
The United States	Before Deflate	**78**	95	-18	**30**	519	-489	**-8**	3	-11
	After Deflate	**79**	8	72	**31**	541	-510	**-10**	3	-13
The Hong Kong Market										
Alberta	Before Deflate	**97**	618	-521	**15**	102,307	-102,292	**-12**	-11	-1
	After Deflate	**94**	-4,157	4,251	**13**	54,952	-54,940	**-7**	-6	-1
The ROC	Before Deflate	**35**	15,587	-15,551	**59**	40,671	-40,611	**6**	-50	55
	After Deflate	**28**	16,313	-16,284	**55**	276,053	-275,997	**16**	-88	105
The United States	Before Deflate	**21**	582	-561	**80**	3,180	-3,099	**-2**	-11	9
	After Deflate	**17**	48	-31	**86**	-4,927	5,013	**-3**	-13	9
The Taiwanese Market										
Australia	Before Deflate	**41**	879	-839	**-43**	-216	173	**102**	7	94
	After Deflate	**26**	468	-442	**-44**	-400	355	**118**	6	112
New Zealand	Before Deflate	**272**	793	-521	**-10**	-374	364	**-162**	-5	-157
	After Deflate	**363**	460	-97	**-29**	-710	681	**-234**	-5	-229
Alberta	Before Deflate	**-35**	168	-202	**84**	27,764	-27,679	**50**	25	25
	After Deflate	**-38**	-1,005	967	**91**	28,467	-28,377	**47**	21	26
The ROC	Before Deflate	**42**	1,531	-1,490	**125**	3,996	-3,871	**-67**	-24	-42
	After Deflate	**48**	915	-866	**128**	3,750	-3,622	**-76**	-26	-50
The United States	Before Deflate	**88**	644	-556	**56**	3,518	-3,462	**-44**	-7	-37
	After Deflate	**99**	54	45	**54**	3,852	-3,798	**-53**	-7	-46

Appendix 17
Variation Due to Prices for Pork

Suppliers		Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Denmark	Before Deflate	23	19,195	-19,172	-318	-4,778	4,460	195	-136	331
	After Deflate	-75	7,136	-7,211	-123	-1,742	1,620	98	-50	148
Alberta	Before Deflate	9	109	-99	85	31	54	5	11	-6
	After Deflate	-5	120	-126	104	29	74	2	9	-7
The ROC	Before Deflate	257	3,112	-2,855	-4	-1,630	1,626	-153	39	-192
	After Deflate	-25	669	-693	-26	-489	463	-49	5	-54
The Japanese Market										
Denmark	Before Deflate	455	1,105	-649	-313	-275	-38	-43	-43	.3
	After Deflate	667	1,593	-926	-510	-389	-121	-57	-59	2
Alberta	Before Deflate	66	346	-280	25	100	-75	8	4	4
	After Deflate	66	334	-267	25	81	-56	9	5	4
The ROC	Before Deflate	215	746	-531	-96	-391	295	-20	-10	-10
	After Deflate	366	1,247	-882	-216	-912	696	-50	-24	-26
The United States	Before Deflate	51	60	-9	43	60	-16	5	6	-1
	After Deflate	49	57	-7	46	64	-18	4	5	-1
The Mexican Market										
Alberta	Before Deflate	232	33,161	-32,929	252	9,589	-9,337	-384	47	-431
	After Deflate	284	35,384	-35,100	327	8,622	-8,294	-511	48	-560
The ROC	Before Deflate	-149	20,273	-20,422	77	-10,616	10,692	-28	-82	55
	After Deflate	-134	15,195	-15,329	68	-11,107	11,175	-35	-85	50
The United States	Before Deflate	-147	3,391	-3,538	238	3,383	-3,146	9	59	-49
	After Deflate	-338	5,205	-5,543	413	5,833	-5,420	24	92	-68

Appendix 18
Variation Due to Prices for Processed Grain

Suppliers		Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
The Japanese Market										
USA	Before Deflate	78	1,374	-1,296	10	-94	105	12	-.1	12
	After Deflate	76	1,367	-1,291	10	-124	134	14	.4	14
Alberta	Before Deflate	159	262	-103	-53	104	-157	-6	-11	4
	After Deflate	200	340	-140	-86	112	-198	-14	-19	5
The ROC	Before Deflate	102	1,157	-1,055	.4	287	-287	-2.9	-1	-2
	After Deflate	115	1,290	-1,176	-8	158	-166	-7	-2	-4
The U.S. Market										
Alberta	Before Deflate	36	204.9	-169.0	52	81	-29	12.0	5	6.5
	After Deflate	34	209	-174	53	69	-15	12	5	7
The ROC	Before Deflate	79	90.2	-10.8	18	22	-4	2.1	2	-.2
	After Deflate	85	95	-10	14	12	3	1	2	-1
The South Korean Market										
The United States	Before Deflate	114	5,664	-5,550	16	-389	405	-30	.1	-30
	After Deflate	117	5,342	-5,225	14	-483	497	-31	1	-32
Alberta	Before Deflate	174	2,639	-2,465	-81	982	-1,064	7	8	-.4
	After Deflate	174	2,568	-2,394	-75	847	-922	1	11	-11
The ROC	Before Deflate	88	5,105	-5,018	-6	1,060	-1,066	18	6	12
	After Deflate	91	4,926	-4,835	-6	605	-611	15	6	9

Appendix 19
Variation Due to Exchange Rates for Beef

Suppliers	Currency	Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Alberta	the Canadian Dollar	-21	1	-21	127	109	17	-6	1	-7
	the US Dollar	-27	-5	-22	137	118	19	-10	-2	-8
The ROC	the Canadian Dollar	-27	34	-62	132	89	43	-5	-2	-4
	the US Dollar	-50	21	-71	158	104	54	-8	-3	-5
The Japanese Market										
Alberta	the Canadian Dollar	35	20.9	14	40	3,455	-3415	25	9	15
	the US Dollar	33	-179	212	39	3,838	-3799	28	11	17
The ROC	the Canadian Dollar	25	640.7	-615	26	1,672	-1645	48	5	43
	the US Dollar	46	426	-381	-2	2,138	-2141	56	-.2	57
The United States	the Canadian Dollar	90	28.2	61	11	154	-144	-.2	-2	2
	the US Dollar	91	8	83	9	182	-172	-.0	-2	2
The Mexican Market										
Alberta	the Canadian Dollar	96	1,189	-1,094	325	196,813	-196,488	-321	35	-356
	the US Dollar	94	-9,801	9,895	338	209,881	-209,543	-332	26	-358
The ROC	the Canadian Dollar	252	5,132	-4,879	276	13,390	-13,114	-629	61	-689
	the US Dollar	249	2,507	-2,258	244	12,568	-12,323	-593	45	-638
The United States	the Canadian Dollar	52	173	-121	40	945	-905	9	4	5
	the US Dollar	51	44	8	42	1,027	-985	7	2	4
The South Korean Market										
Alberta	the Canadian Dollar	203	70	133	-246	11,607	-11,853	143	-28	171
	the US Dollar	251	-584	835	-309	12,505	-12,814	158	-36	194
The ROC	the Canadian Dollar	62	1,242	-1,180	-27	3,241	-3,268	65	35	30
	the US Dollar	66	670	-603	-19	3,359	-3,378	52	23	30
The United States	the Canadian Dollar	78	95	-18	30	519	-489	-8	3	-11
	the US Dollar	76	23	53	35	553	-518	-11	2	-13
The Hong Kong Market										
Alberta	the Canadian Dollar	97	618	-521	15	102,307	-102,292	-12	-11	-1
	the US Dollar	88	-5,371	5,459	37	115,019	-114,982	-25	-25	1
The ROC	the Canadian Dollar	35	15,587	-15,551	59	40,671	-40,611	6	-50	55
	the US Dollar	29	10,972	-10,943	56	55,009	-54,953	16	-61	77
The United States	the Canadian Dollar	21	582	-561	80	3,180	-3,099	-2	-11	9
	the US Dollar	16	146	-130	85	3,443	-3,359	-1	-10	9
The Taiwanese Market										
Alberta	the Canadian Dollar	-35	168	-202	84	27,764	-27,679	50	25	25
	the US Dollar	-36	-1,378	1,342	88	29,505	-29,417	49	22	26
The ROC	the Canadian Dollar	42	1,531	-1,490	125	3,996	-3,871	-67	-24	-42
	the US Dollar	49	838	-789	125	4,201	-4,076	-74	-25	-49
The United States	the Canadian Dollar	88	644	-556	56	3,518	-3,462	-44	-7	-37
	the US Dollar	101	164	-62	54	3,848	-3,794	-55	-11	-44

Appendix 20
Variation Due to Exchange Rates for Pork

Suppliers	Currency	Structural Effect	Growth Effect	Market Effect	Residual Effect	Pure Residual	Static Structural Residual	Second-order Effect	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Denmark	the Canadian Dollar	**23**	19,195	-19,172	**-318**	-4,778	4,460	**195**	-136	331
	the US Dollar	**-65**	7,662	-7,727	**-127**	-1,999	1,872	**92**	-63	156
Alberta	the Canadian Dollar	**9**	109	-99	**85**	31	54	**5**	11	-6
	the US Dollar	**-6**	107	-113	**96**	35	62	**10**	16	-6
The ROC	the Canadian Dollar	**257**	3,112	-2,855	**-4**	-1,630	1,626	**-153**	39	-192
	the US Dollar	**21**	1,699	-1,678	**-25**	-1,043	1,018	**-96**	22	-118
The Japanese Market										
Denmark	the Canadian Dollar	**455**	1,105	-649	**-313**	-275	-38	**-43**	-43	0
	the US Dollar	**238**	14	225	**-189**	-130	-59	**-22**	-13	-10
Alberta	the Canadian Dollar	**66**	346	-280	**25**	100	-75	**8**	4	4
	the US Dollar	**57**	316	-259	**35**	102	-67	**8**	3	5
The ROC	the Canadian Dollar	**215**	746	-531	**-96**	-391	295	**-20**	-10	-10
	the US Dollar	**271**	948	-677	**-144**	-582	438	**-27**	-12	-15
The United States	the Canadian Dollar	**51**	60	-9	**43**	60	-16	**5**	6	-1
	the US Dollar	**50**	57	-7	**45**	64	-18	**5**	6	-1
The Mexican Market										
Alberta	the Canadian Dollar	**232**	33,161.2	-32929	**252**	9,589	-9,337	**-384**	47	-431
	the US Dollar	**175**	31,936	-31,762	**388**	10,325	-9,937	**-463**	58	-521
The ROC	the Canadian Dollar	**-149**	20,273.2	-20422	**77**	-10,616	10,692	**-28**	-82	55
	the US Dollar	**-204**	17,483	-17,687	**166**	-10,732	10,899	**-62**	-89	27
The United States	the Canadian Dollar	**-147**	3,391	-3538	**238**	3,383	-3,146	**9**	59	-49
	the US Dollar	**-257**	4,083	-4,340	**319**	4,555	-4,236	**38**	87	-49

Appendix 21
Variation Due to Exchange Rates for Processed Grain

Suppliers	Currency	**Structural Effect**	Growth Effect	Market Effect	**Residual Effect**	Pure Residual	Static Structural Residual	**Second-order Effect**	Pure Second-order Effect	Dynamic Structural Residual
The U.S. Market										
Alberta	the Canadian Dollar	**36**	205	-169	**52**	81	-29	**12**	5	7
	the US Dollar	**34**	201	-167	**56**	74	-18	**10**	3	7
The ROC	the Canadian Dollar	**79**	90	-11	**18**	22	-4	**2**	2	-.2
	the US Dollar	**78**	89	-11	**20**	23	-3	**2**	2	-.4
The Japanese Market										
The United States	the Canadian Dollar	**78**	1,374	-1,296	**10**	-94	105	**12**	-.1	12
	the US Dollar	**76**	1,316	-1,239	**14**	-62	76	**10**	-4	13
Alberta	the Canadian Dollar	**159**	262	-103	**-53**	104	-157	**-6**	-11	4
	the US Dollar	**170**	290	-120	**-73**	106	-179	**3**	-4	7
The ROC	the Canadian Dollar	**102**	1,157	-1,055	**.4**	287	-287	**-2.9**	-1	-2
	the US Dollar	**100**	1,166	-1,066	**-1**	308	-309	**1**	3	-2
The South Korean Market										
The United States	the Canadian Dollar	**114**	5,664	-5,550	**16**	-389	405	**-30**	-1	-30
	the US Dollar	**113**	5,266	-5,154	**19**	-250	269	**-32**	-1	-31
Alberta	the Canadian Dollar	**174**	2,639	-2,465	**-81**	982	-1,054	**7**	7.8	-.4
	the US Dollar	**169**	2,566	-2,397	**-63**	875	-939	**-6**	-3	-3
The ROC	the Canadian Dollar	**88**	5,105	-5,018	**-6**	1,060	-1,066	**18**	5.9	12
	the US Dollar	**82**	4,820	-4,738	**-.2**	1,052	-1,053	**19**	7	12