An Empirical Assessment of the 'International Competitiveness' of the Australian Processed Food Industry

by

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Abstract

This paper examines the competitiveness of the Australian processed food industry using trade pattern measures and constant market share (CMS) model. The trade orientation criterion adopted in the study revealed that the industry has evolved over the years with an export focus and capable of competing with foreign suppliers in the domestic market. But an important empirical finding is that the industry's competitive position in foreign markets as a whole has deteriorated over the period between 1980 and 1996 although different sub groups within the industry have shown mixed performance.

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1.0 Introduction

The key motivation for this paper stems from mainly two sources. Firstly, there has been little research aimed at analysing the competitiveness position of Australian high value agricultural products in foreign markets in spite of the fact that Australian processed food industry play a key role within Australian manufactures in terms of contribution to GDP, manufactured export growth, value addition and employment generation[1]. Hence, the competitiveness of this industry in international markets should be a major concern not only for policy makers but also for manufactures[2]. Manufactures should be concerned about their survival while government may be concerned about avoiding job losses and appropriate policy developments. The analysis of this study is particularly useful in the light of the fact that the world's imports of processed food have increased from US$124 billion in 1980 to US$286 billion in 1996 representing growth of 132 per cent[3]. The paper examines whether Australia has taken advantage of this growth.

Secondly, in the global context the trade in processed food products has become increasingly more prominent than agricultural commodities. For example a study by Henderson *et al.* (1998) which examined the composition of the world food trade using global agricultural trade data from 1972 to 1993 made the following observation:

> " Over the period 1972 to 1993, the value of trade in manufactured food products grew by 574 per cent, while the value of bulk commodity trade grew by just 355 per cent. Trade in manufactured food products now accounts for 67 per cent of world trade in agricultural products compared to 58 per cent in 1972" (P.12, 1998)

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[1] In this context it is worthwhile to mention that the competitiveness issue of the processed food industry has been widely investigated during the recent years in other major processed food exporting countries such as USA (Macdonald and Lee, 1994), Canada (Miner, 1994; Ash *et al*., 1994; Hazeldine, 1994 and Coffin *et al*.1993), New Zealand (Lattimore, 1994) and Denmark (Jorgensen, 1994). .

[2] For example the processed food industry is ranked today as the second largest manufacturing sector in the Australian economy contributing nearly 21 percent to GDP (DIST, 1998 and PC, 1996). In 1995/96 this industry recorded an annual turnover of about $ 42 billion of which 27 percent were export sales (A$10.7 billion). In the same year the processed food industry provided around 160, 000 jobs, which accounted for approximately 17 percent of manufacturing employment. Moreover, according to a study by productivity commission (1996) 80 percent of the growth in Australian manufactured exports in the decade to 1994/95 was sourced from three industries. The food and beverage industry is one of them.

[3] IEDB (International Economic Data Bank) data.

In the light of above backdrop the objectives of this paper are mainly twofold.

(a) To address the competitiveness issue of Australia processed food industry in its main export markets primarily using trade pattern measures.
(b) To explain changes in export performance of Australian processed food industry in its principal markets in terms of sources of growth using constant market share analysis.

This structure of this paper as follows. It starts with a discussion of conceptual issues and the problem of defining the term 'competitiveness' and as a background analysis. Secondly, after a brief review of various measures being used to assess competitiveness, it will discuss in detail trade oriented measures on competitiveness. Finally, an attempt will be made to explain the competitiveness position of the Australian processed food industry on the basis of the trade orientation, standard market share approach and Constant Market Share (CMS) model.

2.0 Competitiveness: Concepts and Definitions

2.1 The Concept

The term ' competitiveness' is an elusive concept. There is little agreement as to what it means, how to measure it or how to interpret the resulting indices, however measured (Markusen, 1992). In spite of the fact that the topic has been subjected to extensive debate in the literature, the confusion as to what it means still continues. The confusion in understanding the meaning of the concept can be partly attributed to the use of diverse definitions and the adoption of different approaches in different disciplines to address the question of competitiveness. As quoted by Abbot and Bredahl (1994, p.12), Robert Reich, an early proponent of competitiveness, highlights the extent of this confusion-"Rarely has a term in public discourse gone so directly from obscurity to meaninglessness without an intervening period of coherence" (Wall Street Journal, July 2, 1992). According to them, both misunderstandings[4] and inadequacies of received theories are to be blamed for the

[4] They cite a number of misunderstandings. One blatant violation of the theory, as argued by them, is the comparison of the production costs across nations to make judgment on competitiveness. This is a gross misunderstanding of economic theory since comparative advantage doctrine taught us what really matter is *relative cost* and not *absolute cost* comparison between countries.

prolonged confusion on the meaning of competitiveness. According to the interpretation by Duren *et al*. (1994), the use of the term competitiveness has become so commonplace that it risks becoming meaningless. Because of this confusion, many authors believe that the concept of competitiveness is a difficult subject to deal with. However, such difficulties can be tackled by adopting a definition in line with the objectives of the study.

2.2 Definitions

There is no generally accepted definition for the term 'competitiveness'. It is a multi-dimensional concept the meaning of which has been defined in diverse ways depending: firstly on the unit of observation (nations, sectors and firms); secondly, the objectives of the analysis (policy prescriptions, sector productivity growth, export performance); and finally, the types of goods analyzed (commodity or differentiated goods)[5]. This paper will not attempt to examine this entire spectrum of definitions, rather it will deliberately narrow the focus to those interpretations adopted in economic approaches to analyse the competitiveness at the industry level.

The tsk force on the Competitiveness of Canada's Agrifood industry (1990) adopted following definition to explain the competitiveness at the industry level.

> "Competitiveness is the sustained ability to profitably gain and maintain market share in domestic and export markets".

This definition has been subsequently used by a number of studies to assess the competitiveness of national food sectors in several countries (USA, Canada, New Zealand and Denmark). Although the meaning is not straightforward at the industry level, competitiveness here is taken to mean the ability of a group of like firms to compete with another group in another sector or with the same sector in another country (Coffin *et al*., 1993). One important advantage of this definition is that it provides some measurable dimensions. For the purpose of this study, the same definition that 'ability to sustain market share and profitability' will be adopted.

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[5] See Bredhal *et al.* (1994) and McCorriston *et al.* (1994) for a discussion of diverse aspects of definitions of competitiveness.

3.0 Measures of Competitiveness

There is little agreement among economist as to how competitiveness should be measured in addition to what it means. Empirical studies, addressing the competitiveness issue, have adopted a number of alternative of measures which range from simple indicators of market share, profitability and cost- centred measures to complex composite indexes (Fagerberg, 1988). These measures can be broadly classified into three categories on the basis of the types of data used for the computation of them (see Figure 1).

The selection of appropriate measures mainly depends on the objectives of the analysis, the question being investigated and the definition adopted for the term competitiveness. For example if the primary concern is to analyze the level of output obtained from a given vector of inputs in a manufacturing industry, the most appropriate measures would be to use productivity and cost oriented measures[6]. On the other hand if the main concern is the market performance aspect of the competitiveness, trade oriented measures can provide a better picture than productivity measures. This paper is mainly concerned with the trading performance aspect of the Australian processed food industry and ignores other measures. The remainder of the analysis will proceed on that basis focusing only on the trade performance aspect of competitiveness (Figure 1).

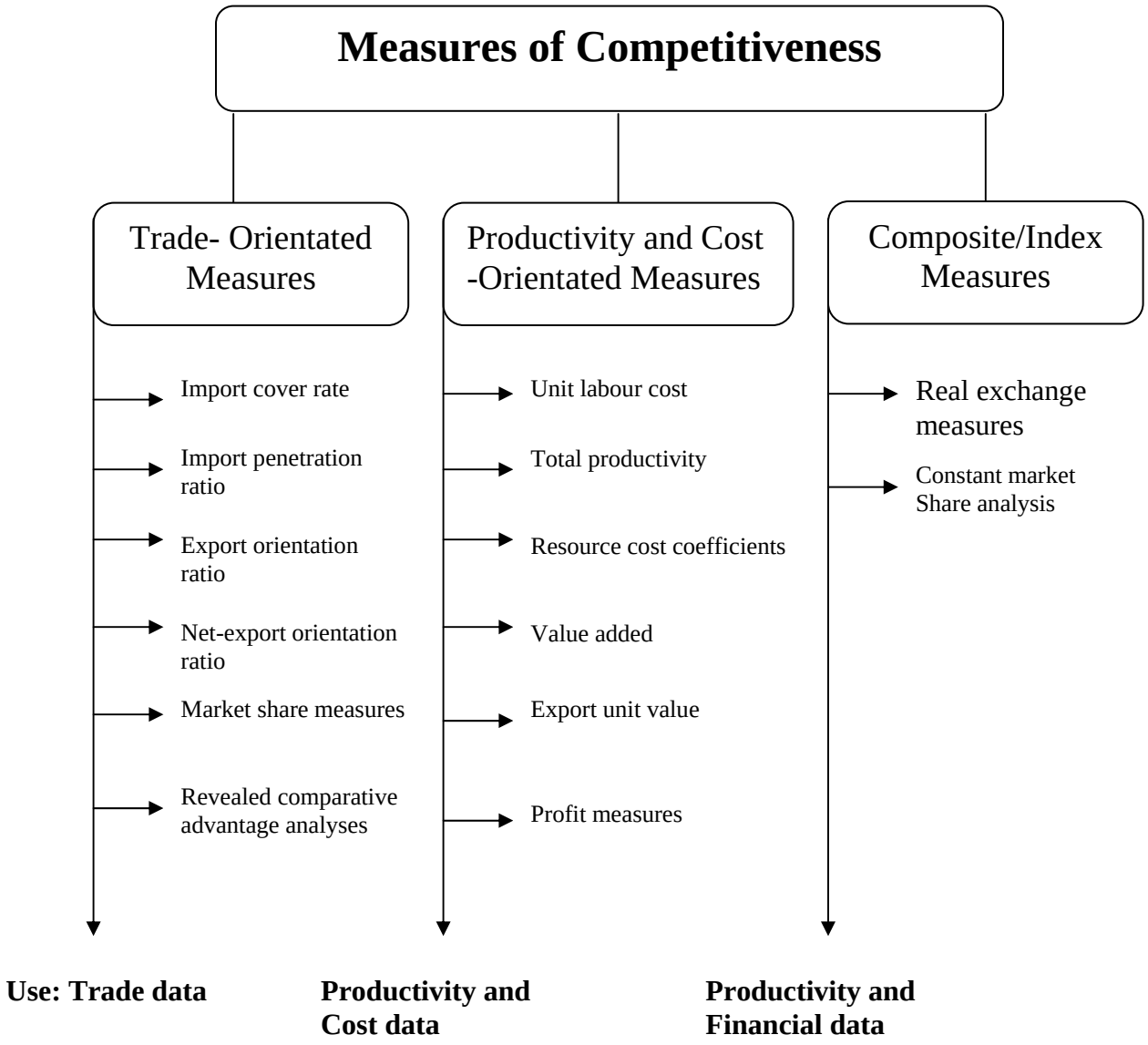
3.1 Trade Pattern Measures

A number of trade pattern measures have been proposed to draw inferences about competitiveness (see Duren *et al*., 1994; Miner, 1994; Macdonald *et al*., 1994 and PC, 1996). They are simply derived and presented in the form of a ratio or percentages using trade data. These trade pattern measures mainly include export orientation ratio (EOR),

[6] Productivity measures are basically of two types: (a) partial productivity measures (b) total productivity measures. They are used to explain the rate of improvement in the efficiency of use of inputs in a manufacturing process. The multi-factor productivity measures can provide a more comprehensive indication on the efficiency of resource utilization than the partial productivity measures since it take into account the influence of all inputs on productivity improvement. Due to the non-availability of adequate data on total productivity, unit labour cost is widely used to assess the relative cost competitiveness of industries. The productivity differences between counties or industries or firms make a big impact on their relative competitive position. See IC (1997) and Sharma (1997) for a general discussion on productivity and productivity measures.

import penetration ratio (IPR), import cover rate (IR) and the net export penetration ratio (NEPR).

Figure 1
Indicators of Competitiveness



3.1.1 Export Orientation and Import Penetration Ratio

The export orientation ratio (EOR) is the percentage share of exports in the total sales, while import penetration ratio (IPR) is simply the percentage of total sales accounted for, by imports in the domestic market. The former is also called the export propensity. These two have been used generally to draw inferences about competitiveness of a particular sector or industry. For example, Miner (1994) computed IPR and EPR to make inferences about the competitiveness of the Canadian food sector. The Productivity Commission (1996) in Australia calculated both of these ratios for a number of Australian manufacturing industries and found that the Australian processed food industry enjoys a lower import penetration and high export propensity (compared to that of other industries in the manufacturing sector). In general, an industry with a lower import penetration and a higher export orientation ratio relative to others in the country is considered to be more competitive. The industry is considered to be gradually losing its competitive position in the event of EOR is falling and IPR is increasing.

3.1.2 Market Share

Market share is more generally defined as a country's export share in world trade. The competitiveness of a given industry is said to have increased, when its volume of exports to a given market has increased relative to that of its competitors. Volume is preferred to values for the computation of market shares but non-availability of data in volume terms has forced most empirical studies to use values.

3.2 Constant Market Share (CMS) Analysis

Constant market share analysis is a widely employed technique in the examination of the structural concentration of export growth performance. This technique was first applied by Tyszynski (1951) and since then has been widely used in a number of studies particularly during 1950s and 1960s to explain a variety of issues relating to export growth performances[7]. Leamer and Stern (1970) articulated a more detailed exposition of the CMS framework. During recent years, Lloyd *et al. (*1996), Low (1994), Lloyd (1994), Chow *et al*. (1993) and Tyers (1984) applied this technique to explain export growth in East Asian countries.

The CMS analysis can be performed mainly at three different levels. The results vary according to the chosen level of analysis or dimension. If the level three of the analysis is employed, then the sources of export growth can be decomposed into four components (Table 1). Leamer and Stern (1970) provide the analytical framework to decompose the growth components at each level of analysis and can be represented by the following identities.

Level 1

$$X_{..}^{2} - X_{..}^{1} \equiv rX_{..}^{1} + (X_{..}^{2} - X_{..}^{1} - rX_{..}^{1}) \qquad (3.3.1)$$

Level 2

$$X_{i.}^{2} - X_{i.}^{1} \equiv rX_{..}^{1} + \sum_{i=i}^{n}(r_i - r)X_{i.}^{1} + \sum_{i=i}^{n}(X_{i.}^{2} - X_{i.}^{1} - r_i X_{i.}^{1}) \qquad (3.3.2)$$

Level 3

$$X_{..}^{2} - X_{..}^{1} \equiv rX_{..}^{1} + \sum_{i}(r_i - r)X_{i.}^{1} + \sum_{ij}(r_{ij} - r_i)X_{ij}^{1} + + \sum_{ij}(X_{ij.}^{2} - X_{ij.}^{1} - r_i X_{ij.}^{1}) \qquad (3.3.3)$$

(a) (b) (c) (d)

Where

$X^{1}_{i.}$ = the value of exports of commodity *i* in period 1

$X^{2}_{i.}$ = the value of exports of commodity *i* in period 2

$X^{1}_{.j}$ = the value of exports to country *j* in period 1

$X^{2}_{.j}$ = the value of exports to country *j* in period 2

X^{1}_{ij} = the value of exports of commodity *i* to country *j* in period 1

r = rate of growth of total world exports over the period

r_i = rate of growth of total world exports of commodity i over the period

r_{ij} = rate of growth of total world exports of commodity *i* to the country *j* over the period.

[7] See Richardson (1971) for details.

In the constant market share norms, the identity (3.3.3) represents 'level three of analysis', by which the total export growth is explained in terms of four components (see Table 1). Accordingly, in this equation the first term of right hand side represents the standard growth while second and third terms are called the commodity composition effect and market distribution effect respectively. The last term on the right hand side represents the competitiveness residual. The results are analysed by taking into account both the magnitude of change of each of these components and their respective sign, which can be either negative or positive.

Table 1

Level of Commodity Aggregations for Different Market Groupings.

Level of analysis and dimensions			**Components of growth**
Level one	Single commodity	Single destination	(a) Standard growth (b) Competitiveness residual
Level two	Several commodities	Single destination	(a) Standard growth (b) Commodity composition effect (c) Competitiveness residual
Level three	Several commodities	A number of destinations	(a) Standard growth (b) Commodity composition effect (c) Market distribution effect (d) Competitiveness residual

4. 0 Data Sources and Problems

Two different data sources and classification systems are used for the estimation of the measures discussed above. Export orientation and import penetration ratios were calculated using the ANZSIC classification system while calculation of market shares and CMS analysis carried out using International Standard Industrial Classification (ISIC) system. The main reason for using two different classification systems and different data sources is as follows:

ISIC production data for Australia and other countries covered by this study at the disaggregation level are incomplete or not available for the recent years. Obviously, it is necessary to adopt an international classification system for market share calculation in foreign countries. Therefore, the ISIC classification system was chosen. The ideal ISIC data set would have been the one that enables both market shares and all trade pattern measures to be obtained. But due to the gaps in ISIC production data series it was not possible to obtain the estimates for the latter using the same data source. For example, import penetration in its real sense should be calculated as percentage share of apparent consumption.[8] Thus, by definition it requires the national production data in order to calculate apparent consumption, which can be used as an approximation for total sales.

The problems arising out of incomplete ISIC production data were overcome as follows. Firstly, the puzzle about insufficient production data in Australia context was resolved adopting the ANZSIC classification based trade and turnover data [9]. Secondly, in respect of foreign country analysis, import shares were utilised as a proxy to market shares. This is one limitation of the study since import shares do not represent the true market share, which should be the percentage shares in apparent consumption or total sales in its real sense.

The required international trade data for this study were obtained from the International Economic Data Bank (IEDB) of the Australian National University. UN based Standard International Trade Classification (SITC) is the commonly used source for trade data. However, SITC, which is a commodity classification system, does not permit the direct identification of what processed food industries are, unless relevant concordances are prepared. This problem can be overcome using the ISIC system, which is a classification of industry origin and making cross-reference to trade data. IEDB maintain such ISIC

[8] National production plus imports less exports give apparent consumption.

[9] Statistical data on the Australian processed food industry on the basis of ANZSIC protocol is available from the DIST internet homepage at http:\\www.dist.gov.au

trade data for about 31 industry groups using an approximate concordance between the two classification systems SITC and ISIC.

Under the ISIC (rev 2) system 15 industry groups are identified as processed food industries at the 4-digits level[10]. The relevant ISIC codes for these processed food industry groups run through from 3111 to 3134. The Australian equivalent is the ANZSIC system according to which processed food industries fall under 'ANZSIC-group 21' consisting of 22 sub groups at the 4-digit level. A concordance between the two-classification systems covering processed food industry groups was prepared.

5.0 Trade Performance of Australian Processed Food Industry

Subject to the free trade qualification, this section addresses the issue of competitiveness of the Australian processed food industry primarily using trade performance measures[11]. For this purpose, firstly, two sets of trade pattern measures namely import penetration ratio and export penetration ratio are calculated for the whole industry and its sub groups as classified on the basis of level of processing. Secondly, the standard market share approach will be adopted to analyse the export performance in the top ten markets for Australian processed food exports. Recognizing the diverse nature of processed food products being exported from Australia and the diverse nature of food processing activities, the analysis of market share and trade orientation is carried out under the broadly classified headings of minimally processed and highly processed food and beverages[12]. Finally, CMS model is applied to explain the sources of export growth.

[10] See http://iedb.anu.edu.au/iedb/datainfo/ISICtradedata.htm for more details of matching trade data and production by the IEDB.

[11] Markussen (1992) draw special attention to include 'free trade environment' when he explains competitiveness using trade pattern measures.

> "The free trade qualification avoids the problem of increased exports or reduced imports due respectively to export subsidies or import barriers" (Markusen1992, p. 9).

[12]On the basis of level of processing, DIST classifies food and beverages exports into three categories: (a) highly processed; (b) minimally processed, and (c) unprocessed food of which (a) and (b) together constitute the processed food industry of Australia. This study opts for the classification adopted by the DIST to

5.1 Trade Orientation of the Australian Processed Food Industry

The export orientation ratio calculated here is the percentage of total turnover that is sold in foreign markets while import penetration is the percentage of total turnover accounted for by imports. These two ratios for the Australian processed food industry and its sub groups are set out in Table 2 for the period between 1989/90 and 1995/96. They are calculated using the ANZSIC classification based data for the reasons explained earlier and results are reported under the headings of minimally processed, and highly processed, food and beverages.

A number of observations can be made on the basis of the results reported in Table.2. The first observation is that the levels of export orientation vary greatly among the different sub groups of the processed food industry (see Figure 2 for ranking). Secondly this variation is more visible between two main categories of minimally processed and highly processed food and beverages. For an example, Seafood processing, sugar manufacturing and red meat industries, which represent minimally, processed food and beverages sector, have the highest export orientation ratios. More than 50 per cent of production of these industries, on average, has been exported during the period between 1989/90 and 1995/96. Thus, these three industries constitute most competitive and the leading export oriented food sectors in Australia. Of the total turnover of seafood processing 62 percent was exported in 1995/96. The corresponding percentages for the sugar industry and red meat industry are 59 and 45 respectively. However, the fact that these three industries fall under the category of minimally processed food and beverages implies that the most export oriented processed food industries in Australia are skewed towards the low value added food products.

Thirdly, the level of export orientation of highly processed food and beverages sector is very modest when compared with that of minimally processed food and beverages. For example, in 1995/96 the highest export penetration ratio in this sector was for dairy products with 26 per cent followed by fruit and vegetable (17.6 per cent), flour mill cereal food manufacturing (17.4 per cent) and confectionery manufacturing (16.9 per cent).

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identify what minimally and highly processed food and beverage are. Garner and Winton (1992) adopt a similar classification in explaining impediments to Australian processed food exports to East Asia.

However, the export orientation ratio of each industry group within this sector has steadily increased during the two period under consideration.

Finally, import penetration is insignificant when taking the Australian domestic processed food market as a whole. For an example, of the total domestic food and beverages market in Australia, imports accounted only 7.6 per cent in 1995/96 compared with 6.4 per cent in 1989/90. The percentage is less than one per cent for meat processing and sugar manufacturing. Except for seafood processing (52.7 per cent) and oil and fat manufacturing (42.7 per cent), the import penetration ratio did not exceed 21 per cent for all other product categories in 1995/96. These data suggest that Australian processed food industry has been able to reduce foreign competition and maintain its domination in the domestic market, assuming that no border controls are exercised to reduce the foreign supplies.

5.2 Performance in the Top Ten Markets

This section examines how Australia has performed in its main exports markets. As evident from the Table 3 the bulk of her exports is heavily concentrated on a few countries which include Japan, USA, U.K, New Zealand, South Korea, Malaysia, Taiwan, Hong Kong, Philippines and Singapore. These ten countries constitute Australia's top ten markets (TTM) [13] which, on average have imported more than 70 per cent of Australian processed food exports over the period between 1980 to 1996. TTM imports of processed food from Australia peaked in 1990 purchasing about 98 per cent of exports but this percentage share gradually dropped in the following years. Nevertheless, these ten nations continue to be the major exports markets for Australian export as shown in Table 3. From the viewpoint of world trade, these ten nations are among the major importers of processed food. For an example their aggregate imports accounted for about 39 per cent of world processed food imports of US $285 billion in 1996 compared with 28 per cent of US $124 billion in 1980. It is on the basis of above considerations that this study makes a detailed examination of Australia's performance in these countries.

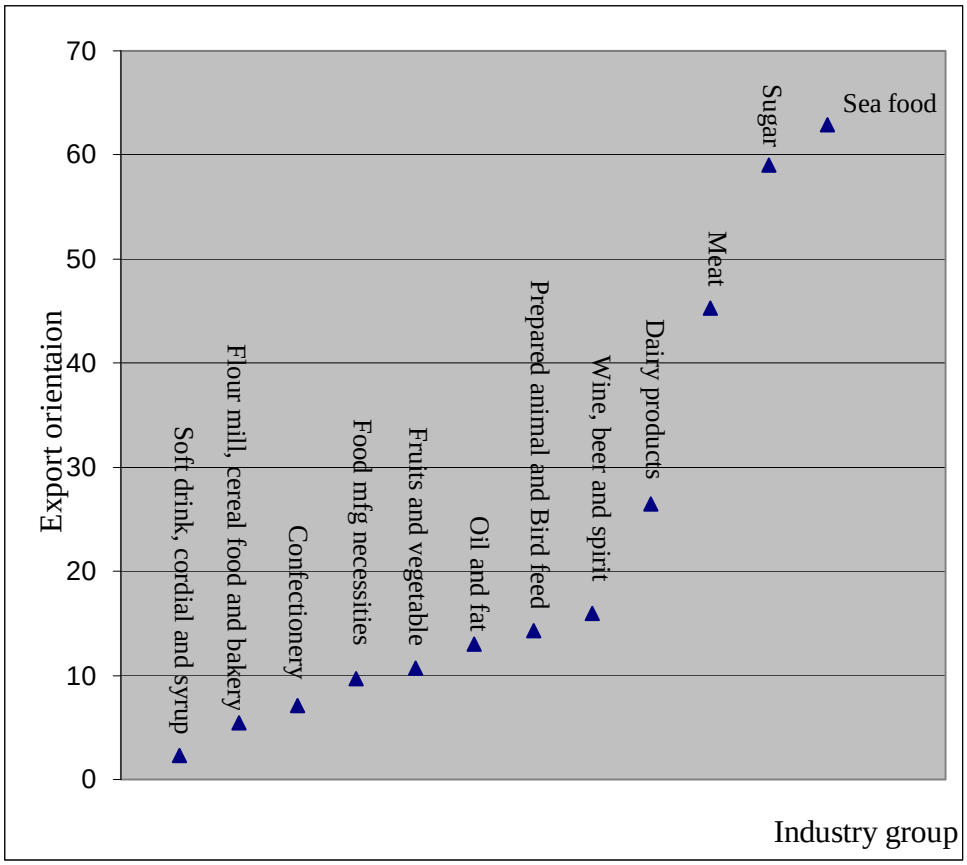
[13] This was determined on the basis of average export values in 1995 and 1996.

Table 2
Export Orientation and Import Penetration in Australian Processed Food Industry
(percentage)

Industry group	1989/90		1995/96	
	Export orientation	Import penetration	Export orientation	Import penetration
Minimally processed	**48.2**	**4.0**	**49.5**	**5.1**
Meat and meat products	44.8	0.6	45.3	0.9
Sea food processing	65.4	44.2	62.9	52.7
Sugar manufacturing	54.6	0.3	59.0	0.4
Highly processed	**9.5**	**7.6**	**15.6**	**8.7**
Dairy products	17.0	2.7	26.5	3.1
Fruits and vegetable processing	10.7	18.9	17.6	20.0
Prepared animal and Bird feed mfg.	14.3	2.2	15.8	3.0
Flour mill, cereal food and bakery products	5.4	2.4	9.9	3.3
Wine, beer and spirit	11.3	9.2	16.0	7.4
Confectionery manufacturing	7.1	16.7	16.9	21.1
Oil and fat manufacturing	3.8	21.9	13.0	46.7
Soft drink cordial and syrup mfg.	2.2	8.1	2.3	11.9
Food mfg necessities	3.4	11.6	9.7	11.0
Total: Processed food and beverages	**22.8**	**6.4**	**25.7**	**7.6**

Source: Derived from data available on the DIST homepage at http://www.dist.gove.au
Note: mfg = Manufacturing

Figure 2
Ranking of Processed Food Industries According to Export Orientation 1995/ 96



Source Table .2

As illustrated in Figure 3, Japan has been the leading importer and the stable market for Australian processed food exports since 1980. Of the total of the top ten's imports, on average, Japan accounted for about 30 percent between the period 1980 and 1996. The next leading importer was the USA, although its imports from Australia have declined from US $ 1271 million in 1980 to US $ 777 million in 1996. Over this period Australia's exports to the remainder of the markets of this group has steadily increased.

However, a close examination of contents of Table 4, which provides percentage shares held by Australia in TTM's total imports of processed food from all sources discloses a different story. Accordingly, it appears that Australia has lost its competitive strength in the top ten markets. For example, Australia's overall share in the TTM's total imports of

food and beverages has declined from 9.9 per cent in 1980 to 6.1 per cent in 1996. The Meat processing industry, which is the leading processed food industry in Australia, has suffered the heaviest losses, the market share has sharply declined from 20.4 per cent in 1980 to 9.9 per cent in 1996. Other industry groups have shown mixed performance. While the sugar manufacturing industry has maintained its market share at around 20 per cent, once again dairy products and prepared animal & bird feed manufacturing have shown better performances over the above two periods by increasing the market share from 7.7 to 11.8 per cent and 2.9 to 10.8 per cent respectively. The performances in other sectors are very marginal.

Table 3
A Comparison of Australia's Exports to the World and Top Ten Markets
(US $ Million)

Year	Processed food exports to :		
	the World	the top ten	% share of top ten
1980	4,673,360	3,433,757	73.5
1982	3,922,758	2,889,511	73.7
1984	3,174,110	2,406,080	75.8
1986	3,363,869	2,435,946	72.4
1988	4,485,458	3,918,905	87.4
1990	4,780,671	4,722,580	98.8
1992	5,334,953	4,906,011	92.0
1994	7,617,098	5,608,586	73.6
1996	7,978,801	5,771,706	72.3

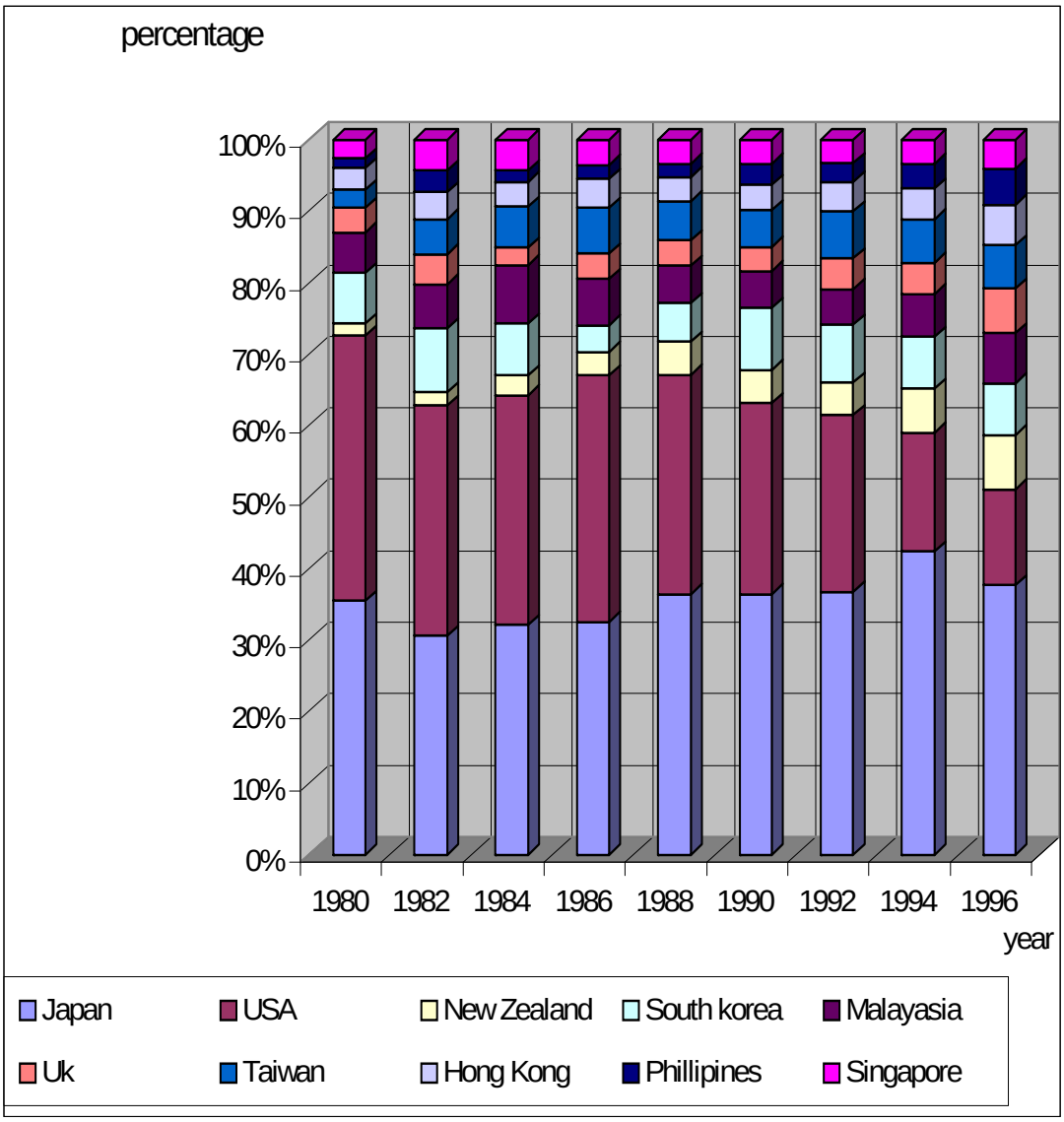
Source: Derived from IEDB data

The above discussion points to the fact that although Australia's exports in absolute values have markedly increased, her performance in terms of market share have weakened in foreign countries. As discussed in Section 3.3, the changes in market shares do not necessarily reveal the true picture of competitiveness until the sources of export growth

are examined. Therefore, the analysis of the next section is devoted to explaining the export growth performance of the Australian processed food industry using CMS analysis, which provides a detailed exposition on components of export growth.

Figure 3

Percentage Shares of Australia's Top Ten markets for Processed Food Exports



Source: Derived from IEDB data

Table 4
Australia's Market Share in TTM's Imports of Processed Food and Beverages
(percentage)

Industry group	1980	1982	1984	1986	1988	1990	1992	1994	1996
Minimally processed	**18.3**	**15.9**	**13.1**	**11.1**	**12.5**	**13.5**	**12.2**	**12.1**	**9.2**
Meat and meat products	20.4	19.7	14.9	13.7	15.2	16.8	15.6	14.7	9.9
Sugar manufacturing	21.0	16.0	18.2	15.0	19.9	17.1	15.0	21.5	19.7
Sea food processing	4.1	4.3	4.1	3.5	3.6	3.4	3.3	3.3	3.0
Highly processed	**2.5**	**2.8**	**2.2**	**2.0**	**2.5**	**2.6**	**2.7**	**3.1**	**3.4**
Dairy products	7.7	9.7	8.4	7.2	8.4	9.1	9.5	11.2	11.8
Fruits and Vegetables Processing	1.7	1.2	0.6	1.0	1.3	1.1	1.3	1.7	1.8
Prepared animal & bird feed mfg.	2.9	3.3	1.7	4.3	8.3	6.7	8.6	11.0	10.8
Confectionery manufacturing	1.8	1.7	1.7	1.3	1.8	1.6	1.6	2.0	2.3
Flour mill, cereal food & bakery products	3.0	3.6	3.4	2.6	2.9	3.1	2.9	2.9	3.2
Wine, beer and spirits	2.6	2.7	2.3	1.7	2.6	2.6	2.6	3.1	3.6
Oil and fat manufacturing	0.4	0.5	0.3	0.7	0.7	0.9	0.9	0.8	1.0
Soft drinks manufacturing	4.0	3.9	1.7	4.5	6.7	2.7	1.1	1.5	3.2
Food manufacturing necessities.	1.8	1.9	1.7	1.4	1.3	1.3	1.2	1.2	1.3
Total: Processed food and Beverages	**9.9**	**8.7**	**6.6**	**5.9**	**7.1**	**7.4**	**6.9**	**7.1**	**6.1**

Sources: Derived from IEDB data

5.3 CMS Analysis for Export Growth Performance of Processed Food Industry in Main Market Destinations

CMS analysis is carried out for Australia's 'Top Ten markets', which import more than 70 per cent of its processed food exports. The analysis is limited to import shares as production data for all ten markets are not available to derive apparent consumption[14]. Time period covered is ten years from 1986 to 1996. This period is large enough to take into account the changes in competitive strength of export growth are reported in Appendix Table 1.The dimension of the analysis covers nine product categories (i = 1….9) and ten exports market destinations (j = 1….10)[15].

The results obtained using identity 3.3.3, which represents 'level three of analysis', can be interpreted basically in two different ways. The first method is Leamer's (1970) initial version explaining export growth in terms of the four standard components discussed in Section 3.3. The illustration of results on that basis is presented in Table 5(a). Accordingly, over the period 1986 to 1996, Australian processed food exports to top ten markets grew by US $ 3336 million, the bulk of which (95.5 per cent) is explained by the general increase in import demand. The commodity composition effect is negative but very marginal (-1.5 per cent). The market distribution effect is positive (53 per cent), indicating that Australia has distributed its exports to the rapidly growing markets. But this gain has been eroded by the loss in market shares, which is reflected in a negative competitiveness effect (47.1 percent).

An alternative way of interpreting the results on decomposition of export growth is presented Table 5(b). This methods has been adopted by Lloyd (1994) and Lloyd and Toguchi (l996). Accordingly, Australia's exports to top ten markets grew by 137 per cent between the two periods under review. Of this increase, 131 percentage points are

[14] As pointed out by Lloyd (1996, p.3) " when examining issues of competitiveness and market penetration, markets should be measured in terms of total sales that is, imports plus domestic supplies".

attributed to the general increase in import demand of these ten countries. Only 6 percentage points are left to explain the combined effects of commodity composition, market distribution and competitiveness residuals. As it should be, the negative and positive effects of these components offset each other adding to the unity. On the basis of these results on decomposition the following can be concluded.

(a) The Australian processed food industry has lost its competitiveness in the top ten by a huge margin of 1051 per cent over the period 1986 to 1996

(b) The commodity effect is also negative but its magnitude is small (-33 per cent) compared that of competitiveness residual (-1051%). The negative commodity effect indicates that the exports of Australian processed food industry are more skewed towards products for which import demand is relatively falling in importing countries.

(c) The Australian processed food industry is fortunate to concentrate its exports on countries whose imports have grown rapidly during this period and this positive market distribution effect was large enough to offset both the huge negative impact of competitiveness residual and negative commodity effect

The positive market distribution effect is seen as a result of increasing exports to high growth markets. Hence, it is useful to see what these high growth markets are. This information is provided in Table 6 in conjunction with Australian export growth rates in each of these markets between the period 1980 to 1996. The estimates presented in this Table show how Australia has been able to exploit opportunities in markets (such as Philippines, South Korea, Hong Kong, Malaysia, and Japan) whose imports have increased sharply. For example imports of processed food by the Philippines and South Korea from all sources rose by 484 per cent and 368 per cent respectively during the period 1986 to1996.

[15] All the processed food categories discussed are incorporated into the analysis. For the simplicity of analysis several products groups were taken as one group and represented here as ‘ other food product manufacturing’

Table 5 (a)
Illustration of Results on Decomposition of Export Growth in Top Ten Markets 1986-96
(US$'000)

Australian exports of processed food to top **ten in 1996**	$\sum_{i=9}^{9}\sum_{j=1}^{10} X_{ij}^{2}$	5,771,706	
Australian Exports of processed food to top ten in 1986	$\sum_{i=9}^{9}\sum_{j=1}^{10} X_{ij}^{1}$	2,435,946	
Changes in exports		3,335,760	
Components due to			**Percentage**
(a) general increase in imports in top ten	$\mathbf{r}\sum_{i=i}^{9} rX^{1}_{i.} = \mathbf{r}\sum_{j=1}^{10} rX^{1}_{.i}$	3,186,217	**95.5**
(b) commodity composition	$\sum_{i}^{9}(r_i - r)\ \mathbf{X^1_i}$	-49,487	**-1.5**
(c)country composition	$\sum_{i=1}^{9}\sum_{j=1}^{10}(r_{ij} - r_i)\ X^{1}_{ij}$	1,770,772	**53.1**
(d) loss in competitiveness	$\sum_{i=1}^{9}\sum_{j=1}^{10}(r^{k}_{ij} - r_i)\ X^{1}_{ij}$	-1,571,751	**-47.0**
		3335751	100

Source: Author' calculations using IEDB data

Table 5 (b)
Illustration of Results on Decomposition of Export Growth in Top Ten Markets 1986-96
(US $'000)

Australian exports of processed food to top **ten in 1996**	$\sum_{i=9}^{9}\sum_{j=1}^{10} X_{ij}^{2}$	5,771,706	
Australian Exports of processed food to top ten in 1986	$\sum_{i=9}^{9}\sum_{j=1}^{10} X_{ij}^{1}$	2,435,946	
Changes in exports		3,335,760	3,335,760
Growth in exports		137%	3,186,217
Growth in top ten's imports		131%	
Difference to be explained		6%	
Components due to			**Percentage**
(a) commodity composition	$\sum_{i}^{9}(r_i - r)\ \mathbf{X^1_i}$	-49,487	**-33**
(b)country composition	$\sum_{i=1}^{9}\sum_{j=1}^{10}(r_{ij} - r_i)\ X^{1}_{ij}$	1,770,772	**1184**
(d) loss in competitiveness	$\sum_{i=1}^{9}\sum_{j=1}^{10}(r^{k}_{ij} - r_i)\ X^{1}_{ij}$	-1,571,751	**-1051**
(a) + (b) +(c)		**149,543**	100

Source: Author' calculations using IEDB data

Processed food exports to these two countries by Australia also increased by phenomenal rates of 564 per cent and 363 per cent respectively over the same period. Australia has maintained similar momentum in rest of the markets as well, except for USA. Had Australia maintained at least its base period market share, then the combined effect of commodity component and competitiveness residuals would have resulted in more exports than the current level.

Table 6
A comparison of Imports Growth Rates of processed Food in Top Ten Markets with Growth Rates of Australian Exports
(US$ Million).

Country	Total Imports from all sources (excluding Australia)			Australian exports to:		
	1986	1996	Percentage growth	1986	1996	Percentage growth
Japan	8,104,253	25,319,474	212	792,633	2,172,823	174
USA	14,816,275	23,046,874	56	841,110	777,584	-8
U.K.	9,984,604	19,236,927	93	85,941	360,795	320
South Korea	1,059,026	4,959,980	368	90,468	419,160	363
Hong Kong	1,804,287	6,496,463	260	98,376	328,124	234
New Zealand	137,118	431,331	215	79,840	435,864	446
Malaysia	594,541	2,093,271	252	157,100	401,396	156
Taiwan	880,543	3,122,099	255	157,870	350,402	122
Philippines	273,678	1,598,334	484	46,901	293,640	526
Singapore	1,058,665	3,057,864	189	85,707	231,918	171
Total	**38,712,990**	**89,362,617**	**131**	**2,435,946**	**5,771,706**	**137**

Source: IEDB data

The finding that the competitiveness residual is negative should be interpreted cautiously. The construction in the CMS framework is that the inability to maintain export shares would result in the competitiveness effect being negative. However, as pointed out by Richardson (1971), this component may encompass a number of other factors that may not necessarily be associated with a country's true competitive position. A good example is discriminatory non-tariff barriers imposed against exports from a particular country, which would result in decreasing export shares. This is particularly true for food products, as there is widespread misuse of food safety regulations known as sanitary and phytosanitary measures and technical barriers. When analyzing the competitiveness issue it is necessary to take such trade barriers into account. The finding that the competitiveness effect is negative alone does not reveal the true picture. Hence, clearly there is a case to examine the links between the competitiveness and discriminatory non-tariff measures in importing countries.

Conclusions

This study made an empirical investigation into the competitiveness issue of the Australian processed food industry using the trade performance measures and constant market share analysis. The trade orientation criterion adopted in the study revealed that the industry has evolved over the years with an export focus and capable of competing with foreign suppliers in the domestic market. But the data support a different story with respect to the industry's competitive position in foreign markets. On the basis of export shares both in the top ten markets the competitiveness of the processed food industry as a whole has deteriorated over the period between 1980 and 1996. However, within the industry, different sub groups have shown a mixed performance. Australia has a comparative edge in minimally processed food and beverages or raw bulk products but competitive position is relatively weaker in further processing. Nevertheless, it is important to note that the determination of relative competitiveness among nation in various stages of production process of food products from observed trade data is clearly a difficult issue. This is because the mix of products actually traded is driven not only by the true competitive position but also heavily influenced by various forms of market distortions introduced by governments.

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Abbreviations

ANZSIC	Australia New Zealand Standard Industrial Classification
ABS	Australian Bureau of Statistics
CMS	Constant Market Analysis
IEDB	International Economic Data Bank
ISIC	International Standard Industrial Classification
IC	Industry commission
IPR	Import Penetration Ratio
EPR	Export Penetration Ratio.
DIST	Department of Industry, Science and Tourism.
PC	Productivity commission
SITC	Standard International Trade Classification.
TTM	Top TEN Markets
UN	United Nations.
WTO	World Trade Organization.
NTBs	Non Tariff Barriers
SPS	Sanitary and Pytosanitary Measures.