Increase Factors of China's Agricultural Products Exporting to Member Countries of Shanghai Cooperation Organization

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Abstract

Purpose-China's agricultural product exporting to the member countries of Shanghai Cooperation Organization (SCO) appeared the trends of faster increase. In order to further enhance the agricultural trade and cooperation, this paper will verify the increasing factors of China's agricultural products exporting to the SCO member countries.

Design/Methodology/Approach-The Constant Market share Model (CMS) with two-level decomposition is used to identify different factors, among which the increase effect is the main increase factor, and then the covering increase factors are summarized.

Findings-The increase factors of China's agricultural products exporting to SCO the Member Countries were appeared in different types, however, to some extent the constraining effects are highly similar.

Originality/Value-This study is the first to carry out the analysis on the increase factor in the case of China's agricultural products exporting to the SCO member countries.

Key words: China; Agricultural products; Shanghai cooperation organization; Increasing factor

INTRODUCTION

The authorities of China, Federation of Russia, Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan signed the "Declaration of the Shanghai Cooperation Organization" in 2001, and then Shanghai Cooperation Organization (SCO) was officially established with the initial intention to safeguard the regional stability and counter-terrorism. As the prosperous development of regional cooperation in economics and business, the regional cooperation in shanghai Cooperation organization was highly valued by the member countries. Since the member countries signed the "Shanghai Cooperation Organization Member States and multilateral trade and Economic Cooperation Program" in 2003, and agriculture was regarded as the key cooperation area, accordingly the agricultural trade between China and the SCO member countries kept an uprising momentum. During the year of 2004-2010, the total trade value of agricultural products between China and the SCO member countries climbed from 1.91 Billion US Dollars to 4.02 Billion US Dollars, with the annual growth rate of 13.18%, what's more, the total export value of China's agricultural products to the SCO member countries increased from 0.65 Billion US Dollars to 1.86 Billion US Dollars with the higher growth of 19.09%. Also considering the distinctive agricultural resources endowments among the member countries and China's favorable geographic location, there is vast export potential for China's agricultural products.

The purpose of this paper is to verify the increase factors of China's agricultural products exporting to the SCO member countries. In this article the Constant Market share Model (CMS) with two-level decomposition is used to identify different effects, among which the increase effect is the most prominent factor, and then the covering increase factors are summarized. Furthermore, this study is the first to carry out the analysis of the increase factors in the case of China's agricultural products exporting to the SCO member countries.

This paper is divided into five sections. Section 2 gives an overview of the trends and patterns of China's agricultural products exports to the SCO member countries; Section 3 illustrates the agricultural products classification and methodology; Section 4 presents the empirical findings from one-level and two-level analysis respectively; and finally Sections 5 offers the conclusions and limitation.

1. TRENDS AND PATTERNS OF CHINA'S AGRICULTURAL PRODUCTS EXPORTS TO THE MEMBER COUNTRIES IN SCO

1.1 Agricultural

From 2004 to 2010, China's agricultural products exporting to the member countries of Shanghai Cooperation Organization appeared the trends of faster increase. The respective export value of China's agricultural products went to Russia, Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan climbed from 729.43 million US Dollars, 31.68 million US Dollars, 7.95 million US Dollars, 15.39 million US Dollars and 2.27 million US Dollars in 2004 to 1536.37 million US Dollars, 141.77 million US Dollars, 127.45 million US Dollars, 39.86 million US Dollars and 13.46 million US Dollars in 2010, with the respective annual increase rate of 17.15%, 28.37%, 58.80%, 17.19% and 34.53%.

Russia was the largest export market of China's agricultural products in SCO member countries, on average, 84.46 percent of China's agricultural products exporting to the SCO member countries went to Russia between the years 2004 and 2010, Kazakhstan ranked the second, accounting for 7.27%, followed by Kyrgyzstan, Uzbekistan and Tajikistan, with the share of 5.42%, 2.28% and 0.57%.

1.2 Export Structure of Agricultural Products

Between years of 2004 and 2010, on average, among the total exports of agricultural products from China to Russia, horticultural products ranking first with the export share of 54.09%, followed by fishery products being 22.22%; Among the total exports of agricultural products from China to Kazakhstan, horticultural products also ranking first, with the export share of 65.88%, followed by bulk commodities and other agri-products being15.14% and10.06%; Among the total exports of agricultural products from China to Kyrgyzstan, livestock products and horticultural products take the lead with the export share of 47.65% and 36.89% respectively; Among the exports of total agricultural products from China to Uzbekistan, horticultural products also ranking first with the export share of 62.56%, followed by other agri-products being 20.72%; Among the total exports of agricultural products from China to Tajikistan, bulk commodities leading with export share of 44.91%, followed by horticultural products and other agri-products being 27.79% and 21.12% respectively (Table 1).

Table 1
The Average Share of China's Agricultural Products Exports to the Member Countries in SCO by Product Type Between 2004-2010

	Russia	Kazakhstan	Kyrgyzstan	Uzbekistan	Tajikistan
Bulk Commodities	7.83	15.14	9.28	12.48	44.91
Livestock Products	3.22	5.82	47.65	4.03	6.13
Fisher Products	22.22	2.46	0.11	0.17	0.01
Horticultural products	54.09	65.88	36.89	62.56	27.79
Beverage &Tobacco	1.37	0.65	1.38	0.04	0.05
Other Agri-Products	11.27	10.06	4.69	20.72	21.12

Resources: Calculated by author based on the HS data from UN COMTRADE DATABASE.

2. PRODUCT CLASSIFICATION AND METHODOLOGY

2.1 Agricultural Products Classification

Based on the agriculture agreement and the Harmonized System Code, the agricultural products defined in this paper contain all products from HS Code 1 to 24 and partial products in HS29, HS35, HS38, HS41, HS43, HS50, HS51, HS52 and HS53. Referring to Lü and Mei's (2001) study, meanwhile, in this paper the general agricultural products are grouped into six main categories at two or four digit HS Level data, the six categories are bulk commodities, livestock products, fishery products, horticultural products, beverage & tobacco, and other agri-products. Specific categories and HS code are illustrated in Table 2.

Table 2
Agricultural Products Classification

Category	HS Code
Bulk commodities	HS10, HS11, HS12.01-12.08, HS15.07-15.15, HS17, HS19, HS52.01-52.03
Livestock products	HS01, HS02, HS04, HS15.01-15.06, HS16.01-16.03, HS41.01-41.03, HS43.01, HS50.01-50.03, HS51.01-51.03
Fishery products	HS03, HS16.04-16.05

Continued

Category	HS Code
Horticultural products	HS07, HS08, HS09, HS18, HS20
Beverage &tobacco	HS22 , HS24
Other Agri-products	HS05, HS06, HS13, HS14, HS21, HS12.09-12.14, HS15.16-15.22, HS2905.43, HS2905.44, HS35.01-35.05, HS3809.10, HS3823.60, HS53.01, HS53.02, HS33.01

2.2 Constant Market Share Model

The Constant Market Share Model (CMS) was first proposed by Tyszynski in 1951, and was consequently modified and perfected by Leamer and Stern (1970), Jepma (1986), Milana (1988) and Ahmadi-Esfahani (1995), which is an widely applied to the study of export competitiveness and export growth. Research with this model has received great interests in the literature, Chen and Duan (2000) studied the competitiveness of Canadian agri-food exports against competitors in Asian during the period of 1980-1997; Lu and Mei (2007) analyzed the causes of China-EU agricultural trade growth; Josef Fogarasi (2008) investigated the competitiveness of Hungarian and Romanian agri-food products in the EU; MA *et al.*(2008) studied the increase effect for China's agricultural products exports to East Asia between 1997-2006; Geng (2010) analyzed the dynamic export increase of fishery products from China to Japan.

As in Jempa's (1986) study, the CMS model was decomposed in the following format (Figure 1):

The first-level CMS decomposition:

$$\Delta q = \sum_i \sum_j S^0_{ij} \Delta Q_{ij} + \sum_i \sum_j \Delta S_{ij} Q^0_{ij} + \sum_i \sum_j \Delta S_{ij} \Delta Q_{ij}$$

(Structural Effect) (Competitive Effect) (Second-order Effect)

The first-level CMS decomposition:

$$\Delta q = S^0 \Delta Q + (\sum_i \sum_j S^0_{ij} \Delta Q_{ij} - \sum_i S^0_i \Delta Q_i) +$$

$$(\sum_i \sum_j S^0_{ij} \Delta Q_{ij} - \sum_j S^0_j \Delta Q_j)$$

(Growth Effect) (Market Effect) (Commodity Effect)

$$+[(\sum_i S^0_i \Delta Q_i - S^0 \Delta Q) - (\sum_i \sum_j S^0_{ij} \Delta Q_{ij} - \sum_j S^0_j \Delta Q_j)] + \Delta SQ^0$$
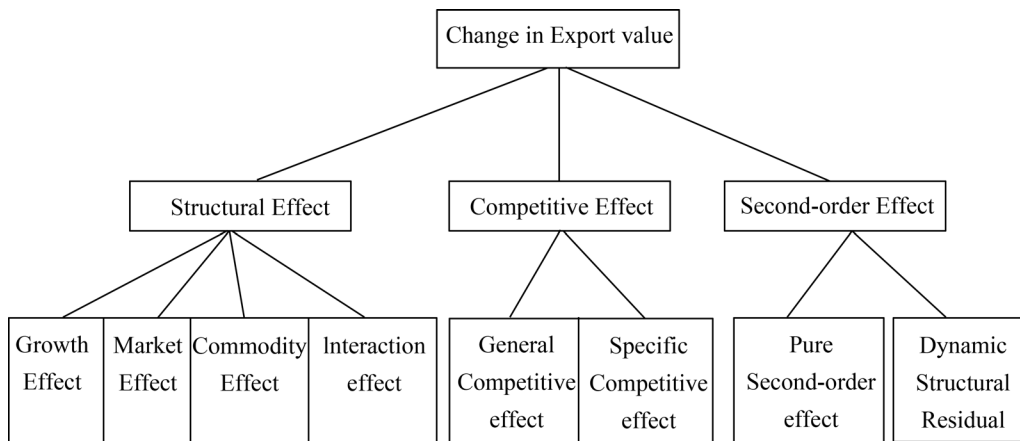
(Interaction Effect) (General Competitive Effect)

$$+(\sum_i \sum_j \Delta S_{ij} Q^0_{ij} - \Delta SQ^0) + (\frac{Q^1}{Q^0} - 1)\sum_i \sum_j \Delta S_{ij} Q^0_{ij}$$

(Specific Competitive Effect) (Pure Second-order Effect)

$$+[\sum_i \sum_j \Delta S_{ij} \Delta Q_{ij} - (\frac{Q^1}{Q^0} - 1)\sum_i \sum_j \Delta S_{ij} Q^0_{ij}]$$

(Dynamic structural Effect)

Figure 1
The CMS with Two-Level Decomposition

On the basis of Jepma's CMS model, we give the specific CMS model to analyze the increasing factors of China's agricultural products exporting to the SCO Member Countries. The market effect and interaction effect can be ignored when one market is analyzed; therefore, the CMS decomposition for analyzing one market is illustrated as follows:

The first-level CMS decomposition:

$$\Delta q = \sum_i S^0_i \Delta Q_i + \sum_i \Delta S_i Q^0_i + \sum_i \Delta S_i \Delta Q_i$$

The second-level CMS decomposition:

$$\Delta q = S^0 \Delta Q + [(\sum_i S^0_i \Delta Q_i - S^0 \Delta Q)] + \Delta SQ^0 +$$

$$[\sum_i \Delta S_i Q^0_i - \Delta SQ^0] + (\frac{Q^1}{Q^0} - 1)\sum_i \Delta S_i Q^0_i +$$

$$[\sum_i \Delta S_i \Delta Q_i - (\frac{Q^1}{Q_0} - 1)\sum_i \Delta S_i \Delta Q^0_i]$$

Where q is China's total exports of agricultural products to the member country in SCO; S is China's

market share of agricultural products exports in the member country in SCO; S_i is China's market share of commodity i in the member country's import of the same commodity; Q is the total imports of the member country; Q_i is the member country's imports of commodity i; Δ represents the change in the two periods; superscripts 0 is the initial year; 1 is the terminal year; Subscripts i represents export commodities (here, bulk commodities, livestock products, fishery products, horticultural products, beverage& tobacco, and other agri-products.

In the two-level CMS decomposition, Growth effect indicates that the change in exports due to the change in the total agricultural products imports of the destination market; Commodity effect indicates that the change in exports due to the commodity composition of China's agricultural products exports to the destination market; General competitive effect points out that the change in exports due to the change of China's competitiveness in its total agricultural export to the destination market; Specific competitiveness effect presents the change in export due to the change of China's competitiveness in its exports of specific commodities to the destination market. Pure second-order effect shows the change in exports due to the interaction of China's export competitiveness and the destination market imports; Dynamic structural residual indicates the change in exports due to the interaction of China's export competitiveness and imports of specific commodities in the destination market.

3. EMPIRICAL ANALYSIS ON THE INCREASING PATTERNS OF CHINA'S AGRICULTURAL PRODUCTS EXPORTS TO THE MEMBER COUNTRIES IN SCO

Table 3 is the CMS decomposition results of China's agricultural products exporting to the SCO member countries from the first-level and second-level decomposition respectively.

3.1 Analysis on the Results of the First-Level Decomposition

The export increase of China's agricultural products went to Russia is attributable to the structural effect and second-order effect. Between 2004 and 2010, the annual increase of China's agricultural products exporting to Russia is 157.0 Billion US Dollars, the results in the first-level CMS decomposition present that the increase (157 Billion US Dollars) mainly attributed to the structural effect, which contributes the export increase of 173.80 Billion US Dollars, with the highest contribution rate of 110.70%. Whereas the competitive effect resulted into the export growth of -18.67 Billion US Dollars, with the negative contribution rate of -11.89%, which indicates

that China's general agricultural products does not enjoy competitiveness in the Russia market.

The export increase of China's agricultural products to Kazakhstan is attributable to the structural effect, competitive effect and second-order effect. Between 2004 and 2010, the annual increase of China's agricultural products exporting to Kazakhstan is 18.35 Billion US Dollars, the results from the first-level CMS decomposition present that the increase can be majorly attributable to the structural effect, which contributes the export increase of 13.50 Billion US Dollars, with the highest contribution rate of 73.57%. The competitive effect, with the relatively higher contribution rate of 24.12, is contributable to the increase of 4.43 Billion US Dollars, while the second-order effect has the lowest contribution with 2.31%.

Also the export increase of China's agricultural products to Kyrgyzstan is attributable to the structural effect, Competitive effect and second-order effect. Between 2004 and 2010, the annual increase of China's agricultural products exporting to Kyrgyzstan is 19.92 Billion US Dollars, the results in the first-level CMS decomposition present that the increase can be mainly attributable to the structural effect, which contributed the export increase of 18.94 Billion US Dollars, with the highest contribution rate of 95.10%. While the competitive effect and second-order effect brought with minor export growth with their contribution rate of 2.87% and 2.03% respectively.

The export increase of China's agricultural products to Uzbekistan, just as the case in China's exports to Russia, is attributable to the structural effect and second-order effect. Between 2004 and 2010, the annual increase of China's agricultural products exporting to Uzbekistan is 4.08 Billion US Dollars, the results from the first-level CMS decomposition present that the increase mainly owed to the structural effect, contributing the export increase of 4.65 Billion US Dollars, with the highest contribution rate of 114.11%. Whereas the competitive effect resulted into the export growth of -0.63 Billion US Dollars, with the negative contribution rate of -15.48%, which also indicated that China's general agricultural products does not enjoy competitiveness in the Uzbekistan market.

The export increase of China's agricultural products to Tajikistan is attributable to the Competitive effect and second-order effect. Between 2004 and 2010, the annual increase of China's agricultural products exporting to Tajikistan is 1.87 Billion US Dollars, the results in the first-level CMS decomposition present that the increase can be mainly attributable to the competitive effect, which contributed the export increase of 1.77 Billion US Dollars, with the highest contribution rate of 94.77%. The structural effect, however, is negative for export increase that resulted into the growth of -0.03 Billion US Dollars with the negative contribution rate of -1.52%.

Table 3
The Average Results of the Yearly CMS Decomposition of the Change in Export Value from 2004 to 2010

Unit: million US Dollars

| Items | China's Agricultural Products Exports to Member Countries in Shanghai Cooperation Organization (SCO) | | | | | | | | | |
| | Federation of Russia | | Kazakhstan | | Kyrgyzstan | | Uzbekistan | | Tajikistan | |
	Average	Share(%)	Average	Share(%)	Average	Share(%)	Average	Share(%)	Average	Share(%)
Change in Export	157.00	100	18.35	100	19.92	100	4.08	100	1.87	100
The First-level Decomposition										
Structural Effect	173.80	110.70	13.5	73.57	18.94	95.10	4.65	114.11	-0.03	-1.52
Competitive Effect	-18.67	-11.89	4.43	24.12	0.57	2.87	-0.63	-15.48	1.77	94.77
Second-order Effect	1.87	1.19	0.42	2.31	0.40	2.03	0.06	1.36	0.13	6.75
The Second-level Decomposition										
Growth Effect	14.73	9.38	0.72	3.94	13.26	66.56	3.12	76.41	-0.22	-11.77
Commodity Effect	159.07	101.32	12.28	69.63	5.69	28.55	1.54	37.70	0.19	10.22
General Competitive Effect	8.39	5.35	0.91	4.98	6.18	31.02	2.61	64.08	2.63	141.16
Specific Competitive Effect	-27.06	-17.24	3.51	19.14	-5.61	-28.14	-3.24	-79.55	-0.87	-46.39
Pure Second-order Effect	2.42	1.54	1.12	6.11	-0.08	-0.39	0.76	18.53	-0.22	-11.88
Dynamic Structural Residual	-0.55	-0.35	-0.70	-3.79	0.48	2.41	-0.70	-17.17	0.35	18.63

Resources: Calculated by author based on the HS data from UN COMTRADE DATABASE.
Note: The CMS decomposition was carried out yearly, and a simple average of the yearly decomposition results was then used to present the chosen period.

3.2 Analysis of the Results from the Second-Level Decomposition

Commodity effect is the main factor for the export growth of China's agricultural products to Russia. During the year of 2004-2010, the results from the second-level CMS decomposition illustrate that the increase can be mainly attributable to the commodity effect, on average, which pushed the increase by 159.07 Billion US Dollars, with the highest contribution rate of 101.32%. The growth effect, general competitive effect and pure second order effect had positive role on export increase with their contribution rate of 9.38%, 5.35% and 1.54% respectively. Whereas the specific competitive effect and dynamic structure residual had negative role with their contribution rate of -17.24% and -0.35%. The reason for higher negative specific competitive effect is that China's livestock products and beverage & tobacco do not enjoy market competitiveness, owing to lower market share of 0.53% and 0.51% respectively.

Commodity effect is also the main factor for the export growth of China's agricultural products to Kazakhstan. During the year of 2004-2010, the results from the second-level CMS decomposition illustrate that the increase can be mainly attributable to the commodity effect, leading to the average increase by 12.28 Billion US Dollars, with the highest contribution rate of 169.63%. The growth effect, general competitive effect, specific competitive effect and pure second order effect took minor positive role on export increase with their contribution rate of 3.94%, 4.98%, 19.14% and 6.114% respectively. Whereas the dynamic structure residual had negative role with its contribution rate of -0.70%.

Growth effect is the main factor for the export growth of China's agricultural products to Kyrgyzstan. Between 2004 and 2010, Kyrgyzstan's agricultural products imports increased from 2.13 Billion US Dollars to 5.49 Billion US Dollars with the annual increase of 26.98%, which in turn pushed China's agricultural products exporting to Kyrgyzstan increase by 13.26 Billion US Dollars, with the highest contribution rate of 66.56%. The commodity effect, general competitive effect and dynamic structural residual had positive role on export increase with their contribution rate of 28.55%, 31.02% and 2.41% respectively. The specific competitive effect and pure second-order effect, however, had negative role with their contribution rate of -28.14% and -0.39%. The reason for higher negative specific competitive effect is that China's fishery products and beverage & tobacco do not share market competitiveness in Kyrgyzstan owing to lower market share of 1.60% and 1.49% respectively.

The main factor for the export growth of China's agricultural products to Uzbekistan is growth effect and general competitive effect. During the year of 2004-2010, the results from the second-level CMS decomposition illustrate that the increase can be mainly attributable to the growth effect and general competitive effect, leading to the respective of average increase by 3.12Billion US Dollars and 2.61 Billion US Dollars, with the their higher contribution rate of 76.41% and 64.08% respectively. The commodity effect and pure second order effect took positive role in export increase with their contribution rate of 37.70% and 18.53% respectively. Whereas the specific competitive effect and dynamic structure residual had negative role with their contribution rate of -79.55% and -17.17%. What's more, the reason for higher negative specific competitive effect is that China's bulk commodities, livestock products, fishery products and beverage & tobacco do not enjoy competitiveness in

Uzbekistan owing to lower market share of 1.32%, 2.94%, 2.49% and 0.06% respectively.

The main factor for the export growth of China's agricultural products to Tajikistan is general competitive effect, during the periods 2004-2010, which on average leads to the export increase by 2.63 Billion US Dollars, with the highest contribution rate of 141.16%. The commodity effect and dynamic structural residual had minor positive role on increase with their contribution rate of 10.22% and 18.63% respectively. Whereas the growth effect, specific competitive effect and pure second-order effect had negative role with their contribution rate of-11.77%,-46.39% and -11.88%, moreover, the reason for higher negative specific competitive effect is that China's fishery products and beverage & tobacco does not enjoy competitiveness in Tajikistan due to lower market share of 0.05% and 0.04% respectively.

CONCLUSION AND LIMITATION

Russia is the largest export market for China's agricultural products in Shanghai Cooperation Organization, followed by Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan. The agricultural trade between China and the four Central Asian Countries should be highly valued, for having higher trade increase potential in the future, though the current trade volumes between China and the four Central Asian Countries are in small scale.

The increasing factors of China's agricultural products exporting to the SCO member countries to some extent appear different types. To be specific, the export increase of China's agricultural products went to Russia and Kazakhstan are both attributable to commodity effect; the export increase to Kyrgyzstan is attributable to growth effect,; the export increase to Uzbekistan is attributable to both growth effect and general competitive effect;

The export growth to Tajikistan is attributable to general competitive effect. However, the main constraining force is highly similar as being low market competitiveness in specific grouped products. (Kazakhstan excluded)

The limitation of study is that regional agreement, trade policy, customs rate, consumption disposition of customers, etc are neglected, which are also highly important in influencing the increase factor. Although the study results are summarized from market analysis, they also have high guiding value in practice. The further research should take into consideration the uncontained factors in this study and put up with an overall and systematic analysis.

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