

12 Agricultural trade between China and ASEAN

Dynamics and prospects

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Bilateral trade between China and the Association of South-East Asian Nations (ASEAN) has expanded very quickly since 2001. China became ASEAN's third largest export market in 2005, after the United States and Japan. In particular, ASEAN's agricultural exports to China have increased rapidly, reaching US\$5.9 billion in 2005. As a result, China became the third largest agricultural export market for ASEAN in 2005. With its rapid economic growth and structural change, slowing population growth, continuing income growth, rapid urbanisation and limited natural resources, China can be expected to import an increasing volume of agricultural products to meet its increasing food demand and the raw material demands of its high-growth industries (Chen 2006; Huang and Yang 2006; Chen 2004; Huang and Rozelle 2003). China's huge and fast growing purchasing power will provide great opportunities for agricultural exporting countries (Huang and Yang 2006).

The trade relationship between China and ASEAN has been strengthened by the ASEAN-China Free Trade Agreement (ACFTA), signed in 2002. In 2005, the ASEAN-China free trade area was the world's largest free trade area, with a population of 1.86 billion, combined gross domestic product (GDP) of US\$2.62 trillion (2000 constant US dollar) and total trade value of US\$1.23 trillion (2000 constant US dollar). The free trade agreement will be implemented fully in 10 years (by 2010). As a first step, the so-called

early harvest program (EHP) was launched successfully in 2004. According to the EHP, from 2004 to 2006 the import tariffs on about 500 agricultural commodities traded between China and the original ASEAN members¹ were to be reduced to zero.

Many studies have been undertaken to explore the possible impacts of the agreement. Some indicate that China's export structure is quite similar to ASEAN in many aspects; therefore, integration will increase the competitive pressure on ASEAN economies (Tongzon 2005; Holst and Weiss 2004; Wong and Chan 2002). Other studies find that the ACFTA could promote net trade gains, stimulate economic growth and greatly improve social welfare in the partner economies (Suthiphand 2002; Chia 2004). The majority of studies, however, focus on impacts in the industrial sectors.

There are questions worthy of study with respect to agricultural trade between China and ASEAN. What has happened to agricultural trade in recent years? Have China and ASEAN become more competitive or more complementary in agriculture? Has trade integration helped the two economies make adjustments towards their respective comparative advantages? What are possible challenges in agriculture as a result of the free trade agreement?

This chapter is structured as follows: in the next section, we describe the classification of agricultural commodities adopted for the exercise. Section three highlights the characteristics and changing trends in ASEAN-China agricultural trade. Sections four and five calculate and analyse revealed comparative advantage and trade complementarity between the two economies. Section six summarises the main findings.

Classification of agricultural commodities

We use the Standard International Trade Classification (SITC Revision 3) to classify agricultural products. Agricultural products are defined to include: SITC0 (food and live animals), SITC1 (beverages and tobacco), SITC4 (animals and vegetable oils, fats and waxes) and some sub-groups² of SITC2 (crude materials, inedibles, except fuels). The agricultural trade data are from United Nations Statistics Division, Commodity Trade Statistics Database (COMTRADE). All values of agricultural trade are in 2000 constant US dollar prices.

In order to demonstrate more clearly changes in agricultural trade between China and ASEAN, the agricultural products are classified further into nine commodity groups: animal products, fish, cereals, vegetables and fruits, sugar, oil seeds, raw materials, rubber, processed products and vegetable oils. As we also analyse changes in terms of the factor intensities of the commodities, agricultural products are classified into labour-intensive and land-intensive commodities. The two sets of classifications at the two-digit level are shown in Table A12.1.

Agricultural trade between China and ASEAN

Changes in China's imports, exports and net exports with ASEAN

Bilateral trade in agricultural products has expanded in recent years. As Figure 12.1 shows, China's imports from ASEAN increased in 1999 after a short period of decline after 1995, and accelerated after 2002. The annual import growth rate jumped from 17.3 per cent during 1999-2001 to 27.3 per cent during 2001-05. The import value of agricultural products from ASEAN to China in 2005 reached US\$5 billion—more than 2.6 times the level in 2001.

Exports of agricultural products from China to ASEAN fluctuated slightly during 1992-2001 and increased continuously after 2001. The average annual export growth rate reached 17 per cent in the period 2001-05—a rapid rate but much lower than that of imports. Therefore, China's trade deficit with ASEAN in agricultural products has been increasing, reaching US\$2.8 billion in 2005.

Shares of bilateral agricultural trade between China and ASEAN

The Chinese market is becoming more and more important for ASEAN's agricultural exports. As Figure 12.2 shows, there was a short-term decline in 1998 and 1999 in the share of ASEAN's total agricultural exports to China. This could have been a temporary effect of the East Asian financial crisis; however, the share resumed its strong growth after 1999. The share of exports to China in ASEAN's total agricultural exports increased quickly from 4.8 per cent in 1999 to 10.2 per cent in 2005. In contrast, the share of

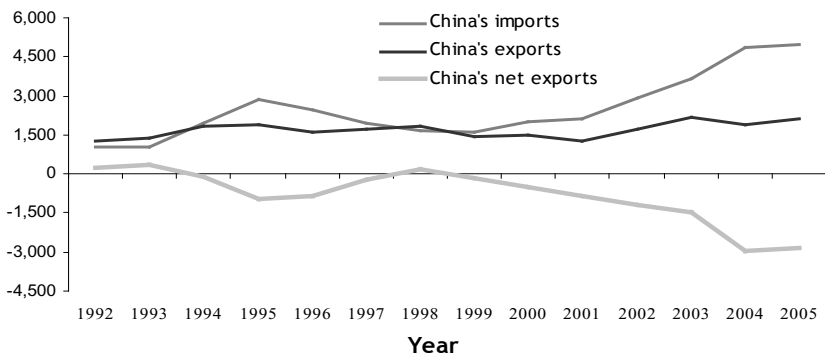
agricultural exports to ASEAN in China's total agricultural exports fluctuated during 1992-2005 around a declining trend, falling from 10.1 per cent in 1999 to 8.8 per cent in 2005.

ASEAN is an important source of China's agricultural imports, as Figure 12.2 shows. On average, imports from ASEAN accounted for 15.6 per cent of China's total agricultural imports during 1992-2005 and there has been a rising trend in recent years, increasing from 14.7 per cent in 2000 to 16.6 per cent in 2005. China's share in ASEAN's agricultural imports is not as important—in 2005, it was only 8.8 per cent.

China-ASEAN import and export structure

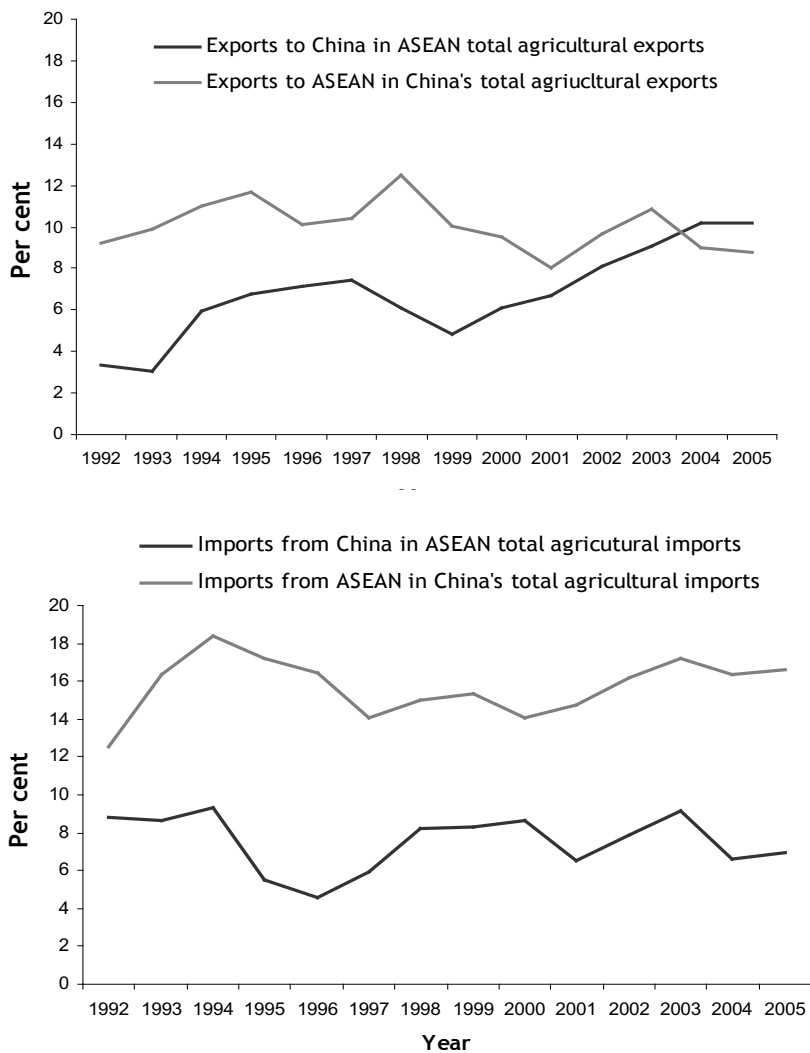
We examine the structure of the bilateral agricultural trade in two ways. First, we use the data from 2005 to analyse the relative importance of agricultural commodities in bilateral trade. Second, we use data for the period 1992-2005 to investigate the trends in bilateral agricultural trade between the two partners.

Figure 12.1 China's imports, exports and net exports with ASEAN (US\$ million)



Source: COMTRADE.

Figure 12.2 Shares of bilateral agricultural trade in total agricultural trade, 1992-2005 (per cent)



Source: COMTRADE.

China-ASEAN agricultural export and import structure, 2005. Figure 12.3 shows China's export and import shares of agricultural products with ASEAN in 2005. China's agricultural exports to ASEAN are concentrated mainly in three groups of commodities: vegetables and fruits, processed food, and fish. The combined share of the three commodity groups accounted for 77 per cent of total agricultural exports to ASEAN. Vegetables and fruits are the largest export commodity group, accounting for 40 per cent.

China's agricultural imports from ASEAN are also concentrated in three different commodity groups. The most important imported agricultural commodity is vegetable oils, taking up 36 per cent. Decomposing this category, we find that palm oil accounted for 98.8 per cent of total vegetable oil imports from ASEAN in 2005. The second most important commodity is rubber—accounting for 33 per cent of total agricultural imports from ASEAN—and the third is vegetables and fruits, accounting for 14 per cent. The combined share of the three commodity groups accounted for 83 per cent of total agricultural imports from ASEAN.

Changes in China's agricultural trade structure with ASEAN, 1992-2005. The export share of vegetables and fruits in China's total agricultural exports to ASEAN increased steadily from 12.2 per cent in 1992 to 40.9 per cent in 2005 (Table 12.1). Vegetables and fruits became the largest group of agricultural exports from China to ASEAN in 2002 and its status has been strengthened by strong export growth since then. The remarkable improvement might have resulted from the EHP tariff-reduction program launched between China and ASEAN in 2004.

The export share of fish was very small (no more than 3 per cent) before 2002; however, it increased quickly from 4.7 per cent in 2002 to 13.8 per cent in 2005. In 2004, the export share of fish from China to ASEAN jumped to 16 per cent from 7.5 per cent in 2003. The large change was due mainly to two factors: first, the United States placed anti-dumping duties on China's prawn exports in 2004 and some products were diverted to the ASEAN market. Second, the EHP launched in 2004 provided good opportunities for China's fish products to access ASEAN's market (Agricultural Information Centre of Guangxi Autonomous Region 2004).

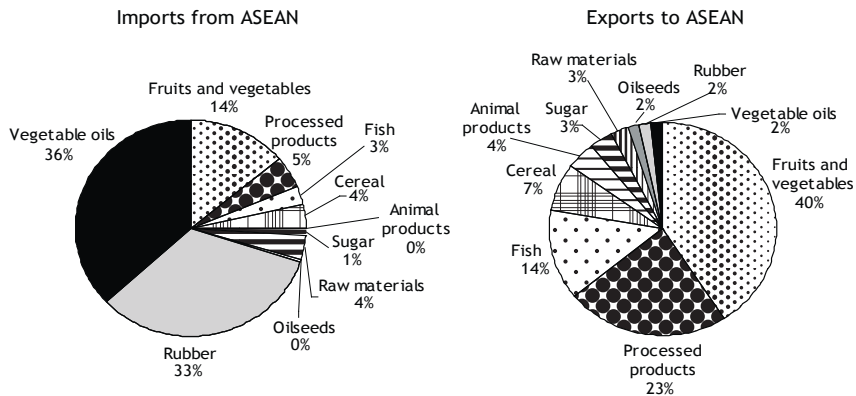
As cereals belong to 'sensitive products' related directly to food security, exports of cereals have always been affected significantly by China's trade policy. For example, exports of the largest export component in cereals (that

is, maize) have sometimes been heavily subsidised by the Chinese government (Tian et al. 2005). Therefore, the export share of cereals has fluctuated with the changes in China's domestic production and trade policies.

Processed agricultural products were the largest export commodity group until cereals took over in 1998. This share has, however, been on a declining trend, although it is still the second largest commodity group in agricultural exports from China to ASEAN. The export share of animal products varied slightly around 5 per cent during the period. For the rest of the commodities, their combined share fell from 24 per cent in 1992 to 10.7 per cent in 2005. In general, China's agricultural exports to ASEAN have become concentrated more and more in vegetables and fruits and processed agricultural products.

Vegetable oils and rubber dominated China's agricultural imports from ASEAN during 1992-2005 (Table 12.2). The combined import share of the two commodities accounted for 52-73 per cent of China's total agricultural imports from ASEAN. Moreover, their combined share has risen in recent years, increasing from 60 per cent during 1992-2001 to 70 per cent during 2002-05.

Figure 12.3 China-ASEAN agricultural trade structure in 2005



Source: COMTRADE.

Table 12.1 Shares in total agricultural exports from China to ASEAN, by commodity (per cent)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Animal products	5.6	4.0	3.2	4.3	4.6	5.6	3.5	6.1	5.7	8.5	5.6	4.0	4.7	4.2
Fish	0.8	1.7	2.0	1.7	2.0	2.6	1.7	2.4	3.0	4.2	6.3	7.5	16.0	13.8
Cereals	23.3	16.2	17.1	3.0	2.7	22.7	46.3	34.1	34.5	19.4	25.9	29.6	7.5	7.2
Vegetables and fruits	12.2	13.2	15.9	17.7	18.7	18.6	12.3	19.0	19.5	26.9	27.4	27.6	38.1	40.9
Sugar	2.3	3.1	1.6	6.1	4.4	1.7	4.7	3.0	2.4	4.6	3.1	2.3	2.9	3.2
Oil seeds	11.1	5.8	12.4	6.8	3.9	1.4	1.1	3.1	2.7	3.2	2.9	2.8	1.7	1.8
Raw materials	10.0	11.9	9.2	4.4	3.6	4.5	2.9	8.1	11.1	2.7	4.0	4.8	1.5	2.5
Rubber	0.1	0.2	0.3	0.7	0.8	1.1	0.4	0.6	0.8	1.4	1.1	0.9	1.4	1.7
Processed products	34.1	43.1	37.9	54.8	56.6	38.4	24.7	22.8	19.9	28.8	23.2	20.1	25.3	23.2
Vegetable oils	0.6	0.8	0.3	0.6	2.7	3.5	2.2	0.8	0.4	0.4	0.5	0.5	0.8	1.5

Table 12.2 Shares in total agricultural imports from ASEAN to China, by commodity (per cent)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Animal products	0.7	1.2	0.7	0.5	0.6	0.9	1.3	3.3	1.7	0.9	0.6	0.4	0.1	0.1
Fish	6.4	5.5	4.2	2.1	1.9	1.5	1.6	1.6	4.7	3.8	2.9	2.4	2.5	2.8
Cereals	4.8	4.5	8.7	17.0	12.7	8.4	8.2	5.8	6.0	5.2	3.5	2.6	4.8	3.7
Vegetables and fruits	6.4	6.9	3.5	4.9	5.8	8.5	10.8	10.1	9.9	16.9	13.4	11.5	12.4	13.8
Sugar	2.6	1.1	7.3	14.3	6.4	3.5	1.3	1.6	1.3	5.4	2.5	1.0	1.3	0.9
Oil seeds	0.2	0.2	0.5	0.1	0.1	0.2	0.2	0.0	0.0	0.1	0.2	0.2	0.2	0.1
Raw materials	7.5	5.1	5.6	4.2	6.5	7.0	6.3	4.0	4.6	4.2	3.9	3.7	3.7	3.8
Rubber	25.7	24.0	18.8	16.4	31.8	25.8	20.7	20.0	30.7	28.5	29.9	30.6	29.0	33.1
Processed products	14.3	13.3	5.9	4.6	6.0	6.3	7.0	9.5	11.9	8.4	6.2	4.9	5.8	4.9
Vegetable oils	31.4	38.2	44.8	36.0	28.3	38.0	42.6	44.1	29.4	26.6	37.0	42.7	40.2	36.9

Source: COMTRADE.

The third largest group of agricultural commodities imported by China from ASEAN is vegetables and fruits. The share of this group increased during 1992-2005, rising from an average of 8.8 per cent during 1992-2001 to 12.8 per cent during 2002-05. China also imports certain raw materials and processed products from ASEAN; however, on average, the share of these commodities has been declining. In general, China's agricultural imports from ASEAN have become concentrated more and more on palm oil, rubber and vegetables and fruits.

China-ASEAN agricultural trade patterns

Aggregation of the commodities into labour-intensive and land-intensive groups presents a different view of the trends in trade between China and ASEAN. As Figure 12.4 shows, imports of labour-intensive commodities from ASEAN to China were stable from 1992 to 1999 and began to increase rapidly after 2000. The average annual growth rate of these kinds of commodities during 2001-05 was 14.6 per cent.

China's exports of labour-intensive agricultural commodities to ASEAN increased between 1992 and 1995 and then declined to the 1992 level between 1996 and 2000. Exports of these kinds of commodities began to increase strongly after 2000, achieving an annual growth rate of 21.2 per cent between 2001 and 2005.

China has been enjoying a trade surplus with ASEAN in labour-intensive agricultural commodities (Figure 12.4). The changing trend in net exports is quite similar to that of China's exports. As the growth rate of exports was higher than that of imports after 2000, the net export value of labour-intensive agricultural commodities increased and the trade surplus reached US\$0.67 billion in 2005.

The picture of China's exports and imports of land-intensive agricultural products with ASEAN is different from that of labour-intensive agricultural products. As Figure 12.5 shows, exports of land-intensive agricultural products from China to ASEAN were relatively stable between 1992 and 2003; however, they declined in 2004 and 2005. In contrast, China's imports of land-intensive agricultural products from ASEAN have increased strongly since 2001. The annual import growth rate of land-intensive agricultural products was 27.5 per cent between 2001 and 2005.

China has been in a trade deficit position with ASEAN with respect to land-intensive agricultural products (Figure 12.5). This situation strengthened rapidly after 2001. The trade deficit in land-intensive products rose from US\$1.5 billion in 2001 to US\$3.95 billion in 2005.

On the whole, China's agricultural trade with ASEAN has been in deficit since 1998 and the deficit has been increasing (Figure 12.1); however, China maintains a trade surplus with ASEAN in labour-intensive agricultural products. Moreover, the trade surplus in labour-intensive agricultural products has increased quickly in recent years. Therefore, China's rising trade deficit in agriculture is the result of the rapid increase in imports of land-intensive agricultural products, mainly palm oil and rubber. These imported commodities are used to meet the changing consumption preference for high-quality food with income growth and the demand for raw materials by China's high-growth industry.

Revealed comparative advantage

In this section, we examine comparative advantage in China and ASEAN as revealed through their agricultural trade and see how it is reflected in trade between the two partners. First, we present the definition of the revealed comparative advantage (RCA) index adopted in this study. Second, we compare the RCA by commodity in the two economies in 2005. Finally, we examine changes in the RCA to assess the export potential of the two economies.

Definition of revealed comparative advantage (RCA)

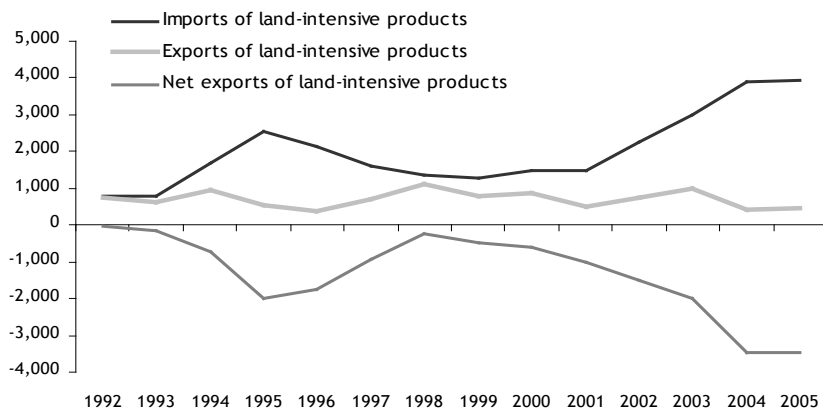
It is difficult if not impossible to measure comparative advantage directly. The most common approach to indirect estimation draws on the principle of RCA proposed by Balassa (1965). The logic of this principle is that the trade of a country is generated by its underlying comparative advantage, therefore, its real exports and imports can be used to infer the underlying pattern of comparative advantage. Following this principle, several indicators of RCA have been developed. In this exercise, we adopt the widely used net export ratio (NER), which is defined as

Figure 12.4 China's exports, imports and net exports with ASEAN in labour-intensive commodities, 1992-2005 (US\$ million)



Source: COMTRADE.

Figure 12.5 China's exports, imports and net exports with ASEAN in land-intensive commodities, 1992-2005 (US\$ million)



Source: COMTRADE.

$$RCA_{ic} = \frac{X_{ic} - M_{ic}}{X_{ic} + M_{ic}} \quad (1)$$

where RCA_{ic} = revealed comparative advantage index of commodity C for country i ; X_{ic} = export value of commodity C by country i ; M_{ic} = import value of commodity C by country i .

The rationale behind the index is that country i has RCA in good C if it exports more of it than it imports. Country i has a comparative advantage in exporting commodity C when RCA_{ic} is positive. If RCA_{ic} is negative, country i has a comparative disadvantage in producing the commodity. The larger RCA_{ic} is, the stronger is the comparative advantage. The index ranges between -1 and +1.

A comparison of RCA in China and ASEAN in 2005

In 2005 China had strong RCA in vegetables and fruits, fish, animal products, and processed products, relatively weak RCA in sugar and cereals, and clear revealed comparative disadvantage in raw materials, oil seeds, vegetable oils and rubber (Figure 12.6).

ASEAN has RCA in vegetables and fruits, fish, vegetable oils and rubber, lower RCA in processed products and sugar, and revealed comparative disadvantage in raw materials, oil seeds and cereals.

There are some overlaps between the two economies. China and ASEAN show significant comparative advantage in vegetables and fruits, and fish. Usually, we think that there will be competition if both economies have comparative advantage in the same commodity. Therefore, as these two economies become more integrated, some adjustments are inevitable.

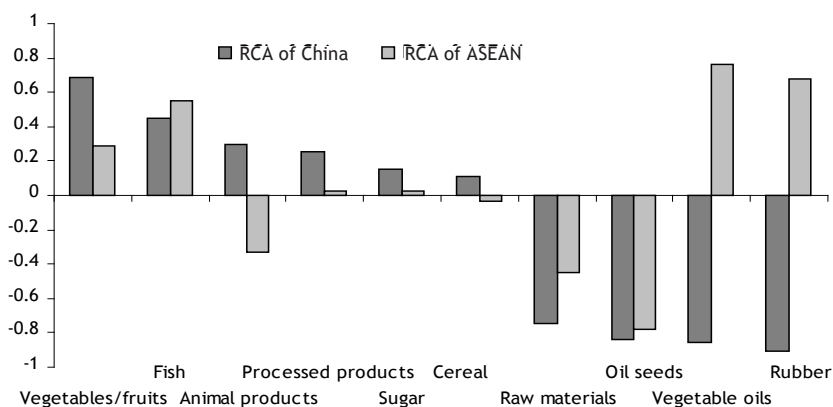
With further decomposition of the vegetables and fruits group, we find that competition is not as likely as the aggregate RCA would suggest. Taking the fresh and dry fruits category (SITC057) as an example,³ China has RCA in temperate fruits (for example, apples, citrus and pears) and revealed comparative disadvantage in tropical fruits (for example, bananas and mangoes). The combined share of apples, citrus and pears accounted for 90.5 per cent of China's total exports of fruits to ASEAN in 2005. In contrast, ASEAN has RCA in tropical fruits and revealed comparative disadvantage

in temperate fruits. The share of bananas, mangoes and other fresh fruits (SITC05798) accounted for 84.1 per cent of China's total imports of fruits from ASEAN in 2005. Therefore, the two economies have good potential for complementarity in fruit trade. This is apparently the reason for the rapid increase in bilateral trade in fruits in recent years.

With regard to processed products, China has stronger RCA than ASEAN. China's RCA value for processed products was 0.25 in 2005—much higher than ASEAN's RCA value of 0.03. Comparing the RCA in past years, we find that China has been maintaining strong RCA in processed products (Table 12.3). In contrast, ASEAN's RCA in processed products has been declining and has approached zero in recent years (Table 12.4). It is expected, therefore, that China will export more processed products to ASEAN if tariffs on processed products are removed through the ACFTA.

Many commodities—for example, animal products, vegetable oils and rubber—enjoy complementarity between China and ASEAN, and it will be

Figure 12.6 Comparisons of revealed comparative advantage in agricultural products in China and ASEAN, 2005



Source: COMTRADE.

easier for these sectors to be integrated, as both sides will benefit. Because China and ASEAN do not possess comparative advantage in raw materials and oil seeds, these are areas for export opportunity for other countries.

Changes in comparative advantage in China and ASEAN, by commodity

It is useful to examine the historical changes in comparative advantage in China and ASEAN. The RCA indices in Table 12.3 show that China had comparative advantage in the production of the following commodities during 1992-2005: animal products, fish, vegetables and fruits, and processed products.

During this period, the values of China's RCA indices for these products declined; however, the relatively large positive values of the RCA indices imply that China's comparative advantage in these commodities will continue for some time.

The values of China's RCA indices for cereals and sugar have fluctuated sharply and were negative in some years. As cereals are related to food security and sugar is very important for farmers' income, especially poor farmers, the production and trade of these commodities are among the most highly distorted (Tian et al. 2005; Huang et al. 2005). With imbalances between domestic supply and demand as a result of policy changes, large fluctuations in exports are expected. Based on the country's endowment of natural resources, however, it is impossible for China to export large quantities of these commodities to ASEAN in the future. With regard to raw materials, rubber and vegetable oils, the values of China's RCA indices have been negative since 1992, implying that China is and will remain heavily dependent on the world market to meet its growing domestic demand for these commodities.

As shown in Table 12.4, during 1992-2005 ASEAN had strong comparative advantage in the production of vegetable oils, rubber, vegetables and fruits, and fish. The high positive RCA indices for these agricultural products suggest that ASEAN will be able to sustain its exports. The values of ASEAN's RCA indices in processed products, though slightly positive, are close to zero, which suggests that imports will soon exceed exports.

ASEAN had comparative disadvantage in animal products, raw materials, cereals and oil seeds during 1992-2005. The high negative values of the RCA indices for animal products, raw materials and oil seeds indicate that ASEAN has been heavily dependent on the world market to meet its demand for these commodities and is likely to remain so.

Changes in comparative advantage in China and ASEAN, by commodity group

To further investigate the changing pattern in comparative advantage in agricultural trade in China and ASEAN, we calculated the RCA indices for labour-intensive and land-intensive commodity groups. As Figure 12.7 shows, China does not have comparative advantage in land-intensive commodities.

China has comparative advantage in labour-intensive agricultural commodities, which was declining in the 1990s but has been stable since 2000. Chen et al. (2006) suggest, however, that the sanitary and phytosanitary (SPS) regulations in industrialised countries could have significant negative impacts on China's exploitation of its comparative advantage in labour-intensive agricultural commodities (see also Sun et al. 2005).

ASEAN's RCA indices reveal that it has comparative advantage in land-intensive and labour-intensive agricultural commodities. As shown in Figure 12.7, the RCA for ASEAN's labour-intensive agricultural commodities declined during 1992-97, but jumped sharply in 1998. This sudden change was caused by the East Asian financial crisis, which began in 1997. With ASEAN's currencies depreciating rapidly, imports became much more expensive than domestic goods (Philippe 1998). As a result, agricultural imports fell by 24 per cent in 1998. As the level of exports changed much less, the RCA value rose abruptly. Since then, the RCA value has declined continuously, and since 2003 it has been below the 1997 level.

The change in the RCA for ASEAN's land-intensive agricultural commodities is very impressive. During 1992-2001, the RCA value fluctuated around a declining trend; however, beginning in 2001, the RCA index increased sharply. The fastest growth happened during 2002 and 2003, when exports of land-intensive agricultural commodities to China increased by 130 per cent (Figure 12.7). Meanwhile, exports of land-intensive agricultural

Table 12.3 China's RCA, by commodity, 1992-2005

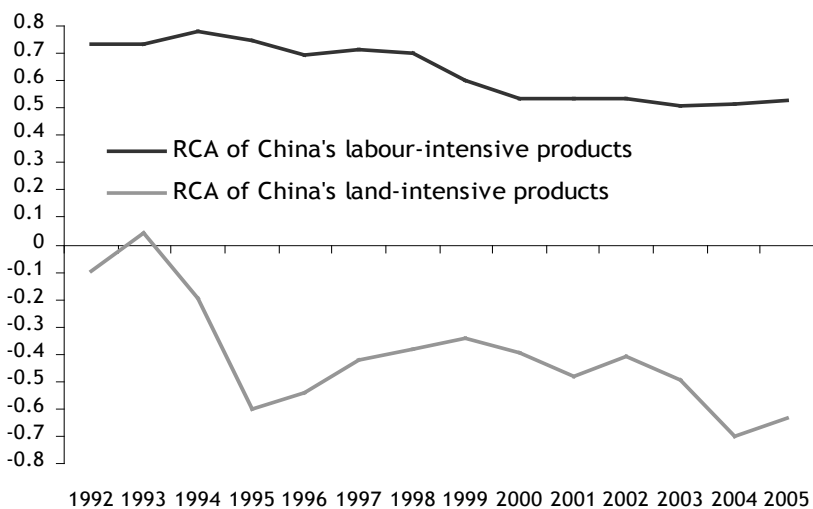
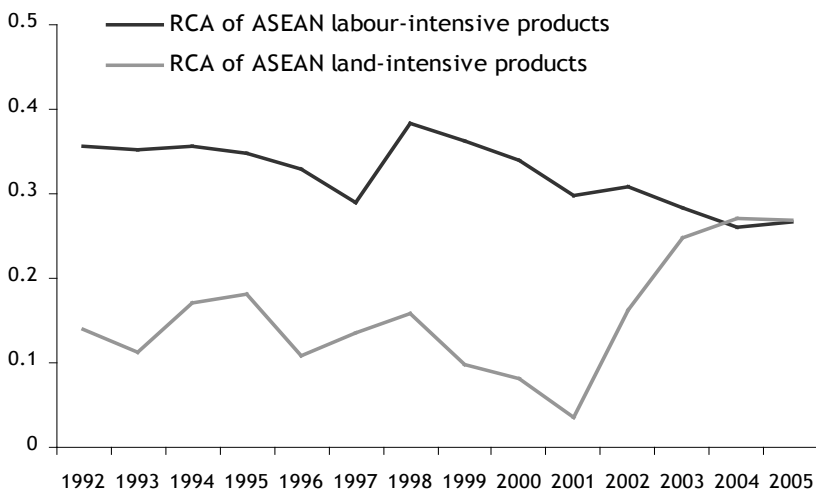
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Animal products	0.74	0.74	0.72	0.70	0.69	0.69	0.64	0.28	0.25	0.33	0.23	0.14	0.22	0.30
Fish	0.65	0.62	0.60	0.65	0.65	0.69	0.60	0.54	0.50	0.50	0.49	0.48	0.48	0.45
Cereal	-0.03	0.22	0.12	-0.85	-0.66	0.23	0.39	0.40	0.50	0.31	0.56	0.70	-0.35	0.11
Vegetables and fruits	0.91	0.91	0.93	0.90	0.83	0.80	0.79	0.78	0.73	0.69	0.70	0.71	0.68	0.69
Sugar	0.49	0.70	0.04	-0.42	0.05	0.12	0.29	0.17	0.28	-0.08	0.09	0.28	0.13	0.16
Oil seeds	0.88	0.88	0.83	0.65	0.19	-0.52	-0.62	-0.61	-0.75	-0.75	-0.79	-0.81	-0.85	-0.84
Raw materials	-0.42	-0.34	-0.48	-0.70	-0.70	-0.67	-0.63	-0.41	-0.52	-0.65	-0.67	-0.68	-0.79	-0.75
Rubber	-0.93	-0.90	-0.90	-0.89	-0.90	-0.84	-0.90	-0.92	-0.92	-0.91	-0.92	-0.92	-0.92	-0.90
Processed products	0.46	0.53	0.64	0.54	0.27	0.18	0.26	0.40	0.25	0.32	0.32	0.32	0.28	0.25
Vegetable oils	-0.57	-0.39	-0.56	-0.69	-0.62	-0.42	-0.64	-0.81	-0.77	-0.73	-0.89	-0.93	-0.94	-0.85

Table 12.4 ASEAN RCA, by commodity, 1992-2005

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Animal products	-0.31	-0.35	-0.35	-0.42	-0.43	-0.44	-0.30	-0.31	-0.32	-0.24	-0.21	-0.18	-0.36	-0.33
Fish	0.51	0.58	0.62	0.62	0.60	0.61	0.66	0.65	0.67	0.64	0.61	0.59	0.56	0.55
Cereal	-0.05	-0.07	-0.11	-0.19	-0.29	-0.03	-0.06	-0.08	-0.06	-0.01	-0.02	-0.02	0.06	-0.04
Vegetables and fruits	0.41	0.33	0.25	0.22	0.25	0.22	0.27	0.33	0.29	0.29	0.29	0.29	0.28	0.29
Sugar	0.39	0.28	0.33	0.24	0.15	0.14	0.00	-0.11	0.10	0.10	0.15	0.20	0.20	0.03
Oil seeds	-0.60	-0.77	-0.75	-0.76	-0.87	-0.78	-0.69	-0.79	-0.80	-0.82	-0.82	-0.82	-0.77	-0.78
Raw materials	-0.74	-0.70	-0.66	-0.64	-0.65	-0.62	-0.61	-0.61	-0.60	-0.68	-0.62	-0.56	-0.51	-0.45
Rubber	0.69	0.66	0.69	0.70	0.70	0.63	0.61	0.57	0.56	0.56	0.63	0.67	0.68	0.68
Processed products	0.10	0.06	0.08	0.08	0.06	0.05	0.18	0.15	0.07	0.00	0.00	0.01	0.02	0.03
Vegetable oils	0.64	0.68	0.77	0.79	0.83	0.82	0.83	0.79	0.81	0.80	0.82	0.83	0.78	0.76

Source: Authors' calculations from COMTRADE data.

Figure 12.7 RCA of labour-intensive and land-intensive agricultural commodities in China and ASEAN, 1992-2005



Source: Authors' calculations from COMTRADE data.

commodities to other regions rose by 56 per cent. Consequently, the share to China in ASEAN's total exports of land-intensive agricultural commodities increased from 8.9 per cent in 2001 to 13.2 per cent in 2003, and increased further to 16.4 per cent in 2005. Therefore, we could argue that China's huge growth in demand contributed significantly to the change. It remains to be seen whether the change will be maintained.

Complementarity in agricultural trade between China and ASEAN

We use the trade complementarity index (TCI) to measure how well the structure of ASEAN-China exports matches the structure of China-ASEAN imports. We calculate the TCI for food and live animals (SITCO) and for all agricultural commodities. By analysing the changes in the TCI, we can predict potential adjustments in agricultural structures in the process of economic integration between China and ASEAN.

Definition of the trade complementarity index (TCI)

The TCI measures the degree to which one country's relative export share structure corresponds with another's across certain commodities (Vollrath and Johnston 2001). The TCI assesses the market match between two economies—that is, is one country selling what the other country wants to buy? The formula for calculating TCIs is as follows

$$TCI_{ij}^s \equiv \sum_{k \in s} \left[\vartheta^k * RXS_i^k * RMS_j^k \right] \quad (2)$$

where

$$RXS_i^k \equiv \frac{X_{iw}^k / X_{iw}^s}{X_{ww}^k / X_{ww}^s} \equiv \frac{\text{share of } k \text{ in country } i\text{'s exports of } s \text{ goods}}{\text{share of } k \text{ in the world's exports of } s \text{ goods}}$$

$$RMS_j^k \equiv \frac{M_{jw}^k / M_{jw}^s}{M_{ww}^k / M_{ww}^s} \equiv \frac{\text{share of } k \text{ in country } j\text{'s imports of } s \text{ goods}}{\text{share of } k \text{ in the world's imports of } s \text{ goods}}$$

$$\hat{\theta}^k \equiv \frac{X_{ww}^k}{X_{ww}^s} \equiv \text{share of } k \text{ in global exports of } s \text{ goods}$$

RXS_i^k is Balassa's revealed comparative advantage. RMS_j^k has the same structure, except that import rather than export data are used. In other words, the index can be interpreted as being a trade-weighted measure for sector s of the degree to which exporter i 's profile of comparative advantages corresponds with the profile of comparative disadvantages for importer j . That is, this index depicts how specialisation in the commodity composition of country i 's exports matches the specialisation in the commodity composition of country j 's imports.

A TCI equal to one represents a threshold, with a value greater (less) than one showing a greater (lesser) level of complementarity in the composition of what exporter i exports and what importer j imports than what occurs between the average pair of countries. Further, an upward-sloping TCI suggests that the structural change is consistent with more efficient use of partner and global resources. Such a change is likely to be welfare enhancing.

Changing trends in trade complementarity between China and ASEAN

Figure 12.8 presents TCIs between ASEAN and China in food and live animals (SITC0) for the period 1992-2005. As the figure shows, the value of the TCI of ASEAN's exports and China's imports is always greater than that of China's exports and ASEAN's imports. After a short period of decline during 1994-97, the TCI value for ASEAN's exports and China's imports increased steadily from 1 in 1998 to 1.23 in 2005, indicating that there not only exists complementarity in ASEAN's exports and China's imports, but that the complementarity has been increasing since 1998.

In contrast, the TCI value for China's exports and ASEAN's imports became less than 1 in 1994; since then, it has been fluctuating about 0.8 and 0.9. This implies that there is less complementarity in China's exports and ASEAN's imports in food and live animals.

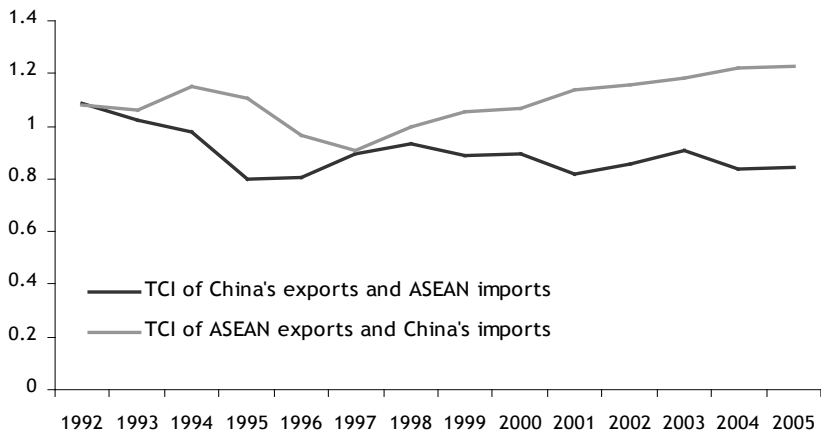
Figure 12.9 shows the TCI between China and ASEAN in all agricultural commodities for the period 1992-2005. The TCI value for all agricultural products in ASEAN's exports and China's imports is larger than that of

food and live animals (SITC0). This is because the TCI of all agricultural commodities adds commodities (for example, rubber and vegetable oils) in which ASEAN has comparative advantage and China has comparative disadvantage. Therefore, agricultural products as a whole show more complementarity between ASEAN's exports and China's imports.

The TCI value of all agricultural products in ASEAN's exports and China's imports declined continuously during 1994-2001, but the decline has been reversed since 2001 (Figure 12.9). The TCI value increased quickly from 1.07 in 2001 to 1.48 in 2005.

The TCI value of China's exports and ASEAN's imports for all agricultural commodities has, however, been less than 1 since 1995. As Figure 12.9 shows, the TCI value fluctuated within the range 0.85-0.93 between 1995 and 2005. This indicates that China's exports and ASEAN's imports have less complementarity in this area. Moreover, this situation has not been changed by the implementation of the free trade agreement.

Figure 12.8 TCIs for China and ASEAN in food and live animals (SITC0), 1992-2005

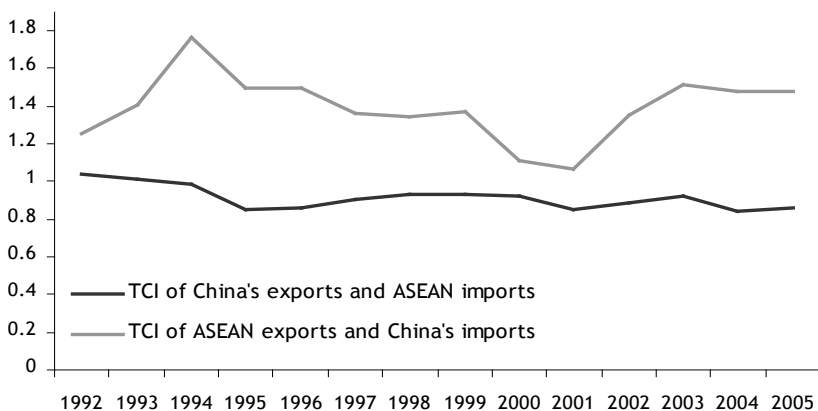


Source: Authors' calculations from COMTRADE data.

From the increasing TCIs in recent years for ASEAN's exports and China's imports in food and live animals (SITCO) and in all agricultural commodities, we could argue that ASEAN's exports to China have been experiencing some structural adjustments based on China's market demand. Moreover, such adjustments are more apparent and started earlier in the food and live animals sectors (SITCO). Such adjustments seemed, however, not to be happening in China. The increasing TCI of ASEAN's exports and China's imports corresponds with the rising share of exports to China in ASEAN's total agricultural exports. With China's market becoming more and more important for ASEAN's agricultural exports, ASEAN's agricultural production structure has started to adjust to match Chinese demand.

The changes in the TCI have another implication. The larger and increasing value of the TCI for ASEAN's exports and China's imports reveals that ASEAN is selling what China wants to buy and this match is becoming stronger. Therefore, exports from ASEAN will meet less resistance in entering China's domestic market. Consequently, ASEAN farmers will not only enjoy more

Figure 12.9 TCIs for China and ASEAN in all agricultural products, 1992-2005



Source: Authors' calculations from COMTRADE data.

opportunities provided by the ACFTA, they will have easier access to the Chinese market. In comparison, the lower value of the TCI for China's exports and ASEAN's imports implies that a lot of effort will be needed for Chinese exporters to grasp the opportunities in the ASEAN markets.

Conclusions

Since China's WTO accession and the implementation of the ACFTA, bilateral agricultural trade between China and ASEAN has increased very rapidly and new trends have emerged during the process of economic integration. The following are the main findings of the preceding analysis.

Bilateral agricultural trade between China and ASEAN has increased rapidly in recent years, especially since the negotiation and implementation of the ACFTA and the launch of the EHP. ASEAN's agricultural exports to China have increased rapidly, reaching US\$5 billion in 2005. China's agricultural exports to ASEAN have also increased but at a slower pace, reaching US\$2.2 billion in 2005. ASEAN has been enjoying a surplus with China in agricultural trade and this surplus has grown.

China's domestic market is becoming more and more important for ASEAN's agricultural exports. The share of exports to China in ASEAN's total agricultural exports increased rapidly from 4.8 per cent in 1999 to 10.2 per cent in 2005. China became the third largest export market for ASEAN's agricultural products in 2005. With the full implementation of the ACFTA, the share can be expected to rise further. China's status as an export destination for ASEAN's agricultural products will be further enhanced; however, such a trend has not been witnessed in China.

China can be expected to export more labour-intensive agricultural products to ASEAN and import more land-intensive agricultural products from ASEAN. As China's RCA in labour-intensive agricultural products is higher than that of ASEAN, it should be possible for China to increase its exports to ASEAN in labour-intensive agricultural products—that is, fruits and vegetables, processed products, animal products, and fish. Compared with China, ASEAN has an overwhelming comparative advantage in certain land-intensive agricultural products (such as rubber and palm oil). Therefore, it will be better for both sides to exploit their comparative advantage in agricultural sectors by deeper integration of their economies.

The agricultural production structure in ASEAN has experienced some adjustments to match Chinese market demand. The TCI for ASEAN's exports and China's imports in food and live animals (SITC0) rose from 1 in 1998 to 1.23 in 2005. The TCI for ASEAN's exports and China's imports of all agricultural products also increased quickly—from 1.07 in 2001 to 1.48 in 2005. These trends demonstrate that the complementarity of ASEAN's exports and China's imports has been increasing in recent years. This implies that ASEAN could have undergone a structural adjustment in its agricultural sectors in response to China's rising status as an important export destination for ASEAN's agricultural products. Such an adjustment has not, however, been witnessed in China—at least, not one as significant as in ASEAN.

It should be relatively easy for ASEAN to gain access to the Chinese market during the integration of the two economies. The high and increasing value of the TCI for ASEAN's exports and China's imports reveals the strong market match between ASEAN and China: ASEAN is selling what China wants to buy. Therefore, the structural adjustment in agricultural production in ASEAN (shown by the rising TCI) should improve ASEAN's capacities to grasp the opportunities provided by China's huge market.

The integration of the two economies also provides opportunities for other agricultural exporting countries to increase their exports to China and ASEAN. The ACFTA will increase its member countries' competitiveness in many commodities. There are, however, some agricultural commodities in which China and ASEAN have no comparative advantage: for example, cereals, milk, beef and raw materials. With income growth induced by the ACFTA, demand for these commodities will rise, providing opportunities for other countries. As for countries with the same comparative advantage as China or ASEAN, they will confront certain challenges with possibly shrinking export shares in the Chinese and ASEAN markets.

There also are some challenges for the trading partners in the short term. Although the ACFTA will assist both sides to exploit their comparative advantage, it puts great pressure on those sectors with comparative disadvantage. Some adjustments will be inevitable. For example, as China's imports from ASEAN in tropical fruits increased quickly in recent years, many Chinese farmers producing tropical fruits in coastal areas (that is,

Guangdong, Guangxi, Fujian and Yunnan) found that they were losing profits and domestic market shares (Newspaper of Southern Agriculture 2006). As a result, many fruit trees have been destroyed. Therefore, certain policies should be taken to assist the transition to different farming activities or to help farmers move to non-agricultural sectors.

Notes

- 1 The original ASEAN members include Brunei, Singapore, Thailand, Malaysia, Indonesia and the Philippines.
- 2 Some sub-groups include the following commodities: SITC21 (hides, skins and fur, raw), SITC22 (oil seeds/oil fruits), SITC23 (crude rubber), SITC26 (textile fibres) and SITC29 (crude animal and vegetable materials).
- 3 SITC057 is one of the important components of fruit exports in China and ASEAN, accounting for 35 per cent and 54.6 per cent of total fruit exports, respectively, in 2005. Moreover, this category dominated fruit exports from ASEAN to China in 2005, making up 94.8 per cent of the total.
- 4 Other fresh fruits (SITC05798) include tropical fruits such as durian, longan and mangosteen, which China imports in large quantities from ASEAN.

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Appendix

Table A12.1 Classification of agricultural commodities, SITC Revision 3

Commodities	Two digital classifications in SITC Revision 3
Animal products	00, 01, 02, 41
Fish	03
Cereals	04
Vegetables and fruits	05
Sugar	06
Oil seeds	22
Raw materials	21,26
Rubber	23
Processed products	11, 12, 29, 08, 07, 09
Vegetable oil	42, 43
Labour intensive	00, 01, 03, 05, 07, 09, 11, 12, 29
Land intensive	02, 04, 06, 08, 21, 22, 23, 26, 41, 42, 43

Source: COMTRADE.
