Impact of China–ASEAN Free Trade Area on China's International Agricultural Trade and Its Regional Development

Huanguang Qiu, Jun Yang, Jikun Huang, Ruijian Chen*

Abstract

This study aims to examine the impact of the China–ASEAN Free Trade Area (CAFTA) on China's international agricultural trade and its regional agricultural development, using the Global Trade Analysis Project model and the China Agricultural Decision Support System. Our analysis showed that: (i) CAFTA will improve resource allocation efficiencies for both China and ASEAN and will promote bilateral agricultural trade and, hence, will have positive effects on the economic development of both sides; (ii) CAFTA will accelerate China's export of the agricultural commodities in which it has comparative advantages, such as vegetables, wheat and horticultural products, but at the same time bring about a large increase in imports of commodities such as vegetable oil and sugar; and (iii) CAFTA will have significantly varying impacts on China's regional agricultural development because of large differences in the agricultural production structure in each region. Our results indicate that agriculture in the northern, northeastern and eastern regions of China will benefit from CAFTA, whereas agriculture development in southern China will suffer. Those regional specific impacts are quite different from the effects brought by multilateral free trade treaties, such as those of the WTO, which usually have positive effects on south China but negative impacts on the northern and western parts of China.

Key words: free trade area, agricultural trade, regional development, model analysis
JEL codes: Q17, F47, E17

I. Introduction

China has been advocating and playing active roles in both multilateral and bilateral free trade area development. Many studies have demonstrated that a free trade area can improve its members' production efficiency, stimulate foreign investment, accelerate domestic reforms and, therefore, promote the growth of the economy (Fukase and Winters, 2003). Because of slow progress in multilateral trade negotiations, especially the Doha Round, China, like other countries, has sped up its bilateral trade-area development. By the end of 2006, China had reached free trade agreements with Hong Kong, Macao, ASEAN, Chile and Pakistan. Negotiations with New Zealand, Australia, the Gulf Cooperation Council and southern countries of Africa are in progress, and four free trade areas are at the feasibility study stage by June 2007.

The China–ASEAN Free Trade Area agreement is a milestone in the cooperation between China and ASEAN. The Framework Agreement on Comprehensive Economic Cooperation, signed in November 2002, provided for the establishment of a China–ASEAN Free Trade Area (CAFTA) for goods trade by 2010 for the older ASEAN members, including Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand, and by 2015 for the newer ASEAN member states, Vietnam, Laos, Cambodia and Myanmar. The Early Harvest Program, implemented on 1 January 2004, specifies that China and all older member countries of ASEAN should phase out and eliminate mutual import tariffs on almost all agricultural goods; newer ASEAN members have until 2015 to eliminate tariffs on these commodities. The enforcement of the Agreement on Trade in Goods of July 2005 signals the operational phase of the Free Trade Agreement.

The China–ASEAN Free Trade Area is one of the largest free trade areas in terms of population, gross economic outputs and trade volume. By the end of 2005, the GDP of CAFTA reached US$2971.1bn, and the total value of imports and exports reached US$1394. 8bn. The development and maturation of this free trade area will have significant impacts on both the Chinese and the ASEAN economies, as well as far-reaching implications for the economy and trade structure of the whole world.

Many studies have analyzed these impacts and have reached two general conclusions: First, most studies have predicted that CAFTA will stimulate the economies of member countries by reducing trade barriers and transaction costs, thereby promoting the development of bilateral trade. For example, Chirathivat (2002), using a computable general equilibrium model, found that the establishment of CAFTA will increase the GDP growth of both China and ASEAN by 0.36 and 0.38 percent, representing US$298.6bn and US$178. 7bn gains, respectively. Some studies also argue that ASEAN countries will suffer from this bilateral agreement, because of lower labor costs in China. They argue that China's cheaper

products will have negative impacts on the total welfare of ASEAN countries, or at least on some important sectors in ASEAN countries (Tongzon, 2005; Holst and Weiss, 2004).

The second research conclusion concerns CAFTA's impacts on the rest of the world. Because CAFTA is a regional and relatively close-knit organization, its benefits are exclusive to member countries. Mutual tariff reductions between member countries can make imports of products of non-member countries less competitive, with negative impacts on those countries' total trade volumes and economic welfare (Ahearne *et al.*, 2006).

Many studies have analyzed the impact of CAFTA on China's agricultural sectors nationally, but few have examined the impacts of CAFTA on China's regional agricultural development. Interestingly, results of studies focusing on the national level differ notably. Lu (2006), in a comparison of the agricultural products of China and ASEAN, concludes that most agricultural products of the two sides are complementary, so CAFTA can promote the export of most of China's agricultural products, except for vegetables and fish. However, Rong and Yang (2006) hold that the agricultural products of the two sides exhibit a competitiveness that has become more obvious in the last ten years. They believe that CAFTA will negatively impact China's agricultural development.

General equilibrium models also have mixed results. Chirathivat's (2002) general equilibrium model reveals that CAFTA will enhance China's imports of rice, sugar and vegetable oil by 251, 23 and 25 percent, respectively, and will increase China's export of fruits by 3 percent in 2010. However, using another general equilibrium model, Yang *et al.* (2006) determine that CAFTA will lead to a limited increase of China's rice exports (2 percent), and will increase imports of China's sugar and vegetable oil by 6 percent and 8 percent, compared with the results of no free trade agreement in 2010.

There are a couple of reasons that might explain these inconsistent results. First, CAFTA is a large economic community, and its members have complex agricultural production structures and trade patterns, making quantitative analysis of economic impacts difficult. Second, these studies have not paid particular attention to the agricultural production conditions of the 11 countries inside ASEAN. China, for instance, has vast geographic diversity, and its agricultural production patterns vary significantly by region; specific products of the same type from different regions can vary greatly. Given the large spatial diversity in production structures, biased or even misleading conclusions could be drawn by studies that are less attentive to regional differences.

The present study analyzes the impacts of CAFTA on China's international agricultural trade and agricultural development at both national and regional levels, using the Global Trade Analysis Program (GTAP) and the China Agricultural Decision Support System (CHINAGRO). Section II summarizes the structure and development of agricultural trade between China and ASEAN. Section III outlines the methodology and scenarios of the

analysis. Major simulation results and the underlying economic reasoning are presented and discussed in Section IV, and Section V concludes.

II. Development of China–ASEAN Agricultural Trade

Since the late 1990s, agricultural trade between China and ASEAN has expanded rapidly; the market interdependency between the two economies has steadily increased in the past decade. The annual growth rate of exports of agricultural products from ASEAN to China was 17.3 percent from 1999 to 2001, and 27.3 percent in 2002–2005. By 2005, China's total import of agricultural products from ASEAN had reached US$5bn. Exports to China grew faster than overall exports, increasing from 4.8 percent of ASEAN's total agricultural exports in 1999 to 10.2 percent in 2005. Compared with the rapid growth of its agricultural imports from ASEAN, China's export of agricultural products to ASEAN grew at only a moderate pace, with an annual growth rate of 17 percent from 2001 to 2005. Since 1994, China has maintained a trade deficit in agriculture with ASEAN, and with the fast growth of ASEAN's exports to China, this deficit has become even larger.

The agricultural import and export structures of China and ASEAN show clear differences. Table 1 illustrates that the dominant agricultural products exported from China to ASEAN in 2005 were mainly fruit and vegetables, processed foods, and fish, accounting

Table 1. Structure of Agricultural Trade between China and ASEAN in 2005

	China's exports to ASEAN (%)	China's imports from ASEAN (%)
Fruit and vegetables	40.9	13.8
Processed food	23.2	4.9
Fish products	13.8	2.8
Grain	7.2	3.7
Livestock	4.2	0.1
Sugar	3.2	0.9
Oilseeds	1.8	0.1
Rubber	1.7	33.1
Vegetable oil	1.5	36.9
Other agricultural products	2.5	3.8

Source: United Nations Commodity Trade Statistics Database (UN Comtrade).

for 77 percent of the total value of the agricultural products exported to ASEAN. Vegetable oils, rubber, and fruit and vegetables led the agricultural exports of ASEAN to China, with the sum of those commodities accounting for 83 percent of the total. The large bilateral trade in fruit and vegetables implies that at least for those products, the two economies are very complementary; ASEAN provides tropical fruits, such as mangoes and bananas, whereas China provides temperate fruits, such as apples and pears.

Trends in trade patterns parallel the comparative advantages of the two sides. China has comparative advantages in labor-intensive products, whereas ASEAN has advantages in land-intensive products. Although China has a trade deficit with ASEAN for agricultural products, for labor-intensive products, China has always shown a net trade surplus, which increased from US$170m in 2001 to US$630m in 2005. In contrast, for land-intensive agricultural products, ASEAN's exports to China have maintained a very high growth rate. For example, China imported US$1.5bn in land-intensive products from ASEAN in 2001, and US$3.9bn in 2005. Table 2 reveals that, in absolute terms, agricultural trade between China and ASEAN has grown steadily in the past decade. From 1992 to 2005, China's agricultural exports to ASEAN countries more than doubled, and ASEAN agricultural exports to China increased by a factor of 6 between 1992 and 2005. The last column also shows that China has become a major importer of agricultural products from ASEAN; China's share accounted for more than 10 percent of ASEAN's total agricultural exports in 2005.

III. Methodology and Policy Scenarios

In the present study, we linked two general equilibrium models: GTAP, which evaluated the impacts of CAFTA on China's international trade, and CHINAGRO, which examined CAFTA's impact on different regions of China. The national-level economic impacts of CAFTA, assessed with the GTAP model, and the simulated price changes of international agricultural products were fed into the multi-regional equilibrium model, CHINAGRO, which analyzed the impacts of CAFTA on China's regional agricultural development.

The Global Trade Analysis Program is a well-known multi-country, multi-sector computable general equilibrium model, and is often used for international trade analysis (Hertel, 1997). The model is based on the assumptions that producers minimize their production costs and consumers maximize their utilities under certain constraints. Supply and demand of all commodities clears by adjusting prices in a perfectly competitive market. Representative consumers of each country or region are determined with a non-homothetic constant difference of elasticity demand function. On the production side, firms combine intermediate inputs and primary factors (e.g. land, labor and capital) to produce commodities with constant-return-to-scale technology. Intermediate inputs are composites of domestic

Table 2. Total Trade and Agricultural Trade between China and ASEAN from 1992 to 2005

Year	Export value from China to ASEAN (US$100m)		Export value from ASEAN to China (US$100m)		Share of bilateral agricultural exports over each country's total agricultural exports (%)	
	Total	Agriculture	Total	Agriculture	China	ASEAN
1992	46.7	10.5	37.9	8.7	9.2	3.3
1993	53.4	11.4	50.7	8.1	9.9	3.1
1994	71.6	15.9	64.6	19.2	11.0	5.9
1995	104.7	16.9	83.1	25.6	11.7	6.7
1996	103.1	14.6	95.5	26.9	10.1	7.2
1997	127.1	15.9	106.7	28.9	10.4	7.4
1998	111.6	17.5	100.9	21.8	12.5	6.1
1999	122.7	13.9	114.2	16.8	10.1	4.8
2000	173.4	15.2	162.1	21.0	9.5	6.1
2001	183.8	13.0	165.8	22.3	8.0	6.7
2002	246.5	18.2	236.4	31.4	9.6	8.1
2003	309.3	23.3	307.0	40.4	10.8	9.1
2004	429.0	21.0	413.5	53.0	9.0	10.2
2005	553.7	24.4	522.3	58.7	8.8	10.2

Source: United Nations Commodity Trade Statistics Database (UN Comtrade).

and foreign components, with the foreign component differentiated by region of origin (the Armington assumption).

In GTAP, China is only one region, so we selected CHINAGRO to explore the impacts of agricultural development in different regions. CHINAGRO is a 17-commodity, 8-region general equilibrium welfare model, which has been successfully used for policy analysis of China's regional agricultural development (Keyzer and van Veen, 2005). The model consists of six income groups per region, with farm supply represented at the county level. For each county, the model comprises 28 outputs and a range of 14 farm types involved in cropping and livestock production. The 28 products encompass most of China's agricultural products, including rice, maize, wheat, sugarcane, oil crops, pork and poultry. The 14 farm types include categories such as irrigated cropping, rainfed cropping, tree cropping, traditional livestock farming and specialized livestock farming. Consumption is depicted at the regional

level, separately for urban and rural populations, and domestic trade is interregional.

As we looked to assess the economic impacts of CAFTA on China's agricultural development both at the national and the regional level, we developed two scenarios: a baseline scenario and a fully implemented CAFTA scenario. We estimate the impact of CAFTA by comparing the results from the two scenarios in 2010.

1. Baseline Scenario

In this scenario, we assume that there is no CAFTA agreement, and that every country will continue existing policies. This scenario embodies the effects of important known policies related to international trade, such as the implementation of Uruguay Round commitments, China's WTO accession commitments between 2001 and 2010, the phase-out by January 2005 of the Multi-fiber Agreement under the WTO Agreement on Textiles and Clothing, and the implementation of the Agreement of Free Trade Area among ASEAN member countries.

2. CAFTA Scenario

In the scenario of full implementation of CAFTA, we assume that the tariffs between China and ASEAN older members will be reduced to zero in 2010 for all commodities except those on the Special Products List; for those special products we assume that the tariffs will be reduced to 5 percent. CAFTA permits newer members to remove all import tariffs as late as 2015, but they must eliminate the import tariff on commodities listed in the "Early Harvest Program". Therefore, in this simulation, we assume that new ASEAN members will not liberalize except to implement their commitments under the "Early Harvest Program", whereas China will impose no import tariffs on commodities imported from those countries in 2010.

IV. Simulation Results

1. Impact of CAFTA at the National Level

Our results reveal that by 2010 CAFTA will improve economic welfare and stimulate the economic growth of both China and ASEAN. The older ASEAN countries will be the bigger winners in terms of absolute social economic welfare gains (US$1507m), followed by China whose welfare will increase by approximately US$517m. The net welfare increase of newer ASEAN members will be approximately US$117m. The GDP growth of all participants will benefit from CAFTA. Compared with the baseline results, GDP growth rates of China, of an older member of ASEAN, and of a newer member of ASEAN will increase approximately 0. 2, 0.6 and 0.5 percent, respectively (Table 3). International trade of all partners will also expand: as indicated in Table 3, total exports and imports of China will increase by US$7764m and US$9769m, and the exports and imports for all ASEAN countries will increase by

US$3492m and $6073m.

The returns to primary inputs (i.e. land, capital and labor) rise for all participant countries in the CAFTA scenario. As trade liberalization promotes production in all the participant countries, the demand for primary factors and primary-factor prices will increase correspondingly. The rent of the land will swell remarkably by 0.32 percent in China, 0.68 percent in older ASEAN members and 1.73 percent in newer ASEAN members. Wages of all countries will grow, but the wage increases for unskilled laborers will be greater than those for skilled laborers in each category of member of country (Table 3).

By 2010, the China–ASEAN Free Trade Area will have significant impacts on China's international agricultural trade as well as on the international prices faced by China, and those impacts will vary remarkably among commodities. Table 4 shows that CAFTA will increase most commodity prices faced by China on the world market, except sugar and vegetable-oil prices, which will decrease by 0.06 and 0.10 percent, respectively. China's exports of sugar, tea/horticultural products, and fruit and vegetables will expand dramatically in the CAFTA scenario by 76.6, 11.17 and 8.28 percent, respectively. However, the imports of vegetable oil, sugar, and fruit and vegetables will also increase by 27.6, 10.8 and 5.29 percent. Because the specific fruit and vegetables produced by ASEAN and China (especially northern China) are quite different, one would expect both the exports and imports of these products to increase substantially when the Free Trade Area is fully implemented. China's tea/horticultural products and fruit and vegetables will see the largest increases in CAFTA exports relative to the baseline scenario, at US$50m and US$46m respectively. On the import side, CAFTA will expand China's imports of vegetable oil by US$239m, mostly in palm oil. CAFTA will also increase China's net imports of sugar, pork and poultry.

Table 3. General Impact of China–ASEAN Free Trade Area on the Chinese and ASEAN Economies by 2010

	China	Older ASEAN members	Newer ASEAN members
Welfare change (EV, US$m)	517	1507	117
GDP change (%)	0.20	0.58	0.46
Export increase (US$m)	7764	3664	128
Import increase (US$m)	9769	5805	268
Price of land (% increase)	0.32	0.68	1.73
Unskilled labor wage (% increase)	0.32	0.94	0.44
Skilled labor wage (% increase)	0.28	0.93	0.42
Price of capital (% increase)	0.42	0.94	0.43

Source: Simulation results.

Table 4. Impact of China–ASEAN Free Trade Area on World Prices and China's Agricultural Trade in 2010

	Price Increase (%)	Exports		Imports	
		% increase	Value (US$)	% increase	Value (US$)
Rice	0.28	2.68	16	2.62	6
Wheat	0.22	7.20	2	0.65	3
Other grains	0.26	0.33	2	0.43	4
Vegetables/fruit	0.33	8.28	135	5.29	89
Oilseeds	0.16	3.18	10	0.28	23
Sugar	−0.06	76.63	16	10.80	43
Cotton	0.13	0.87	1	0.42	11
Vegetable oil	−0.10	3.08	4	27.60	243
Tea/horticulture	1.15	11.17	137	5.40	87
Beef and mutton	0.26	0.10	0	0.71	5
Pork and poultry	0.28	2.65	114	3.63	154
Milk	0.23	0.75	0	1.04	7
Fish	0.09	0.16	1	1.58	2

Source: Simulation results.

2. Impact of China–ASEAN Free Trade Area at the Regional Level by Commodity

We analyzed above the impact of CAFTA on China's overall economy and on its international agricultural trade in particular. For a variety of reasons, we would expect that those impacts would be very different for the various regions of China. First, China is a large country with high geographic diversity. Agricultural production endowments, such as land quality and climate, are distributed quite unevenly across China, resulting in large differences in the agricultural production structures of different regions. For example, north and northeast China accounts for more than 60 percent of China's total maize production, whereas south and southwest China are more focused on rice and sugar. Second, even for the same type of product, the specific products can be very different, as in the different types of rice and fruit produced in northern and southern China. Third, transportation infrastructure and other market developments vary by region and can affect price transmission. Last but not least, supply elasticities of price differ by region, so production responds more to price changes in some regions than in others.

Table 5. Price Effects of China–ASEAN Free Trade Area for Different Regions of China by 2010 (% Change)

	Rice	Wheat	Vegetable oil	Sugar	Fruit	Vegetables	Livestock
North	1.02	0.00	−1.47	−0.74	1.99	2.13	−1.77
Northeast	1.71	0.00	−1.31	−1.15	1.73	1.82	−1.75
East	0.60	0.78	−1.30	−0.37	1.94	2.02	−1.51
Central	0.64	0.75	−1.47	−0.74	1.87	1.96	−1.60
South	−1.49	0.65	−2.08	−3.45	−4.63	2.15	−1.24
Southwest	−0.52	0.71	−1.29	−3.02	−0.28	1.90	−1.36
Tibet	—	0.00	—	—	1.69	1.96	−1.44
Northwest	0.51	0.71	−1.48	−1.12	2.61	2.06	−1.70

Source: Simulation results.

Note: —, no data.

Table 5 presents the price effect of CAFTA on agricultural products in different regions of China. As a result of joining CAFTA, the prices of vegetable oils, sugar and livestock products in all regions will decrease, but prices will increase for the commodities in which China has competitive advantages, such as vegetables. The price changes in different regions might stem from either international price changes resulting from CAFTA, or from changes in import and export tariffs.

For certain classes of commodities, CAFTA will lower prices in some parts of China and raise them in others. These discrepancies primarily result from differences in the products themselves. Rice and fruit, for example, are similar in South China and in ASEAN countries, but the products produced in northern China are more complementary with those of ASEAN countries. Therefore, after tariffs are reduced under the CAFTA agreement, more rice and tropical fruit will be imported to northern China from ASEAN countries, and exports of rice and fruit produced in northern China will rise. As a result, farmers in northern China will receive higher prices for their rice and fruit, whereas those in southern China will receive lower prices.

Price changes impact the allocation of factor inputs and, hence, the outputs of different commodities in each region. In our simulation, regional changes in outputs are strongly correlated with regional price changes. For example, as prices increase for vegetables in all regions, the output of vegetables in all regions rises. The uneven output increases (the highest in northern China at 1.13 percent and the lowest in eastern China at 0.02 percent) result from differing price increases and differing supply elasticities. By contrast, CAFTA will decrease China's total vegetable oil and sugar production by 0.82 and 1.5 percent, respectively; as expected, the agreement will reduce rice and fruit production in the south and southwest, but increase them in other regions, for example raising rice production in

Table 6. Effects of China–ASEAN Free Trade Area on Regional Agricultural Production in China in 2010 (% Change)

	Rice	Wheat	Vegetable oil	Sugar	Fruit	Vegetables	Livestock
North	0.40	0.00	−0.66	−0.59	0.66	1.13	−0.23
Northeast	0.88	0.16	−0.57	−0.64	0.55	1.02	−0.36
East	0.79	−0.28	−1.03	−1.00	0.66	0.02	−0.34
Central	0.77	−0.41	−1.28	−1.20	0.59	0.13	−0.38
South	−0.20	0.61	−0.13	−1.75	-1.03	1.08	−0.33
Southwest	−0.11	−0.33	−1.06	−1.69	-0.09	0.57	−0.35
Tibet	-	-	−0.39	-	0.60	0.96	0.00
Northwest	0.10	0.06	−0.45	−0.34	0.67	1.09	−0.11
China	0.44	−0.07	−0.82	−1.50	0.27	0.70	−0.31

Source: Simulation results.

the northeast by 0.88 percent.

Only the changes in wheat production are contrary to our expectations. Although the prices of wheat in all regions increased in the CAFTA scenario, China's total wheat production decreased by 0.07 percent. Wheat production in the northeastern, northwestern, and southern regions is expected to increase, but production in the eastern, central and southwestern regions will decrease moderately. The discrepancy between the simulated effects on price and production can be explained by fixed factors of production in agriculture, including land and labor constraints. In the eastern and central regions, although the wheat price will increase in the CAFTA scenario, the prices of fruit and vegetables will increase more (Table 5), meaning that the opportunity cost of growing wheat increases more than its price. Because the total available cultivated land and agricultural labor remain fixed, when more resources are moved from the wheat sector, its production might be expected to decline even as its price increases.

3. Aggregate Impact of China–ASEAN Free Trade Area on Agriculture at the Regional Level

Table 7 shows the impact of CAFTA on each region and China as a whole in total and net agricultural output. At the national level, compared with baseline scenario results, total and net agricultural outputs under CAFTA show increases of 0.18 and 0.35 percent (US$52.9m and US$79.4m). Net output rises by a larger percentage than total output because CAFTA improves production efficiency and profit margins.

At the regional level, southern China will lose under CAFTA, with total agricultural

output declining by 0.99 percent, and net agricultural output by 1.06 percent. This is consistent with our expectations. As we discussed above, primary agricultural products in southern China, such as fruit and sugar, will face fierce competition from ASEAN products, and both the prices and outputs of those products will decrease. Although wheat and vegetable outputs will increase in the CAFTA scenario, the shares of those products are very low, so the growth of these products cannot counteract the decreases for the main products. However, neither the total agricultural nor the net output value includes fishing or the nonagricultural industries; CAFTA might positively effect the total economy of the southern region because those industries are especially competitive in this region.

Another region that will lose in the CAFTA scenario is Tibet, but only to a limited extent. The total and net agricultural outputs of this region will decrease by 0.16 and 0.18 percent, respectively. The main negative effect on Tibet comes from the livestock sector, which suffers from an increase in maize prices and decrease in milk prices in our simulation.

Other regions will gain from this free trade agreement. The east will see the largest net agricultural output increase (0.92 percent), followed by the northeast (0.87 percent), the north (0.68 percent) and the northwest (0.67 percent). In terms of total net agricultural output, the north, the east, the southwest and the northeast will gain US$32.5m, US$31.3m, US$19.4m and US$15.0m, respectively. Gains for the north and east regions mainly come

Table 7. Impact of China–ASEAN Free Trade Area on China's National and Regional Total and Net Agricultural Output in 2010

	Total agricultural output		Net agricultural output	
	Value (US$m)	Percent change	Value (US$m)	Percent change
North	25.4	0.35	32.5	0.68
Northeast	8.9	0.34	15.0	0.87
East	28.8	0.70	31.3	0.92
Central	10.9	0.28	12.5	0.38
South	−47.0	−0.99	−43.1	−1.06
Southwest	18.0	0.37	19.4	0.54
Tibet	−0.6	−0.16	−0.6	−0.18
Northwest	8.6	0.34	12.5	0.67
China	52.9	0.18	79.4	0.35

Source: Simulation results.

from increases in fruit and vegetable production, whereas the increases in rice prices and production account for most of the net output increase in the east. For the north, rice and vegetable increases account for 70 percent of the overall gain, with the rest from fruit and wheat. The production and price increases of fruit, vegetables and wheat mainly account for the increases of the northwest's net agricultural output. The central and southwestern regions will have only a very moderate gain from this agreement.

V. Conclusions

The formation of CAFTA will promote agricultural trade between China and ASEAN countries, and will improve the economic welfare and stimulate the economic growth of both China and ASEAN countries. By 2010, the economic welfare of ASEAN countries will increase by approximately US$1624m, and China's economic welfare will increase by approximately US$517m.

Trade will increase in all CAFTA countries. Total Chinese exports and imports will increase by US$7764m and US$9769m, and the exports and imports of ASEAN countries will increase by US$3492m and US$6073m, respectively. The development of agricultural trade clearly follows each side's comparative advantage. China's net exports of fruit and vegetables will increase by approximately US$46m as a result of joining the Free Trade Area. On the import side, China's imports of vegetable oil and sugar will increase by US$239m and US$75.8m. CAFTA will also bring about a large increase in China's net imports of pork and poultry.

The free trade only reduces trade barriers between two sides. It can promote the production of some commodities for which neither side has a worldwide comparative advantage, and harm some sectors in some countries. For example, although ASEAN countries do not have a comparative advantage in the production of sugar and livestock products on the international market, with the reduction of Chinese import tariffs, the production of these commodities in ASEAN countries will increase. The countries that have global comparative advantages for these commodities, such as Brazil or Australia, will, therefore, lose part of their international market.

The impact of CAFTA on China's agricultural development differs significantly among regions. For the production of some commodities, such as sugar, the impact has the same sign for all regions, but the magnitudes differ. For other classes of commodities, such as rice and fruit, impacts can be of opposite signs in different regions, largely because the specific products differ between northern and southern regions; generally, products in the south are closer substitutes for ASEAN products than are products from the north.

Considering the overall impacts on regional total and net agricultural outputs, southern China will lose in the CAFTA scenario with the total value of agricultural output declining by

0.99 percent, and net agricultural output declining by 1.06 percent. Northern regions of China will gain; the northeast will see its net agricultural output value increase by approximately 0. 92 percent, followed by the northeast (0.87 percent), the north (0.68 percent) and the northwest (0.67 percent). CAFTA has no economically significant impacts on total and net agricultural output values in Tibet, southwest and central China. Most studies of the impact of multilateral trade agreements, such as the WTO, on different regions of China have found that southern regions of China will gain significantly from trade liberalization, whereas northern regions of China will see moderate gains or even losses (Huang *et al.*, 2003). However, CAFTA might have the opposite pattern of regional effects in agriculture, which would have important implications for the government's regional development policies.

References

Alan, G. Ahearne, John G. Fernald, Prakash Loungani and John W. Schindler, 2006, "Flying Geese or Sitting Ducks: China's Impact on the Trade Fortunes of Other Asian Economies," *Board of Governors of the Federal Reserve System Working paper,* No. 887, Board of Governors of the Federal Reserve System, Washington DC.

Chirathivat, Suthiphand, 2002, "ASEAN-China Free Trade Area: Background, Implications, and Future Development," *Journal of Asia Economics*, Vol. 13, No. 5, pp. 671–86.

Fukase, Emiko and L. Alan Winters, 2003, "Possible Dynamic Effects of AFTA for the New Member Countries," *World Economy*, Vol. 26, No. 6, pp. 853–71.

Hertel, Thomas W., ed., 1997, *Global Trade Analysis: Modeling and Applications.* New York and Cambridge: Cambridge University Press,

Holst David R. and John Weiss, 2004, "ASEAN and China: Export Rivals or Partners in Regional Growth?" *World Economy*, Vol. 27, No. 8, pp. 1255–74.

Huang, Jikun, Ninghui Li and Scott Rozelle, 2003, "Trade Reform, Household Effect, and Poverty in Rural China," Vol. 85, No.5, *American Journal of Agricultural Economics*, pp. 1292–8.

Keyzer, A. Mechiel and Wim van Veen, 2005, "Towards a Spatially and Socially Explicit Agricultural Policy Analysis for China," working paper, Center for World Food Study, Amsterdam.

Lu, Lingli, 2006. "The Analysis on the Similarity of China and ASEAN's Agricultural Products," *World Agricultural Economy*, Vol. 1, pp 36–40. (In Chinese)

Rong, Jing and Chuang Yang, "Empirical Study on Competitiveness and Complementarity of China and ASEAN's Agricultural Products," *International Trade Problems*, Vol. 8, pp. 45–50. (In Chinese)

Tongzon, J.2005, "ASEAN-China Free Trade Area: A Bane or Boon for ASEAN Countries?" *World Economy,* Vol. 28, No. 2, pp. 91–210.

Yang, Jun and Chunlai, Chen, 2006, "Computational Analysis of the Free Trade Areas of China and ASEAN," *working paper,* Asia Pacific School of Economics and Management of Australian National University, Canberra.

(Edited by Xinyu Fan)