03 China's WTO accession
The impact on its agricultural sector and grain policy

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China's WTO accession was approved on 27 September 2001, and China finally joined the WTO at the annual Ministerial Meeting of the WTO in November 2001. The further integration of China into the international economy will undoubtedly bring profound economic and social changes to China. The issue has been widely debated in China in recent years. Of the implications of China's accession to the WTO, the impact on China's agricultural sector is of particular importance as it links to sensitive issues such as rural income and food security. As a result, the significance of the debate on the issue of the agricultural impact has been far beyond that suggested by the share of agriculture in China's GDP or its external trade.

China's WTO entry commitments in the agricultural sector

By 2001, China had concluded bilateral agreements with every nation except Mexico[1] but only the US-China Agreement was available to the public. In principle, China's commitments could differ from agreement to agreement. The WTO Secretariat's task was to combine the best commitments from each and aggregate them into a single combined text. The combined text would become the basis for the final documents for China's WTO accession, and all member countries would have recourse to the combined text. However, as for the agricultural commitments, it is widely believed that the US-China Agreement has addressed most of the important issues in this sector.

Following the signing of the bilateral agreement on 15 November 1999, the China Trade Relations Working Group under the US government released a document that specified the contents of China's commitments including for the agricultural sector. It specifically mentioned that the upper limit of China's agricultural subsidy would be determined in the phase of multilateral negotiation in Geneva. Agreement on this issue was finally reached in June 2001. On the basis of the information currently available, the agricultural commitments made by China with respect to WTO accession mainly cover three aspects: tariff binding and tariff reduction, a tariff rate quota system and reduction of market distortion measures.

Tariff binding and tariff reduction

China commits to establish a 'tariff-only' import regime; all non-tariff barriers will be eventually eliminated. Any other measures, such as inspection, testing, and domestic taxes must be applied in a manner consistent with WTO rules on a transparent and non-discriminatory bases and all health measures must be based on sound science. The tariff on agricultural products will be reduced from an overall average of 22 per cent to 17.5 per cent, while the average duty on agricultural products of priority interests to the US will fall from 31 per cent to 14 per cent. Table 3.1 details the specific tariff reduction commitments for major agricultural products and the time path over which they will be phased in. For example, the tariff on imported fresh cheese will be reduced from the current level of 50 per cent to 12 per cent. The tariff reduction will be phased in by 2004 (the final year for implementation of Uruguay Round agreements for development countries) in equal annual instalments.

Tariff rate quota system

China will replace its agricultural import quota and licensing system with a tariff rate quota (TRQ) system. The TRQ system has been widely adopted by WTO members in respect to some sensitive bulk agricultural products. The system is characterised by a two-tiered discontinued tariff rate divided by a benchmark quantity of quota. Imports of a given product within quota are subject to very low duties whereas imports above the quota face very high, usually prohibitive, duties.

Table 3.2 reports TRQs for five bulk agricultural products that are regarded as sensitive by China. For example, cotton will have an annual import quota of 734,000 tonnes upon China's WTO accession with an in-quota duty of 1 per cent. The cotton quota will increase to 894,000 tonnes over the transition period of implementation that ends by 2004. To ensure the state monopolistic power in cotton trading will not be used to impede commercial imports of cotton after China's WTO accession, 67 per cent of the quota will be allocated to non-state enterprises. It is further specified that if the TRQ share reserved for importation by a state trading company is not contracted for by October of any given year, it will be reallocated to non-state trading entities.

Due to food security considerations, wheat, rice and corn are subject to TRQ regulation. The total quota for grain will increase from 14.47 million tonnes upon WTO accession to 22.16 million tonnes by 2004. The in-quota duty for pure grain is 1 per cent and for processed grain products may be higher than 1 per cent but not exceed 10 per cent. Market shares for grain imports will be assigned to non-state enterprises.

Reduction of market distortion measures

China also made commitments to reduce market distortions in both domestic distribution and the foreign trade of various agricultural products and inputs.

First, China has, in principle, committed to allow foreign companies to have full trading rights, including rights in retail, wholesale, warehousing and transportation. These measures imply that the traditional state monopolies in foreign trade and domestic distribution for some agricultural products will be reformed. China agrees that any entity will be able to import most products into any part of China. This commitment is to be phased in over a three-year period with all entities being permitted to import and export at the end of the period. China will permit foreign enterprises to engage in the full range of distribution services for chemical fertilisers after a five-year transition period. China will gradually reform the long entrenched state monopoly in grain and other bulk agricultural products. Non-state enterprises will take different market shares in sensitive bulk agricultural products Table 3.2).

Table 3.1   China's agreed tariff reductions for selected agricultural products (per cent)

Products	Current tariff	Tariff in 2004*
Fresh cheese	50	12
Crated/powdered cheese	50	12
Processed cheese	50	12
Yogurt	50	10
Lactose	35	10
Ice Cream	45	19
Other food preparations	25	10
Beer	70	0 (by 2005)
Distilled spirits	65	10 (by 2005)
Wine	65	20
Fishery products	25.3	10.6 (Jan. 1, 2005)
Sorghum	3	2
Barley malt	30	10
Barley	(Quota)	9 (replace the old quota)
Soybean and meal	3	3-5 (binding tariff)**
Soybean oil	(Quota)	9 (2006)***
Vegetable oil	(Quota)	10 (replace quota immediately)
Frozen beef cuts	45	12
Frozen beef tongue and offal	20	12
Frozen pork cuts and offal	20	12
Frozen chicken and turkey	20	10
Lettuce	16	10
Cauliflower and other 5 vegetables	13	10
Canned sweet corn	25	10
Canned tomato paste	25	20

Tomato ketchup	30	15
Hazelnuts and other 4 nuts	30-35	10-13
Oranges and other 5 citrus	35-40	12-15
Apples and other 8 other fruits	30-40	10
Grapes	40	13
Grape juice and other 5 other fruits	30-65	20
Other water based drinks	50	35
Soup, cigarettes and other 8 products	20-65	10-25
Wood and wood products	10.6	3.8

Note: * Tariff reductions were to be phased in by 2004 (the year by which the obligations of Uruguay Round agreements would be completed) in equal annual instalments unless otherwise stated.
** China's imports of soybeans exceeded 3 million tonnes in 1998. China has committed to bind its tariff for soybeans at the current applied rate of 3 per cent and also foreclosed its ability to establish a quota in the future. China will bind its tariff for soybean meals at 5 per cent.
*** A tariff quota is currently applied to soybean imports with the in-quota duty at 9 per cent and the over-quota at 74 per cent. After joining the WTO, the over-quota duty will fall to 9 per cent in 2006 and the quota will be phased out by 2006.
Source: China Trade Relations Working Group, US Government, 15 February 2000.

Table 3.2   China's TRQ system for selected agricultural products ('000 metric tonnes)

Products	Initial TRQ	2004 TRQ	In-quota duty (per cent)	Private share (per cent)
Cotton	734	894	1	67
Wheat	7,300	9,636	1–10*	10
Corn	4,500	7,200	1–10*	From 25 to 40
Rice	2,670	5,320	1–10*	50 and 10**
Soybean oil	1,718	3,261***	9	From 50 to 90

Notes: * 1 per cent of duty for grain and no more than 10 per cent for partially processed grain products.
** 50 per cent of duty for short and medium grain rice; 10 per cent for long grain rice.
*** TRQ will be phased out by the year 2006.
Source: China Trade Relations Working Group, US Government, 15 February 2000.

Second, China agrees not to use export subsidies for agricultural products after it joins the WTO. China also commits to cap and reduce trade-distorting domestic subsidies. Although a serious dispute occurred over the upper-limit level of the subsidy, final agreement was reached in June 2001 that total trade-distorting domestic subsidies for agriculture under the title of 'Amber Box' would not exceed 8.5 per cent of China's agricultural GDP.

Third, China commits to abide fully by the terms of the WTO Agreement on Sanitary and Phytosanitary Measures, which requires that all animal, plant, and human health import requirements are based on sound science, not on the basis of a political agenda or protectionism concerns. On the basis of this commitment, China and the United States agreed bilaterally the terms for the removal of the restrictions on importation of US wheat, citrus, and meat.

Growth of China's economy and agriculture: the setting for the impact assessment

To give an assessment of the impact of further opening up of China's agricultural sector, it is necessary to have a look at the background to China's recent economic growth and structural changes, especially with respect to its agricultural and rural sector.

Growth and institutional reform

Thanks to the implementation of market-oriented reform and opening-up policies, China's economy achieved remarkable growth during the last 20 years or so. Nominal per capita GDP grew from 379 yuan to 6,534 yuan during the period of 1978–99. Real GDP per capita in 1999 was 5.22 times as high as that in 1978, recording an average annual growth rate of 8.2 per cent (China Statistical Yearbook 2000:53, 56). Rural residents' income per capita increased from 133.6 yuan in 1978 to 2,210.3 yuan in 1999 (China Rural Statistical Yearbook 2000:249). Deflated by the retail price index, the average annual income growth rate for rural population was 7.5 per cent. Both urban and rural residents benefited from the enormous economic growth; however, rural income has grown more slowly. As a result, the income gap between rural and urban households has widened. Within the rural population, the income gap between the east, middle and west regions has also increased. The income inequality between rural and urban areas and between the rural regions has raised concern among policymakers and the general public.

Production of major food and other agricultural products has increased at different rates over the last 20 years or so (Table 3.3). Bulk agricultural products such as grain and cotton grew at rates of less than 3 per cent per annum during the period, in part because the growth in demand for consumption of the products has been relatively low. Output of other products such as fruit, meats and aquatic products increased more quickly; again because of changes in diets towards these products as incomes increased. In contrast to the widespread concern about severe shortages in the supply of grain and other agricultural products in the late 1980s and the mid 1990s, China's agricultural sector has been facing problems of oversupply in recent years.

Of many factors behind the unprecedented growth in China's agricultural sector, two have been critically important. One is the technological progress that has fundamentally changed the agricultural production function. The other is the market oriented reform that has provided incentives for farmers to work harder and better. The past performance of the Chinese agricultural sector is suggestive in gauging the growth potential of Chinese agriculture. If it can be assumed that technological progress in agriculture will not halt and the market reform will not be reversed, China's agricultural system

Table 3.3   Production growth for selected agricultural products in China (million tonnes)

Products	1978-79	1998–00	Growth rate (per cent)	
			Total	Annual
Grain	312.70	510.30	63.2	2.4
Oil-bearing crops	6.45	24.57	281.4	6.9
Cotton	2.44	4.16	70.6	2.7
Fruit	6.70	58.50	772.0	11.4
Pork, beef and mutton	10.30	58.40	466.7	9.7
Milk	0.98	7.81	696.4	10.9
Aquatic products	4.08	40.14	883.9	12.1

Source: State Statistical Bureau (SSB), 1995 and 2000. *Zhongguo Tongji Nianjian* [China Statistical Yearbook], Zhongguo Tongji Chubanshe, Beijing.

should be able to provide sufficient food and agricultural products to meet the growing demands of this huge and rapidly changing economy.

The institutional system in the Chinese rural sector has undergone fundamental change since the first market-oriented reforms were implemented in the late 1970s. The household contract responsibility system in the initial reform period successfully transformed the agricultural economy from the collectively-owned and managed system to a peasant household-based system. Reform of the agricultural distribution system began in the mid 1980s. Deregulation of residence and labour mobility has made it possible for peasants to migrate to urban areas to explore opportunities for work at higher incomes. However, the reform agenda is unfinished. For example, reform of the distribution system for bulk agricultural products such as grain and cotton has undergone several setbacks since the mid-1980s. The policy reversals were not only detrimental to farmers' incomes and long-term economic growth but also caused hundreds of billions of yuan of losses through non-performing loans in the China Agricultural Policy Bank. Urban-biased policies still exist in areas from public expenditure to job market regulation. We need to bear these factors in mind in assessing the impact of China's WTO accession on agricultural sectors.

Trade pattern and comparative advantage in China's agriculture

The direct impact of WTO accession on a given sector will show in changes in its trade flow. To help assess the trade impact, it is useful to look at China's agricultural trade pattern since the 1980s. The statistical code in the Chinese customs data collection changed from the SITC to the HS system in 1992, causing difficulties in the observation of trends in agricultural trade over the last 20 years or so. A cross-coding system has been produced to facilitate analysis of the data for Chinese agricultural trade in a consistent way throughout the 1980s (Lu 2000).

Figure 3.1 reports data on Chinese agricultural trade. There are clearly positive trends in exports and imports of agricultural products. Exports increased from about US$4 billion in the early 1980s to a peak level of US$14 billion in the mid 1990s. However, exports declined significantly as a result

Figure 3.1   China's agriculture trade, 1981-99 (US$ million)
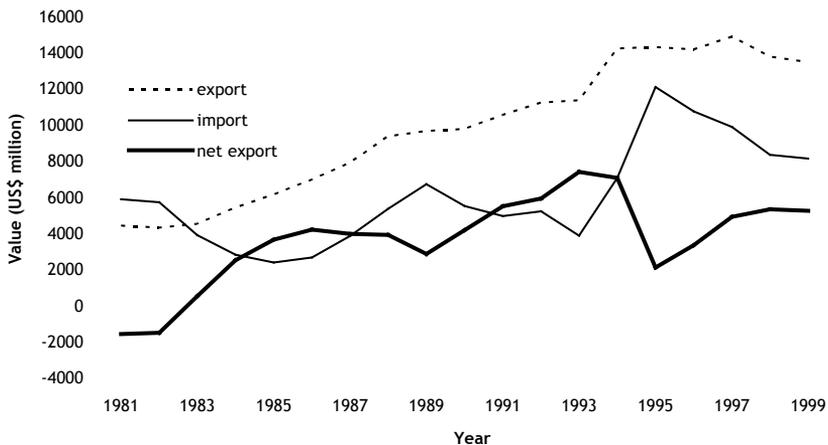
Source: China General Administration of Customs, various issues, *China Customs Statistical Yearbook*, Zhongguo Haiguan Chubanshe, Beijing; China General Administration of Customs, various issues, *China Customs Statistical Yearbook*, Zhongguo Haiguan Chubanshe, Beijing.

of shrinking markets in the East Asian economies due to the Asian economic crisis but surged again in 2000[2] with the economic recovery under way in the Asian economies. Imports declined substantially in the first half of the 1980s, followed by the first wave of growth in the second half of the 1980s. Imports declined again in the early years of the 1990s but surged from 1993 and peaked in 1995 when total imports reached US$12 billion. Total exports of agricultural products have exceeded imports in value terms for most years during the period. As a result, the value of net exports for the agricultural sector has been positive and growing for most of the period.

To investigate the structural changes in China's agricultural trade, agricultural products are divided into seven categories: bulk agricultural products; animal products as food; non-food animal products; fishery products; horticulture products; drinking and tobacco products; other miscellaneous products. Figures 3.2 and 3.3 report exports and imports, respectively, of the seven categories of agricultural products over the period 1981–99.

On the export side, fishery and horticultural products (vegetables and fruits in particular) showed remarkable growth momentum over the period. On the import side, bulk agricultural products such as grain and oil-bearing products held by far the largest share. From the perspective of the food trade, the basic structural features shown by the data present a noticeable 'food for food pattern'. As argued by Lu (1998), the most competitive Chinese agricultural products in the international market tend to derive from labour-intensive activities whereas those lacking competitiveness are usually land-intensive products. The evidence suggests that the evolution and structure of China's agricultural trade are consistent with the economic principle that links the structure of the trade flows with underlying comparative advantage and therefore to factor endowments among the different economies.

## The setting for agricultural liberalisation

The combination of the factors briefly overviewed above present the setting for assessing the impact of China's WTO accession on its agricultural sector and its food policies. First, China is currently experiencing dynamic growth and has benefited enormously from market-oriented reform as well

Figure 3.2   Structure of China's agricultural exports, 1981-99 (US$ million)
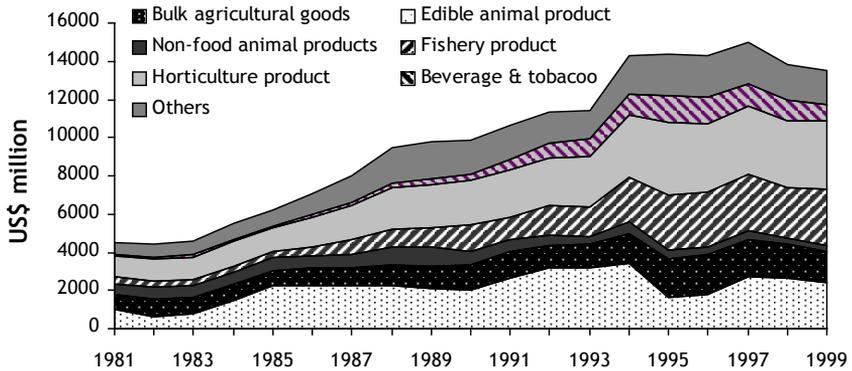
Source: China General Administration of Customs, various issues, *China Customs Statistical Yearbook*, Zhongguo Haiguan Chubanshe, Beijing; China General Administration of Customs, various issues, *China Customs Statistical Yearbook*, Zhongguo Haiguan Chubanshe, Beijing.

Figure 3.3   Structure of China's agricultural imports, 1981-99 (US$ million)
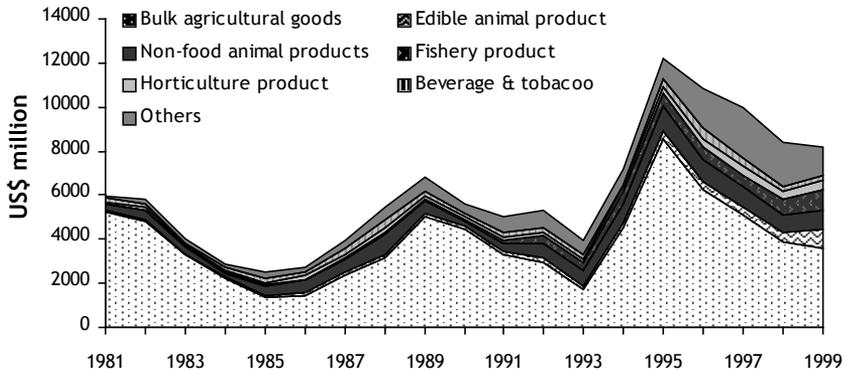
Source: China General Administration of Customs, various issues, *China Customs Statistical Yearbook*, Zhongguo Haiguan Chubanshe, Beijing; China General Administration of Customs, various issues, *China Customs Statistical Yearbook*, Zhongguo Haiguan Chubanshe, Beijing.

as integration with the rest of the world over the last 20 years or so. During this period, the diet of the Chinese people has been substantially improved and food security has been more assured than at any time in its long history. Second, market reforms in agriculture and in other sectors are not complete. There are still large gains that may be tapped through completion of the reform agenda. Assessment of the agricultural impact needs to take into account the institutional impact. Third, income gaps between rural and urban areas as well as among rural residents in the different regions have become important issues for the long term economic growth and social stability of China. The income effects of agricultural liberalisation and their regional distribution deserve special attention. Finally, as indicated by China's agricultural trade pattern since the 1980s, China has comparative advantage in labour-intensive agricultural products and has comparative disadvantage in land-intensive products. It may be reasonably inferred that WTO accession will produce two kinds of trade impacts for the Chinese agricultural sector: growth of exports of labour-intensive agricultural products and increase in imports of land-intensive agricultural products.

Agricultural sector impacts of China's WTO accession

It has been widely acknowledged that WTO accession will be a milestone in the process of China's integration into the global economy. It will undoubtedly produce tremendous challenges and opportunities for the Chinese agricultural sector.

Opportunities and benefits of agricultural liberalisation

The potential benefits for the Chinese agricultural sector from WTO accession may be assessed through three effects. The first is its institutional reform impacts. Although market-oriented reform has made possible great achievements in the Chinese agricultural sector, the reform agenda is unfinished. Periodic reversals to the state monopolistic system in the domestic distribution of bulk agricultural products such as grain and cotton have led to huge claims against the Government budget over the past 15 years. The unstable policy environment has also been detrimental to agricultural growth and farmers' interests. The state monopoly in the

distribution of agricultural inputs such as fertiliser and seeds also results in efficiency losses. It is widely expected that WTO accession will advance the reform agenda in these areas. Although it is difficult to forecast the institutional impacts, the strong interaction between institutional reform and economic performance in the Chinese economy over the past 20 years or so indicates the potential importance of these effects.

The second potential benefit of WTO accession is its export-promoting effect. WTO accession and future agricultural trade liberalisation will reduce trade barriers both in China and in the rest of the world. This will help China further expand exports of the agricultural products in which it has comparative advantage. On the basis of observation of the historical pattern of China's agricultural trade, exports of aquatic and meat products are likely to increase as a result of trade liberalisation. Abandonment of the grain self-sufficiency policy will be a crucial factor in achieving this export expansion because liberalisation of the grain trade will reduce feed grain costs and increase the competitiveness of animal production using feed grain inputs. Exports of horticultural products such as vegetables and fruits may increase, as their production is relatively more labour intensive than bulk agricultural products. Exports of traditional specialties such as honey and tea may also increase as foreign trade barriers are reduced. As the value of labour-intensive agricultural products usually has a relatively larger labour element, growth of these exports may produce favourable income effects in the rural economy.

The third potential benefit of accession is its welfare effect. Domestic prices for most agricultural products are likely to decline as a result WTO accession. A partial equilibrium model, China's Agricultural Policy Analysis and Simulation Model (CAPSiM), developed by the China Centre for Agricultural Policy (CCAP) at the China Academy of Sciences (CAS), compared a WTO accession scenario with a base scenario without WTO accession. The results indicate that the prices of bulk agricultural products such as corn, wheat and soybean will reduce by about 20 per cent (Huang 2000). Although the projected price reduction is hypothetical, it is generally agreed that trade liberalisation tends to reduce market prices for the products in question. With the price decline for food and other agricultural products, the purchasing power of a given income will increase and consumers' welfare will be improved.

Adjustment costs of WTO entry and their income implications

Agricultural liberalisation may also produce challenges and adjustment costs for the Chinese agricultural sector. The logic is simple. China's WTO commitments for the agricultural sector include tariff reductions, market access and reform of state monopolies in agricultural trade. Although these measures may increase the long-term competitiveness of China's agricultural sector and therefore contribute to income growth for the Chinese rural population, the structural adjustments necessary are likely to cause short-term difficulties for Chinese farmers. For example, as indicated by Table 3.1, tariffs for most dairy products will decline from 50 per cent to 10–12 per cent; tariffs for apples and eight other fruits will be reduced from 30–40 per cent to 10 per cent. The measures will reduce the Chinese renminbi (RMB) price of foreign imported goods and therefore increase competitiveness of these foreign products in Chinese markets. Other things being equal, the structural adjustments from the reduction of tariffs imply shrinking of the domestic production of these products and adjustment costs for farmers. The magnitude of the substitution effects from growing imports for domestic products will depend upon relative prices between the domestic market and the international market for the product after WTO entry. For example, the import-led substitution effects may be relatively small for fruits in which domestic production has an apparent comparative advantage. The external shock may be significantly larger for dairy products as dairy production is less competitive.

The TRQ system for sensitive products is a double-edged sword for domestic production. On the one hand, it provides a protective mechanism for domestic production, as imports are usually unable to exceed the quota threshold. On the other hand, the TRQ system makes it impossible to restrict imports of the products within the quota, should the import prices of these products be significantly lower than the domestic prices. As bulk agricultural products such as grain and oil-seed bearing products are usually land intensive, and China generally lacks comparative advantage in these products, imports of bulk agricultural products may increase. As a result, domestic production will face adjustment pressures. Possible import surges of grain, especially corn, are of most concern. If average annual imports of corn increase by 5 million tonnes as a result of WTO accession, domestic corn production has to be reduced by that amount.

Production adjustment costs have obvious implications for rural income. Although it may be reasonably believed that the resources released by reduction of production will be used more efficiently in other activities in the long run, in the short run farmers may not be able to find other profitable activities to employ the released resources, including their own labour. As a result, farmers' income may be negatively affected. This issue has been extensively analysed within the framework of simulation models (Huang 2000; Tian 1999; Li et al. 2000). On the basis of simulation of the above-mentioned CAPSiM model, bulk agricultural products such as grain, cotton, oil-bearing products and sugar products will decline by 2.5 per cent to 7.7 per cent. As a result, farmer income will be reduced by the amount equivalent to the total income of 3 million labourers in recent years (Huang 2000). It should be borne in mind, however, that the degree of accuracy of the estimated results depends upon the assumptions of the model, the interaction of various economic variables, and the reliability of the statistical data and the estimated parameters. The projections nevertheless highlight the importance of the short-term income effects of WTO accession for farmers. As income inequality between the rural and urban population has become a crucial issue for the overall economic and social development of China, the potential adverse income effects for the rural population deserve special attention.

Food security and WTO accession

In the debate over the effects of China's WTO accession, the impact on China's long-term food security has been frequently raised. There are concerns that WTO accession will place China's long-term food security at risk. For a huge country like China, food security has been and will continue to be a very important objective. There are no doubts whatsoever of the importance and legitimacy of the food security objective per se. However the assertion that agricultural liberalisation will harm food security is questionable.

Concerns about the detrimental impact of China's WTO accession on its food security are mainly based upon the possible surge in grain imports as a result of the implementation of the tariff quota system. Although the imports of grain into China may increase after China's entry into the WTO, they are unlikely to harm China's food security. We approach the issue from the following four perspectives.

First, the volume of the tariff quota for all grains increased from 14.5 million tonnes upon China's entry into the WTO to 22.2 million tonnes by 2004. China's imports of grain in 1995 were 20.81 million tonnes, only fractionally less than the peak level of the quota (China Statistical Yearbook 1996:592). These imports did no harm to China's food security; therefore, it does not appear convincing to argue that slightly higher imports will damage China's food security.

Second, the White Paper on grain security published by the Chinese Government in 1996 set 95 per cent of grain self-sufficiency as a reference line for assuring the objective of grain security for China. In principle, the desirable level of grain self-sufficiency for China may depend upon many changing factors in future, such as the level of food consumption, the international environment, and China's foreign exchange payment ability. It is arguable that China's food security objective may be consistent with a 90 per cent or even lower grain self-sufficiency to allow a larger role to be played by the international market. However, even with this official guideline that is cautious and conservative in nature, the tariff quota for grain may not exceed the upper limit of grain import ratios. China's total consumption of grain in recent years is about 500 million tonnes. As total grain consumption is likely to increase, a 22 million tonnes grain quota would be less than 4.4 per cent of total grain consumption by 2004. Taking into account other factors such as imports of other grains except corn, wheat and rice, imports are unlikely to exceed the 5 per cent of total grain consumption by a significant margin.

Third, the above discussion is based on the assumption that imports of grain will reach the quota level. However this assumption is quite uncertain. The tariff quota for grains in the package of market access arrangements for China's WTO accession only represents the import opportunity for foreigners not China's import obligations. How much grain will be imported during the period from the year of China's entry into WTO to 2004 will depend upon the relative price for the different grains between the Chinese domestic market and the international market. Although China's grain imports are likely to increase as grains are generally land-intensive products in which China lacks comparative advantage, it is also quite possible that future imports of grain will be significantly lower than the quota. If grain imports

to the quota level are unlikely to harm China's food security, lower imports must make the gloomy predictions even more unrealistic.

Finally, the traditional argument asserting the detrimental impact of grain imports on food security usually mentions the constraint of the foreign exchange capacity to purchase grains. This argument made sense in the 1960s and 1970s during which time the grain import bills usually consumed more than 10 per cent of total export revenues. Around 1961 when China was hit by the severe famine brought about by the disastrous policy mistakes made by the Government, the proportion of grain import costs in total export revenue reached as high as 25 per cent.[3] Under these circumstances, foreign exchange was indeed a critical constraint on the growth of grain imports and therefore had serious implications for food security. However, the situation has fundamentally changed since the economic reforms were implemented. The past two decades or so have witnessed tremendous growth of China's export sector. Total export revenue increased from US$9.75 billion in 1978 to US$249.2 billion in 2000—an average annual growth rate of 15.1 per cent.[4] As a result of the growth of exports, future grain imports can at most consume only a small fraction of total export revenue. On the basis of projected grain prices, 22.2 million tonnes of grain may consume US$3–4 billion. In 2000, China's export revenue was more than US$200 billion; hence grain imports would be 1.2–1.6 per cent of total export revenue in 2000. It is likely that net grain imports will be an even lower percentage of total export revenue in the future.

The regional pattern of the agricultural impact of WTO accession

In light of the historical pattern of China's agricultural trade, the one-off trade flow effects of WTO accession may be negative for the agricultural products in which China lacks comparative advantage and positive for those products in which China has comparative advantage. As the provinces and regions of China are very diversified in terms of geographical settings and economic conditions, the trade impact of WTO accession on agriculture is likely to differ significantly among the different regions.

'Export promoting effects' and 'substitution effects from imports'

The logic and the analytical technique used for the analysis are simple. The historical performance of China's agricultural trade indicates that WTO accession is likely to strengthen the tendency for imports of land-intensive agricultural products on the one hand, and encourage exports of labour-intensive agricultural products on the other. In other words, WTO accession will likely produce two trade flow effects. One is the positive export-promoting effect and the other is the negative substitution effect from the growth in imports. As regards the pattern of export promoting effects, it may link closely to the domestic distribution of comparative advantage for labour-intensive agricultural products. Those regions with comparative advantage in labour-intensive agricultural products are likely to benefit more from the potential export expansion effects of the WTO accession, and vice versa.

The regional pattern of substitution effects will depend upon how domestic production of land-intensive products is substituted. From an analytical point of view there are at least two possibilities. One possibility is based on an assumption that growing imports of land-intensive agricultural products will largely substitute for domestic production of these products in the regions with relatively high production costs for these products. So those provinces with relative domestic advantage in land-intensive agricultural products may incur relatively small adjustment costs from the possible import surge effects, and vice versa. Alternatively, it may be assumed that growing imports of land-intensive agricultural products will substitute for domestic production of these products in proportion to the relative concentration of the production across the regions. The two assumptions have different implications for the regional distribution of the substitution effects and the adjustment costs.

Regional production concentration indices for major agricultural products

To examine the regional pattern of trade flow impacts on China's agricultural sector resulting from WTO accession, we need to know the regional distribution of comparative advantage of the two categories of agricultural products. On the basis of economic principles, a product or a production

activity with comparative advantage in an economy or a region may be defined as one where the opportunity costs associated with the activity are relatively low. Alternatively, comparative advantage may be defined as the activities that utilise the abundantly endowed resource in an economy or region at a relatively high intensity. Providing a direct measure of comparative advantage for the various products across the regions of China would require data on opportunity costs or factor intensities, as well as production cost proportions. This would be highly demanding. Therefore, we use an alternative method to measure comparative advantage. Similar to the widely used method that takes the export concentration index for a commodity as an indicator of 'revealed' comparative advantage, we use the 'production concentration index' of a product for a region as an indicator of comparative advantage. The production concentration index of a product for a region is defined as the ratio of the sown area (or output) for the product per capita of the agricultural population for the region divided by the same ratio for the nation as a whole. The interpretation of the index is straightforward: a region has a comparative advantage if the measured value of the production concentration index is larger than one and has a comparative disadvantage if the value is less than one. The greater the margin by which the index exceeds (or is less than) one, the stronger the comparative advantage (or disadvantage) is for the given product in the region.

Table 3.4 presents the ratios of production concentration for major agricultural products for the provinces (as well as the autonomous regions and municipalities under the direct administration of the central government). The average indices for three broadly defined regions (the east, middle and west regions) are also reported. As indicated by the results, production concentration indexes for the labour-intensive products are relatively high for the east region and low for the west region, with the middle region in between. By comparison, production concentration indexes for the land-intensive products are relatively high for the west region and low for the east region, with the middle region again in between.

To facilitate the examination of the regional distribution of the agricultural impact of China's WTO entry, it is useful to present the concentration indices for the two categories of agricultural products in the framework of a plane-coordinate system (see Figure 3.4). The horizontal and

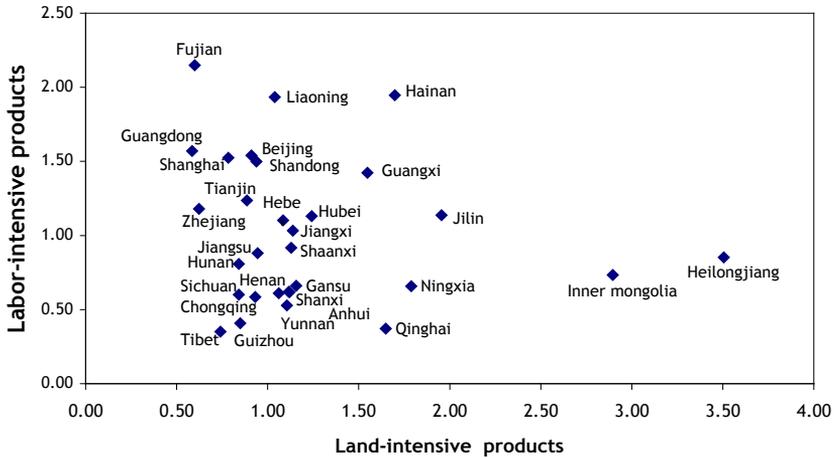**Table 3.4 Production concentration index for selected agricultural products for provinces and regions in China, 1997–99**

Provinces and region	Land-intensive agricultural products					Labour-intensive agricultural products				
	Grains	Oil & oil seeds	Cotton	Sugar	Average	Vegetables	Fruits	Meat	Fishery products	Average
Beijing	0.93	0.19	0.12	0.00	0.91	1.87	1.78	2.01	0.50	1.54
Tianjin	0.92	0.34	0.31	0.00	0.89	1.86	0.91	0.90	1.29	1.24
Hebei	1.10	0.82	1.30	0.07	1.08	0.94	2.02	1.15	0.30	1.10
Liaoning	1.07	0.35	0.14	0.39	1.04	1.17	1.84	1.53	3.20	1.93
Shandong	0.93	0.85	1.21	0.01	0.94	1.44	1.26	1.10	2.20	1.50
Shanghai	0.75	1.06	0.19	0.16	0.78	2.06	0.32	1.95	1.76	1.52
Jiangsu	0.92	0.87	1.53	0.04	0.94	1.05	0.29	0.91	1.27	0.88
Zhejiang	0.64	0.56	0.33	0.16	0.62	0.77	0.72	0.48	2.75	1.18
Fujian	0.62	0.32	0.00	0.56	0.60	1.31	2.28	0.83	4.17	2.15
Guangdong	0.51	0.44	0.00	2.00	0.58	1.31	1.75	0.87	2.35	1.57
Guangxi	0.77	0.63	0.01	7.22	1.55	1.41	1.93	1.08	1.28	1.42
Hainan	0.96	0.78	0.00	7.90	1.70	2.21	1.57	1.05	2.97	1.95
East region	0.83	0.58	0.36	1.68	0.97	1.45	1.40	1.16	1.98	1.50
Shanxi	1.14	1.04	0.59	0.53	1.12	0.65	1.38	0.43	0.02	0.62
Inner Mongolia	2.88	2.92	0.01	3.60	2.90	0.70	0.58	1.54	0.10	0.73
Jilin	2.01	0.65	0.00	0.62	1.96	1.26	0.75	2.30	0.23	1.14
Heilongjiang	3.53	0.81	0.00	5.34	3.50	1.36	0.33	1.27	0.45	0.85
Anhui	0.97	1.73	1.58	0.06	1.12	0.68	0.19	0.92	0.69	0.62
Jiangxi	0.90	2.11	0.63	0.59	1.14	1.20	1.00	1.05	0.88	1.03
Henan	0.94	1.14	2.26	0.03	1.06	0.88	0.53	0.95	0.08	0.61
Hubei	0.97	2.03	2.21	0.26	1.24	1.53	0.62	1.08	1.29	1.13
Hunan	0.78	1.23	0.72	0.30	0.84	0.81	0.64	1.26	0.52	0.81
Middle region	1.57	1.52	0.89	1.26	1.65	1.01	0.67	1.20	0.47	0.84

Chongqing	0.96	0.56	0.01	0.04	0.93	0.85	0.37	0.95	0.17	0.58
Sichuan	0.85	0.85	0.39	0.22	0.84	0.73	0.39	1.15	0.14	0.60
Guizhou	0.82	1.07	0.02	0.22	0.85	0.77	0.21	0.61	0.04	0.41
Yunnan	0.93	0.30	0.01	4.05	1.11	0.56	0.61	0.85	0.10	0.53
Tibet	0.76	0.56	0.00	0.00	0.74	0.28	0.06	1.05	0.02	0.35
Shaanxi	1.16	0.76	0.27	0.04	1.13	0.54	2.59	0.50	0.04	0.92
Gansu	1.17	1.16	0.31	0.68	1.16	0.58	1.62	0.44	0.01	0.66
Qinghai	0.92	3.37	0.00	0.00	1.65	0.29	0.18	1.00	0.01	0.37
Ningxia	1.75	2.12	0.00	1.36	1.79	0.66	1.12	0.68	0.17	0.66
Xinjiang	1.45	1.85	23.46	5.17	8.90	0.73	1.83	1.34	0.14	1.01
West Region	1.08	1.26	2.45	1.18	1.91	0.60	0.90	0.86	0.08	0.61

Notes: The production concentration index for a given product for grain, oil, cotton, sugar, vegetables and fruits in a province is defined as the ratio of sown area of the product per capita for the rural population in the region divided by the national average for the same ratio. The index for meat and fishery products in a province is defined as the ratio of the output of the product per capita for the rural population in the region divided by the national average for the same ratio. The average index for the land-intensive agricultural products for a province is the weighted average of the indices for the four products using the distribution of land among the four products as the weights; the average index for the labour-intensive products for a province is the simple average. The average index of individual products and groups of land and labour-intensive products are simple averages of the indices of provinces covered in the large regions.

Sources: Data for rural populations are from *China Rural Statistical Yearbook* (1998 and 2000). Data on sown areas and output of meat and fishery products for provinces and regions are from *China Statistical Yearbook* (1998-2000).

Figure 3.4   Graphic presentation of the concentration ratios for land-intensive and labor-intensive agricultural products for provinces and regions, 1997-99

Notes: Xinjiang, with a concentration index for land intensive products of 8.9 and 1.01 is a remote outlier and therefore is not shown in the diagram.
Source: Data are from Table 3.4.

vertical axes of the system represent concentration ratios for labour-intensive and land-intensive products, respectively. Two additional lines representing the ratio of one for labour-intensive and land-intensive products divide the space of the plane system into four areas. All points located in the north east quadrant show indices for land and labour intensive products higher than one. The points in the south west quadrant represent the combinations of measurements for land and labour-intensive products lower than one. The points in the south east quadrant indicate land-intensive products with indices higher than one and indices for labour-intensive products lower than one; the north west quadrant shows the opposite combination of indices.

Regional pattern of the agricultural impact: Scenario one

Scenario one follows from the assumption that increased imports of land-intensive products resulting from WTO entry will mainly substitute for domestic production in the provinces that lack comparative advantage in these products. On the basis of this assumption, as well as discussion of the rationale for distribution of the export promoting effects, we may compare the agricultural trade impacts for provinces and regions in the different quadrants in Figure 3.5.

Seven provinces and regions (Hainan, Liaoning, Guangxi, Hebei, Hubei, Jiangxi and Jilin) located in the north-east quadrant are likely to have the best outcome from the agricultural liberalisation. As these provinces appear to have comparative advantage in labour-intensive agricultural products,

Figure 3.5   Regional pattern of the agricultural impact: scenario one

Adjustment costs from the possible import surge

		Large	Small
Benefits from the possible export expansion	Large	Fujian, Guangdong, Shanghai, Shandong Tianjin, Zhejiang Beijing	Hainan, Jilin, Guangxi Liaoning, Hubei, Hebei, Jiangxi
	Small	Jiangsu, Hunan Sichuan, Chongqing Guizhou, Xizang	Xinjiang, Heilongjiang Inner Mongolia, Ningxia, Qinghai, Shanxi, Shaanxi, Anhui, Yunnan, Gansu, Henan

they are likely to benefit more than the national average from export expansion of labour-intensive agricultural products. They may also incur relatively small adjustment costs from the import surge of land-intensive products as they also have comparative advantage in these activities.

The payoff for the group of six provinces and regions (Jiangsu, Hunan, Sichuan, Hunan, Chongqing and Guizhou) located in the south-west quadrant may be the most unfavourable as they lack comparative advantage in both labour-intensive and land-intensive agricultural products. As a result, they are likely to shoulder relatively large adjustment costs arising from the external shocks of import growth for land-intensive agricultural products and obtain a relatively smaller share of benefits from expansion in exports of labour-intensive agricultural products.

The seven provinces and municipalities directly under administration of the Central Government located in the north-west quadrant are likely to enjoy relatively large benefits from the export expansion of labour-intensive products. But they are also likely to face relatively large adjustment costs from the import growth of agricultural products that are land intensive in nature. Finally, there are 11 provinces and regions (Xinjiang, Heilongjiang, Inner Mongolia, Ningxia, Qinghai, Shanxi, Shaanxi, Anhui, Yunnan, Gansu and Henan) located in the south-east quadrant for which the benefits and costs are likely to be relatively small (Figure 3.5).

The coastal regions are likely to be the major beneficiaries from export expansion of labour-intensive products while the vast inland provinces and regions will have relatively small benefits. On the other hand, coastal regions may experience a relatively large share of the adjustment costs from the import growth while inland provinces and regions may experience smaller external shocks. It appears, therefore, that there could be a negative correlation between the benefits and costs across the broadly defined regions that is, the eastern, the middle and western regions.

Regional pattern of the agricultural impact: scenario two

In scenario two it is assumed that imports will substitute for domestic production in proportion to the domestic share of production across provinces and regions. Under this assumption, domestic adjustment costs resulting from the increasing imports will have to be mainly shouldered

by provinces with a relatively high concentration index for the products. As for the export promoting effects, they are expected to be distributed in the same way as in scenario one.

Changes in the regional impact pattern under the new assumption may be simply captured by switching the position of the provinces in the left and right quadrants in Figure 3.6. For example, in line with scenario two, the seven provinces and regions located in the north-east quadrant switch to the north-west quadrant while those in the north-west quadrant move to the north-east quadrant. Similar shifts of position occur between those provinces in the south-east quadrant and the south-west quadrant.

In scenario two, the larger share of benefits from export expansion in labour-intensive products still goes to the coastal regions while the vast

Figure 3.6   Regional pattern of the agricultural impact: scenario two

Adjustment costs from the possible import surge

	Large	Small
Large	Hainan, Jilin, Guangxi Liaoning, Hubei, Hebei, Jiangxi	Fujian, Guangdong, Shanghai, Shandong Tianjin, Zhejiang Beijing
Small	Xinjiang, Heilongjiang Inner Mongolia, Ningxia, Qinghai, Shanxi, Shaanxi, Anhui, Yunnan, Gansu, Henan	Jiangsu, Hunan Sichuan, Chongqing Guizhou, Xizang

(Left axis label: **Benefits from the possible export expansion**)

inland provinces and regions have a small share of the benefits. However, the regional distribution of the import-led substitution effects changes substantially. A large share of the adjustment costs from the possible growth of land-intensive agricultural imports may go to inland and western provinces while coastal provinces may only have to shoulder a small share. For example, 11 provinces, most of them either the major grain production bases (such as Heilongjiang, Henan and Anhui) or provinces located in western regions (such as Xinjiang, Shaanxi and Ningxia) will have the most unfavourable impacts from WTO accession, that is, a combination of small export-promoting effects and large adjustments costs. In general, under scenario two the agricultural impact of China's WTO accession will be more unbalanced in terms of the export-promoting effects and the import-led substitution effects than in scenario one. Scenario two is obviously less desirable than scenario one in terms of income distribution as it may see an increase in the income gap between the east and west regions.

The distribution of the adjustment costs from agricultural liberalisation is of course unlikely to accord exactly with either of the two scenarios. It may fall somewhere between the two cases. The above observations are nevertheless useful to an understanding of the mechanism affecting the regional distribution of the agricultural trade impact from China's WTO accession across provinces and regions in China. The regional impact may in part depend upon the policies adopted by the Chinese government in managing trade liberalisation. To maximise the likelihood for scenario one to materialise, the domestic agricultural polices will need to be adjusted in a more liberal and market-oriented direction. This will allow the principle of comparative advantage to play a bigger role in the allocation of domestic resources in the agricultural sector across provinces and regions. On the contrary, if the traditional policy stance with its emphasis on provincial grain self-sufficiency persists, it will be difficult for the coastal provinces to reduce grain and other bulk agricultural production in which they do not have a comparative advantage. As a result, the import-led adjustment costs will be distributed more proportionally across the provinces and the undesirable scenario two will be more likely.

Summary and policy implications

From a political economy point of view, WTO accession is undoubtedly one of the most complicated and challenging events in contemporary Chinese history. Of China's WTO commitments, the agricultural component is potentially the most contentious because of the number of people employed in agriculture, and its implications for food security as well as for social stability. The study has examined various aspects of the impact of WTO accession for China's agricultural sector. Several points emerge from the investigation.

The desirable impacts from WTO accession should be the institutional effects. WTO accession may help complete the unfinished agenda of institutional transformation in the agricultural and rural sectors through the dynamics from the interactions between the market-oriented reform and further opening up to the outside world. Implementation of WTO commitments is likely to reduce unnecessary government intervention in the distribution of agricultural products, and break up the state monopoly in foreign trade in bulk agricultural products. Improvements in the institutional framework will make important contributions to the long-term growth of Chinese agricultural and rural income. Without its institutional effects, the desirable impacts of China's WTO accession on its agricultural sector as well as on the whole economy would be substantially diminished.

Second, consistent with the structure of factor endowments in the agricultural sector, China has comparative advantage in labour-intensive agricultural products such as vegetables and fruits, fishery products and meat, but lacks comparative advantage in land-intensive bulk agricultural products such as grain and oil-bearing products. WTO accession is likely to help China expand exports of the products in which it has comparative advantage. On the other hand, it may also give rise to substantial adjustment costs for those products for which domestic production costs are relatively high and where imports may increase. Although the long-term impacts are generally expected to be positive, the short-term adjustment costs may be substantial. The income implications of the import-led substitution effects deserve special attention.

Third, it is interesting to gauge the regional pattern of the export-promoting benefits and the import-led adjustment costs that WTO accession

may give rise to in the agricultural sector. The larger share of benefits from the export expansion of labour-intensive products is likely to go to coastal regions while the vast inland province and regions may have smaller benefits. As for the adjustment costs resulting from the potential growth of land-intensive agricultural imports, the regional distribution pattern will depend upon how extensively the imported products substitute for domestic production. Under the assumption that the increased imports will mainly substitute for domestic production in the provinces that lack comparative advantage in their production, the larger share of adjustment costs will be borne by the coastal regions while inland province and regions will have to shoulder only a small share. However, under an alternative assumption that the increased imports will substitute for domestic production in proportion to the relative density of current production across provinces, inland and western provinces will face the largest adjustment costs.

Finally, WTO accession and agricultural liberalisation may have significant implications for food security in China. As a direct impact of WTO accession, tariff quota arrangements for the three major grain products are likely to increase China's grain imports, with the gradual integration of the Chinese food economy with the world food market. As the evolving pattern of 'food for food exchange' will likely develop further, the traditional mechanism for achieving food security based on the concept of grain self-sufficiency needs to be modified. China needs to assess how best to assure its food security as domestic and external environments change. There are nevertheless no grounds for believing that the market access commitments made by China in its WTO accession package will harm its food security objective.

Bearing in mind the complexity of the subject and the incompleteness of this research, policy implications of this study are noteworthy. First, the Chinese government may need to minimise administrative interventions in the agricultural sector that were quite often proposed and implemented on the basis of the food security argument. Agricultural policy adjustments in line with domestic regional comparative advantage are necessary for the Chinese agricultural system to respond better to the potential export opportunities for those agricultural products in which China enjoys comparative advantage. Such policy adjustments will also be helpful in shaping the regional distribution of the adjustment costs of

WTO accession in a more desirable way. On the other hand, much needs to be done to improve the information system, quality control procedures and marketing skills of Chinese farmers and firms producing agricultural processed products to benefit fully from the potential opportunities in the international market.

Second, the negative effects from the possible surge of agricultural imports must be taken seriously. Particular attention should be given to the inland and western provinces and regions that will benefit little from the WTO accession, which may result in an even larger income gap between these economically less developed regions and the economically advanced coastal provinces. To help these regions, Chinese governments at central and provincial levels may need to take more responsibility for financing rural education rather than providing direct subsides to agricultural production activities. To strengthen the competitiveness of China's agricultural and rural sectors, the government may need to invest more in agricultural technology extension and rural infrastructure such as transportation and communication facilities.

Notes

1   It is reported that the Mexican Government promised not to be in the way of China's WTO accession even if the bilateral agreement with Mexico was not reached later in the year.
2   The estimated annual data on Chinese agricultural trade in 2000 are not reported in this figure.
3   The figures were calculated using the data reported in Department of Planning, Ministry of Agriculture, Husbandry and Fishery of China: 'Materials of Agricultural Economy (1940–1983)'(pp. 434–5), internal publications.
4   The figure for export revenues in 1978 is from *China Statistical Yearbook* (2000) and that for 2000 is from Summary of China Statistics (2001).

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