Grain versus food: a hidden issue in China's food policy debate

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East Asia

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Abstract

Focusing on the difference between grain and food in the context of China's food policy debate, the paper examines the likely pattern of China's food trade in the future should China's food trade policy be adjusted to accommodate her comparative advantage. Differing from the common perception that China's overall food sector will follow the path of grain trade and face an ever-growing trend in net imports, this study has found an evolving pattern of exchanging food for food in China over the last 15 years. The pattern is in part characterised by strong export expansion of selected food products such as vegetables and fruits, and aquatic products. The economic rationale for this trend has been examined through a comparison of the factor endowment effects on relative costs of production of different types of food; and other possible causes are also examined, such as domestic consumption and distance to markets. The potential for China to develop this food trade pattern further and its implications for China's rural economy and the traditional policy of grain self sufficiency are discussed.
This paper was prepared during my three-month visit to the Research School of Pacific and Asian Studies (RSPAS) at the Australian National University (ANU) from August 1996 as part of the China Grain Project sponsored by the Australian Centre for International Agricultural Research. I would like to thank Professor Ross Garnaut and Dr. Yiping Huang for inviting me for the visit. I am most grateful to Professor Ross Garnaut for his warm encouragement and many valuable comments on the early draft of this paper. I also benefited in many ways from discussions with Dr. Premachandra Athukorala. The early draft of the paper was presented at the Conference on Food and Agricultural Policy Challenges for the Asia-Pacific at Manila during 1–3 October 1996 and at the Economics Seminars at RSPAS, ANU on 29 October 1996, I appreciate many useful comments contributed by participants on both occasions. The responsibility for any remaining errors is mine.
Grain versus food:
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China has been highly acclaimed for its ability to feed over 20 per cent of the world's population with only 7 per cent of the world's arable land. Nevertheless, as industrialisation has gained pace over the last decade or so, there is evidence that traditional emphasis on self-sufficiency in grain may eventually become an undesirable policy. As a result, the prospect of China's further integration into the world food system has attracted much research and has made news headlines in recent years.

Previous studies have focused exclusively on China's future grain demand, supply and import requirements while paying little attention to other food products. There is an implicit assumption that the future trend in China's food trade as a whole will coincide with its grain trade. This assumption is reflected in the current debate surrounding Brown's prediction of China's future food situation. In his assessment of the grain situation in both the Chinese and global context, Brown raised the question of 'who will feed China?' and implied that the growth of China's grain imports would starve the world (Brown 1995). Brown's argument entirely ignores future trade trends of other major food products, reflecting his assumption that China's food trade is identical to her grain trade.

Many professional economists and food analysts have dismissed Brown's assertion. They have rightly criticised Brown's study for its lack of serious economic research. Nevertheless, at least to my knowledge, these analysts have not challenged the conflation of food trade with grain trade. On the contrary, this assumption is widespread in the economic literature. The argument has been made persuasively in that there is likely to be a declining trend in China's comparative advantage in grain production as a result of rapid economic growth. This has led to the conclusion that net imports for China's food sector as a whole will also increase. It has also been suggested that China's required net imports of food can be financed by foreign exchange generated by export
growth in labour-intensive manufactured products in which China has comparative advantage.

Chinese researchers and officials tend to argue that China will be able to develop adequate capacity for domestic grain production to meet the growing demand from its population. However, significant disagreement exists over the necessity and feasibility of future substantial growth in China's net grain imports and China's potential dependence on food supplied from the outside world. In this context as well, grain and food are used interchangeably. Nor is the difference between grain and other major foodstuffs acknowledged in discussions of China's prospects for further integration into the world food system.

A major limitation of all of these discussions is the failure to account for the heterogeneity of the food sector. The food sector covers a range of diversified products which vary in factor proportions and cost structures. Given China's factor endowment, comparative advantage and competitiveness for different food products are likely to differ. Although China's grain imports are likely to increase as a result of a decline in the comparative advantage of domestic production, it is not necessarily true that the competitiveness of other major foodstuffs will be eroded at the same time. Even in a period of rapid structural change and under a liberalised trade policy environment, certain food products may maintain, or even strengthen, their competitiveness while the ratio of self sufficiency for grain and other food items declines.

This paper investigates the likely pattern of China’s food trade in a liberalised trading environment. I examine the evolving food trade pattern not only for mainland China since 1980, but also for Taiwan over the last three decades. Taiwan’s experience is included because before Taiwan’s rapid industrialisation during the 1950s and 1960s, Taiwan’s structure of factor endowments was similar to that of mainland China today. Consequently, its food trade experience during the period of economic transformation is useful in examining the validity of the assumption of food product homogeneity. What emerges in both the Taiwanese and Chinese data is a pattern of exchanging food for food across the Taiwan Strait rather than a monotonous decline in the self-sufficiency ratio for all food products. The next section of the paper explores the economic causes for the observed food trade pattern, mainly through a comparison of the relative costs of alternative food products in China. The potential impact on China’s food trade pattern of changes in domestic consumption and the distance factor are also discussed. The issue is then examined in the broad context of the structural changes in the world food market with a view to investigating the potential for China to develop the food for food trade pattern further. Finally, the policy implications of the study are discussed.
Structural pattern of food trade during rapid industrialisation: the evidence

Taiwan's experience

Taiwan has experienced dramatic economic transformation over the last four decades. Its per capita GNP increased from US$197.00 in 1955 to US$12,439.00 in 1995. The agricultural share of GDP fell from 47.7 per cent to 3.5 per cent over the same period (Shei 1983; Asia Pacific Economics Group 1996). At the early stage of its economic development, Taiwan was a small open economy with abundant labour and scarce cultivated land in relation to the rest of the world. According to the conventional view, there should be a strong tendency for the comparative advantage of Taiwan's food sector to decline as a result of rapid industrialisation. This prediction is in part borne out by the massive increase in net imports of cereals and animal feed throughout the period. Starting as a small net exporter in 1965, Taiwan turned into a net grain importer in the 1970s, when net grain imports per annum increased to almost US$1 billion in the 1990s (Table 1). Dairy products and animal feed were also major net imports. Mainly due to the massive import of cereals, Taiwan's overall food self-sufficiency ratio, measured in terms of calories, declined from 115.7 per cent to about 40 per cent in 1990 (Lin 1993).

Table 1 Structure of Taiwan's food trade, selected years 1965–94 (US$ million)

<table>
<thead>
<tr>
<th></th>
<th>Food total</th>
<th>Net exports*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exports</td>
<td>Imports</td>
<td>Meat</td>
</tr>
<tr>
<td>1965</td>
<td>229.63</td>
<td>45.85</td>
<td>0.02</td>
</tr>
<tr>
<td>1970</td>
<td>262.54</td>
<td>129.30</td>
<td>5.34</td>
</tr>
<tr>
<td>1975</td>
<td>819.88</td>
<td>535.42</td>
<td>-3.25</td>
</tr>
<tr>
<td>1980</td>
<td>1691.81</td>
<td>1204.34</td>
<td>31.71</td>
</tr>
<tr>
<td>1985</td>
<td>1715.91</td>
<td>1327.35</td>
<td>167.20</td>
</tr>
<tr>
<td>1990</td>
<td>2660.30</td>
<td>2527.31</td>
<td>526.85</td>
</tr>
<tr>
<td>1994</td>
<td>3900.94</td>
<td>3422.65</td>
<td>1226.33</td>
</tr>
</tbody>
</table>

* Negative sign implies net imports.

Note: Meat includes meat and meat preparations, SITC 01; Fish includes fish and fish preparations, SITC 03; Fruit/veg. includes fruit and vegetables, SITC 05; Cereals includes cereal preparations, SITC 04; Dairy includes dairy products and eggs, SITC 02; Feed includes animal feedstuff, SITC 08.

Source: UN Trade Data, International Economic Databank, The Australian National University, Canberra.
These facts tell only one side of the story. On the other hand, Taiwan’s food exports also expanded enormously. Remarkably, in value terms, Taiwan remained a net exporter for the food sector as a whole, albeit by a declining amount, until the 1990s. Three groups of food items played the leading role in food exports: meat and meat preparations (SITC 01); aquatic products (03), and fruits and vegetables (05) (Table 1). The time sequence of the changing roles played by each of these food products in promoting food exports is interesting. Fruits and vegetables generated over US$100 million net export revenue by the mid-1960s, the beginning of economic take-off in Taiwan. Their net export revenue peaked in 1980 and declined afterwards to a considerable deficit in 1994. Fish and fish preparations showed significant net exports in the 1970s. Since then, its net exports have increased strongly and reached the record level of US$1 billion in 1990, however, this growth seems to have peaked in recent years. Meat and meat preparations are the latest foreign exchange generator in the food sector. Although not a significant net exporter until the early 1980s, the growth rate of net exports was the highest in the food sector over the last 15 years, and it was by far the largest net exporter in Taiwan’s food sector in recent years.

The evidence demonstrates that Taiwan’s food trade pattern during rapid industrialisation was shaped not only by grain imports but also by massive exports of other food products. Several groups of food products enjoyed competitiveness in the world market throughout the period. The cycles of growth and decline in competitiveness for the three export products indicate a dynamic process of rural structural adjustment in Taiwan. Taiwan’s food sector did not lose on all grounds during the period of rapid industrialisation. Instead there has been a dynamic trend of exchanging food for food. This challenges the assumption that the future trends in all food trade will be identical to that of grain in mainland China.

The evolving pattern of China’s food trade

Now let us look at evidence from mainland China. Mainland China entered the fast lane of economic growth in the late 1970s, when it embarked on program of economic reform and opening to the outside world. GDP in 1995 was almost five times higher than in 1978 and the average growth rate per annum during the period from the mid-1970s to the mid-1990s was 9.86 per cent (China Statistical Bureau 1996). The share of the agricultural sector in GDP declined from 32.4 per cent to 13.3 per cent (Asia Pacific Economic Group 1996:133). The share of food exports as a percentage of total exports fell from 16 per cent to about 7 per cent over the same period.

The structural features of China’s food trade since the 1980s resemble those of Taiwan in the 1970s (Table 2). On the import side, grain has been the most important item. The share of cereal and cereal preparations in total food imports was 59 per cent
and 84 per cent in 1995 and 1980 respectively. Though there was a clear increasing trend in China’s food imports, mainly pushed by imports of grain and sugar, China developed a position as a net exporter of food in value terms during the period. Starting from the position of almost balanced trade in the food sector in 1980, net food exports were US$2.3 billion in 1985 and reached US$3.8 billion in 1995. Exports of some competitive food products more than compensated for the growth in other food imports during the period.

Among ten categories of 2-digit SITC food products, six were net exports in 1995. All six groups were net exports in 1980 and retained their status throughout the period. Nevertheless, the growth rates among them differed substantially. Apart from the category of ‘others’ (09) that covers diverse items, live animals (00) and coffee, tea (07) have been traditional food export products for China, but these have only achieved modest growth rates over the last 15 years, averaging 1.8 and 3.1 per cent per annum respectively. On the other hand, three groups of food products, meat (01), aquatic

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Structure of food trade in mainland China, selected years 1980–95 (US$ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Export</td>
</tr>
<tr>
<td>Live animals (00)</td>
<td>384</td>
</tr>
<tr>
<td>Meat, etc. (01)</td>
<td>361</td>
</tr>
<tr>
<td>Dairy products, etc. (02)</td>
<td>71</td>
</tr>
<tr>
<td>Fish, etc. (03)</td>
<td>380</td>
</tr>
<tr>
<td>Cereals, etc. (04)</td>
<td>423</td>
</tr>
<tr>
<td>Vegetables &amp; fruits (05)</td>
<td>746</td>
</tr>
<tr>
<td>Sugar, etc. (06)</td>
<td>221</td>
</tr>
<tr>
<td>Coffee, tea etc. (07)</td>
<td>328</td>
</tr>
<tr>
<td>Feeding stuff, etc. (08)</td>
<td>58</td>
</tr>
<tr>
<td>Others (09)</td>
<td>49</td>
</tr>
<tr>
<td>Total food (0)</td>
<td>2,985</td>
</tr>
<tr>
<td>Total food as %</td>
<td>16.47</td>
</tr>
</tbody>
</table>

Note: SITC codes are in parenthesis.
products (03), and fruits and vegetables (05) enjoyed enormous export expansion over the period. The annual growth rates for these three groups were 9.3, 14.4 and 10.5 per cent respectively—all higher than the average annual growth rate of 8.4 per cent for total food exports.

These different growth rates brought about significant changes in the profile of China's food exports during the period. For example, in 1980 the magnitude of exports of aquatic products (03) was similar to that of live animals (00) and coffee and tea (07), whereas in 1995 the former was more than five times that of the latter. The position of vegetables and fruits (05) as the leading food export was further strengthened: its share in total food exports increased from one-quarter in 1980 to one-third in 1995. Due to the high growth rates of these three products, their share in total food exports increased to over 75 per cent in 1995 from about 50 per cent in 1980. This evidence indicates a remarkable similarity between trends in mainland China and Taiwan: China's food export expansion since 1980 has been driven mainly by the same three groups of food products which increased Taiwan's food exports in earlier decades.

The export specialisation indices of selected food products in 1994 and 1980 support the argument. In 1994, the indices for aquatic products and vegetable and fruits were 1.95 and 1.86 respectively (Table 3). For the food sector as a whole the index was 1.2, implying an overall comparative advantage with the rest of the world. In comparison with 1980, the index for these products as well as for the total food sector had reduced significantly by 1994. For example, the index for vegetable and fruit products almost halved and that for the total food sector decreased by one-third over the period. However, the decline of the indices for these two food products was mainly caused by a much faster growth rate for China's overall exports in relation to the rest of the world. The market share of these products increased substantially (from 2.81 per cent to 5.82 per cent for aquatic products, and from 3.37 per cent to 5.56 per cent for fruit and vegetables). The growth in world market share indicates that the competitiveness for these food products actually strengthened during the period.

Most of China's food exports go to its rich neighbouring economies (Table 4). Japan and Hong Kong are by far the most important markets for China. Hong Kong has been a traditional food export market for mainland China. The geographical advantage for China to export food products to Hong Kong is in part reflected by the fact that about 80 per cent of China's export of live animals (chiefly for food) goes to Hong Kong. However, the expansion of the Hong Kong food market is much slower than that of other markets, such as Japan. In 1994, Japan's food imports from China were US$4.65 billion, accounting for almost half of China's total food exports—a tenfold increase since 1980. Two products played the leading role in expanding Japan's imports from China: aquatic products (03) and vegetables and fruits (05). The export value of
Table 3  Export specialisation index and the world market share of selected food products for China, 1980, 1994

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Live animals and meat (00) and (01)</td>
<td>2.95</td>
<td>0.78</td>
<td>2.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Fish &amp; preparations (03)</td>
<td>3.04</td>
<td>1.95</td>
<td>2.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Vegetables &amp; fruits (05)</td>
<td>3.65</td>
<td>1.86</td>
<td>3.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Total food (0)</td>
<td>1.82</td>
<td>1.21</td>
<td>1.7</td>
<td>3.6</td>
</tr>
</tbody>
</table>

*The index is defined as the ratio of the share of export on certain commodity in total export for one country to the same share for the whole world. According to a conventional interpretation, the value of the index over unity implies comparative advantage for the commodity and country in question in relation to the rest of the world, and vice versa.

Note: SITC categories are in parenthesis.
Source: UN Trade Data, International Economic Databank, The Australian National University, Canberra.

these two groups reached more than US$3 billion in 1994, up from about US$300 million in 1980.

The second group of major importers of China’s food products include other newly industrialising economies (NIEs) plus Malaysia. In 1994, the value of South Korea’s

Table 4  Main importers of selected food products from China, 1980, 1994 (US$ million)

<table>
<thead>
<tr>
<th></th>
<th>Total food (0)</th>
<th>Meat etc. (01)</th>
<th>Fish etc. (03)</th>
<th>Fruit &amp; Veg. (05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>1096.24</td>
<td>1775.2</td>
<td>168.1</td>
<td>201.86</td>
</tr>
<tr>
<td>Japan</td>
<td>465</td>
<td>4652.6</td>
<td>59.19</td>
<td>347.16</td>
</tr>
<tr>
<td>South Korea</td>
<td>913.89</td>
<td>8.49</td>
<td>110.29</td>
<td>119</td>
</tr>
<tr>
<td>Taiwan</td>
<td>207.31</td>
<td>5.8</td>
<td>53.13</td>
<td>29.21</td>
</tr>
<tr>
<td>Singapore</td>
<td>138.81</td>
<td>297.74</td>
<td>14.71</td>
<td>27.69</td>
</tr>
<tr>
<td>EEC</td>
<td>473.91</td>
<td>985.09</td>
<td>93.64</td>
<td>115.91</td>
</tr>
<tr>
<td>United States</td>
<td>65.18</td>
<td>589.85</td>
<td>1.24</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: Blank space implies either data not available or amount less than US$1,000.00; SITC categories are in parenthesis.
Source: UN Trade Data, International Economic Databank, The Australian National University, Canberra; Taiwan’s data are from General Administration of Customs of the People’s Republic of China: China Monthly Exports & Imports (1995.12), Beijing.
imports of aquatic products (03) and vegetables and fruits (05) from China was about US$100 million each. South Korea's total food import bill from China exceeded US$900 million that year. Taiwan has been a traditional exporter of aquatic products and vegetables and fruits, however, the competitiveness of its domestic production in these products has been eroded in recent years as a result of increases in wage and land prices, shortages of labour and appreciation of Taiwan currency. There is evidence that mainland China has a comparative advantage over Taiwan in these food products. For example, Taiwan has become a net importer of fruit and vegetables in recent years, while mainland China's exports of these foods has been particularly strong. According to a comparative study on agricultural trade of Taiwan and mainland China, the costs of raising prawns and hogs (two main competitive food products for Taiwan) in the mainland were only about 36 per cent of Taiwan's costs (Qiu and Duan 1992). It is interesting to note that Taiwan also started to import significant amounts of these products from mainland China in recent years. The trend may continue if political relationships across the Strait improve.

The United States and the European Union (EU) are traditional grain exporters to China and important food importers from China. China's food exports to the United States increased from US$65.1 million in 1980 to US$589.9 million in 1994, at an average growth rate of 17 per cent per annum. Two products (aquatic products and fruits and vegetables) accounted for 74.4 per cent of exports. In view of the strong competitiveness assumed by the United States in the agricultural sector as a whole, particularly in grains, China's export expansion of the above foodstuffs into the US market shows that it is possible for China to increase its exports of some food products while importing others, especially grains, during the course of rapid economic growth.

Comparative advantage and China's food trade pattern

The evidence across the Taiwan Strait suggests that in terms of world market competitiveness, different groups of food products showed different trends over the period of rapid structural transformation. This observation raises some important questions: why did certain food products maintain or even strengthen their competitiveness throughout the period of industrialisation? Were these mainly caused by policy intervention and distortion, or was there an economic rationale behind the phenomenon?

The potential impact of policy distortion is a serious issue. The agricultural sector has been notorious for heavy government intervention. For example, the high self-sufficiency ratio of rice in Japan, Taiwan and South Korea has been achieved mainly through domestic protection policies. Nevertheless, as far as the three competitive foodstuffs are concerned, the influence of policy intervention must not be substantial.
First, the old agricultural policy in mainland China was characterised by squeezing out agricultural surplus to support urban industrialisation. Though various reform measures have been implemented since the late 1970s, discrimination against agriculture has yet to be completely removed. Agricultural protection has been discussed by researchers as a future possibility (Garnaut, Cai and Huang 1996), but is not yet a reality, and was not the case in the past. Second, and more importantly, the enormous expansion in selected food product exports occurred in both Taiwan and mainland China. The vast differences between the two economies in terms of institutional settings and policy environment imply that policy effects on the observed food trade pattern are unlikely to be substantial.

I shall argue instead that the observed phenomenon can be explained on the basis of economic analysis. International trade theory suggests that the world trade pattern of a commodity is primarily determined by the relative costs of delivering the commodity to the market by participant economies. The comparative advantage may be influenced by many factors, of which the factor endowment is one basic determinant. According to the standard theory of comparative advantage, under various assumptions (including no distortions to producer incentives), a country tends to export commodities which require relatively intensive use of the country’s relatively abundant factors of production. Apart from factor endowment, other factors such as distance and domestic consumption have been long recognised as potential determinants of patterns of trade.

In light of conventional trade theory, I shall approach the topic through an examination of factor combinations and cost structures of alternative food production activities, then discuss the potential impact of other possible economic causes, such as changes in domestic food consumption and distance. First, however, it may be appropriate to review the structural features of China’s factor endowments.

The structural features of China’s factor endowments

The fundamental feature of China’s factor endowment for food production is a serious shortage of arable land and capital with an abundance of labour. This is highlighted by the fact that China has to feed 22 per cent of the world’s population with only 7 per cent of the world’s arable land. On the capital side, in spite of high-speed economic growth in recent years, China remains a low-income economy facing capital shortages. These features have been graphically demonstrated in Anderson (1991) using the Leamer (1987) triangle (Figure 1). The triangle represents relative endowments of three factors for various countries: N denotes natural resources; L, labour time; and C, capital.
Anderson (1991) used agricultural land per capita and income per capita to represent the natural resources-to-labour ratio and the capital-to-labour ratio. Using 1988 data, the diagram measures the ratios in log terms along the NL and LC sides of the triangle respectively. The mid-point of each line represents the world average which is taken as the numeraire. Thus the point W represents the global average endowment of all three factors; the mid-point lines NB, LD and AC divide the triangle into six small triangles. Countries are located in different small triangles according to their factor endowment. For example, Australia and New Zealand fall into the small triangle WDN, indicating above average per capita endowments of capital as well as natural resources. On the other hand, Japan’s location inside WBC reflects above-average per capita endowment of capital and below-average per capita endowment of agricultural land. China’s endowment point is inside the area of WLA, representing below-average per capita endowment of capital and agricultural land. This position highlights China’s relative endowment status as a densely populated low-income level country.

To describe the structure of factor endowment for China’s rural economy, the above model needs further clarification. First, with regard to the potential linkage between factor endowment and comparative advantage, the average farm size may be a more appropriate measurement to indicate the relative scarcity of land. If the average farm size is used in this context rather than agricultural land per capita, the relative scarcity
of arable land in China is even more acute than that reflected in the triangle diagram. The reason is that the proportion of China's workforce still in farm employment is much higher than the average for the rest of the world. As a result, the average farm size for China is not only much lower than land resource rich countries such as Australia and the United States, but also lower than for economies such as Japan, Taiwan, South Korea, where per capita arable land is lower than China (Asian Productivity Organisation 1996:56). Using average farm size shifts China's position upwards only slightly, but shifts the positions of countries such as Australia, the United States, Japan and the NIEs substantially upwards in the diagram.

Second, in terms of capital endowment, China is the second-lowest country in the diagram, next to the South Asian countries. However, if we take sectoral bias against agriculture and the rural economy into account, the relative scarcity of capital is even more acute in rural areas. Due to various institutional factors, capital per farmer in China is much lower than the per capita measurements for total population. Policy instruments were adopted in China from the 1950s to transfer surplus from the rural sector to support a heavy industrialisation program in the urban areas. Certain aspects of this policy are still in place even in the current situation. On the other hand, there is evidence that the financial sector in China discriminates against the agricultural and rural sectors. There is widespread financial drainage and other difficulties in the rural sector that make farmers' capital endowment even more unfavourable.

Third, China's agricultural factor endowment is influenced by seasonal patterns of labour demand. In a typical rural area of China, grain production has usually been the dominant activity. Labour demand for grain production is highly seasonal. As a result, shortages in labour supply can be observed in the relatively short peak seasons, whereas in long off-peak seasons there is a large labour surplus. To the extent that seasonal labour surplus exists, the opportunity cost of labour at the off-peak season is extremely low. There is a strong incentive for peasants in less-developed rural areas to undertake any available economic activities in the off-peak season, even though the return may be lower than living costs.

Factor intensity and cost structure for different food commodities as farm products

It should be noted that the food commodities (vegetables and fruits, aquatic products, meats) in which China's exports have expanded since 1980, are not purely farm products. Production of these foodstuffs often involves manufacturing activities with farm value added and manufactured value added. In this section, I examine factor intensities and cost structures for these food products at the stage of farm activity. Similar issues surrounding the manufacturing process are dealt with in the next section.
On the basis of the factor endowments, three predictions may be made with reference to the comparative advantage or competitiveness of alternative economic activities in China's rural areas. Among alternative activities using good quality land as input, and other things equal, those making intensive use of labour tend to have comparative advantage or market competitiveness. Second, other things equal, those activities requiring either no arable land or only marginal land of inferior quality tend to have comparative advantage or competitiveness. Third, those activities utilising more labour surplus in off-peak seasons tend to have comparative advantage or competitiveness. Given these predictions, we can examine factor intensity and cost structure for different foodstuffs as farm products to investigate whether there are economic reasons for the pattern of exchanging food for food observed in China over the last 15 years.

Let us first look at the production costs of grains in comparison to vegetables and fruits. Production of these food products rely on traditional agricultural activities. Though different skills are needed for cultivating grain, vegetables and fruit, differences in technology levels are negligible. The different skills can be easily acquired by peasants through traditional method of 'learning-by-doing', provided there are sufficient incentives for them to do so. However, there is a substantial variation in labour intensity between production of these two food products. The labour requirement per unit of land for vegetable and fruit production is much higher than that for grain. According to China's cost survey data in 1994, the average labour input requirements per mu for vegetables and fruits were 61.5 and 67.1 working days respectively, about 4.5 times the 13.6 days required for various grain crops (Table 5). The capital requirement for vegetable and fruit production was higher than that for grain, however, this is unlikely to have a significant impact on the structure of comparative advantage for two reasons. First, the absolute amount of capital needed for vegetable and fruit production is modest and most peasants could self-finance what was required. Second, the ratio of input costs per unit of product value for vegetables and fruit is lower than that of grain because of the much higher product value of the former. The data indicate that, given the current technology level for agricultural production, vegetable and fruit activities make use of labour much more intensively than grain, giving comparative advantage to China's vegetable and fruit production.

As for the production of aquatic products and meats, we cannot compare them with that of grain in terms of labour intensity relative to land as they do not need arable land as input. Nevertheless, the data indicate that production of meat and aquatic products such as fish and prawns also use a great deal of labour (Table 5). Raising one hog needs on the average 20.5 working days, while cattle require 57.5 working days. Assuming the annual working year for a peasant is 300 days, about 15 hogs or 5 cattle will keep him or her fully occupied, given the current level of technology in the sector. For aquatic products, freshwater fish per mu on average need 31 working days.
Apart from the intensive use of labour resources, two additional factors are important for the potential competitiveness of products such as meat, fish, fruit and vegetables. First, as mentioned above, production of meat, fish, and fruit, either does not require arable land as input or only needs marginal arable land. To the extent that the argument on comparative disadvantage of China’s grain production has been made on the basis of China’s scarcity of arable land, it does not apply to the production of these non-grain foods. Second, highly seasonal demand for labour in grain production usually results in large-scale labour surplus in the agricultural areas where economic activity is dominated by grain production. Since other food products such as meat, fish, vegetables, fruit have different labour demand patterns, they can be organised to increase demand for labour in the off-peak season and therefore contribute to absorbing the vast amount of labour surplus in rural areas. Given the low opportunity cost of labour during the off-peak season, motivation for Chinese farmers to engage in these activities is high. This may have strengthened China’s competitiveness in these food products.

Factor intensity for selected food commodities as manufactured products

Many exported food items are processed foods or manufactured goods, and involve significant processing activities under factory conditions. The combined nature of farm

<table>
<thead>
<tr>
<th>Working days</th>
<th>Labour cost</th>
<th>Other input</th>
<th>Total output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains (per mu)</td>
<td>13.61</td>
<td>75.26</td>
<td>108.87</td>
</tr>
<tr>
<td>Vegetables (per mu)</td>
<td>61.52</td>
<td>355.59</td>
<td>434.03</td>
</tr>
<tr>
<td>Fruits (per mu)</td>
<td>67.13</td>
<td>406.93</td>
<td>416.55</td>
</tr>
<tr>
<td>Hogs (per head)</td>
<td>20.53</td>
<td>128.31</td>
<td>531.58</td>
</tr>
<tr>
<td>Beef cattle (per head)</td>
<td>57.54</td>
<td>295.76</td>
<td>1348.9</td>
</tr>
<tr>
<td>Freshwater fish (per mu)</td>
<td>30.9</td>
<td>278.1</td>
<td>1576.4</td>
</tr>
</tbody>
</table>

Notes: Data for grains are the average figures for six grain crops: paddy, wheat, corn, sorghum, millet and soybean. They are survey data covering 1,356 counties, 9,283 farm households and 67,016 mu. (Mu is the area measurement used in China. 1 mu = 0.0667 hectare.) Data for vegetables are the average measurements for 14 vegetables. The survey data cover 359 counties, 940 farm households and 3,325 mu. Data for fruits are the average for apples and oranges. Survey data for apples cover 73 counties, 208 farm households and 3,523 mu while those for oranges cover 37 counties, 181 households and 856 mu. Data on hogs and beef cattle refer to those raised by peasant households. The data sample on hogs covers 327 counties, 1,664 households, 8,692 hogs; while that on beef cattle covers 21 counties, 72 households, 374 cattle. Fish data cover 76 counties, 243 households and 60,427 mu of water.

and manufacturing activities for many foodstuffs is significant. Importantly, manufacturing activities need no arable land as input. This indicates a crucial difference in factor combination between processed food and bulk farm products such as grain. It supports the argument of this paper that there are significant differences between grain and other foods in terms of world market competitiveness for a given country with a given factor endowment.

Looking at the relationship between the competitiveness of certain foodstuffs and the processing activities involved, this section explores two issues. First, it discusses the percentage of food products falling into the category of processed food. Then it examines the factor intensity of the Chinese processed food sector by discussing the data on the fixed capital-to-labour ratio for this sector.

As for the first issue, difficulty arises from the conventional international classification system of trade data. As argued by Teitel (1989) and Athukorala and Sen (1996), the SITC data cover the processed foods in the commodity group of primary goods. Processed foods, along with other commodities, are not classified as manufactured goods though they are recognised as industrial products by industrial origins in the international standard industrial classification (ISIC). To identify the share of processed food in total food export, Teitel (1989) and Athukorala and Sen (1996) suggest cross referencing the SITC commodity listing at the 5-digit level to that of the ISIC at the 4-digit level, using the United Nations commodity concordance.

This approach enables us to identify processed foodstuffs from the SITC food export data (see Appendix 1 in Athukorala and Sen 1996). Using the lists of processed food for different food groups, the export values of processed food and their share in total food exports for China in 1994 are reported in Table 6. The value of processed food exported was US$6.41 billion, and its share of total food exports was 58 per cent. The data on the ratio of manufacturing value added in the total output value of processed food for China is not available. It was reported that the ratio for Latin America in the 1970s and 1980s was 30.2 per cent (Teitel 1989:327–8). Using this figure, a rough estimate of the manufacture value added for food exported by China in 1994 was about US$1.93 billion.

Data on the fixed capital-to-labour ratio for the food manufacturing sector represent a quantitative indicator of the factor intensity for the sector. The data on the fixed capital-to-labour ratio for different industrial sectors in China in selected years from 1952 to 1992 are reported in Table 7. Food manufacturing was one of the most labour-intensive sectors from the 1950s to the 1970s. In 1984, it was still the second most labour-intensive sector with a fixed capital-to-labour ratio only slightly higher than the textile industry. This picture had changed significantly by 1992. The growth rate of the ratio for the food sector was much higher than most of the other sectors. For example, the ratio for sectors such as textile, paper making, and building materials increased by
Table 6 Value of processed food exports and the share in total food exports for China, 1994 (US$1,000)

<table>
<thead>
<tr>
<th>Export value of of processed food (1)</th>
<th>Total food export value (2)</th>
<th>Ratio of (2)/(1) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live animals (00)</td>
<td>0.0</td>
<td>463,799</td>
</tr>
<tr>
<td>Meat, etc. (01)</td>
<td>715,749</td>
<td>728,444</td>
</tr>
<tr>
<td>Dairy products, etc. (02)</td>
<td>20,146</td>
<td>65,071</td>
</tr>
<tr>
<td>Fish, etc. (03)</td>
<td>2,596,075</td>
<td>2,596,079</td>
</tr>
<tr>
<td>Cereals, etc. (04)</td>
<td>188,933</td>
<td>1,989,447</td>
</tr>
<tr>
<td>Vegetables &amp; fruits (05)</td>
<td>1,891,322</td>
<td>3,430,565</td>
</tr>
<tr>
<td>Sugar, etc. (06)</td>
<td>328,056</td>
<td>328,062</td>
</tr>
<tr>
<td>Coffee, tea, etc. (07)</td>
<td>48,699</td>
<td>598,592</td>
</tr>
<tr>
<td>Feeding stuff etc. (08)</td>
<td>449,267</td>
<td>589,685</td>
</tr>
<tr>
<td>Others (09)</td>
<td>171,199</td>
<td>171,317</td>
</tr>
<tr>
<td>Total food (0)</td>
<td>6,409,446</td>
<td>10,961,061</td>
</tr>
</tbody>
</table>

Note: SITC category is in parenthesis. Source: UN Trade Data, International Economic Databank, The Australian National University, Canberra.

only about one-half from 1984 to 1992, while that for food manufacturing increased by 1.4 times during the same period. Although the capital intensity for the food sector was still much lower than utilities or the petrochemical industries in 1992, it became one of the most capital-intensive sectors among light manufacturing industries.

It should be noted that the data for the period 1952 to 1984 and those for 1992 are from two different sources. The first data set covers 11 industries, whereas the second includes 29 more narrowly defined industries. As the two data sets are not entirely comparable, their implications for the sectoral changes in capital intensity must be treated with caution. On the other hand, food manufacturing covers a variety of sub-sectors with differing capital intensities. For the purpose of this study, it would be useful to examine the data on the fixed capital-to-labour ratio for the sub-sectors related to China’s food export structure. Although fresh data are needed to make a more accurate assessment, the existing data suggest a trend with respect to the relative changes in capital intensity for the food processing sector. In view of the fact that China is still a capital-scarce economy, the rapid increase in food sector capital intensity may have an adverse impact on the competitiveness of China’s food exports.

Two alternative inferences with respect to the relationship between China’s food export growth and the food manufacturing activities may be drawn from this tentative
investment. First, the manufacturing activities per se may not be a significant factor contributing to the export expansion of China’s competitive food products. Second, although the manufacturing activities may be one important factor in this context, this role may have diminished because the relatively higher growth in capital intensity may have weakened China’s comparative advantage of food manufactured activities. Should either be the case, there are implications for the assessment of sources of comparative advantage for China’s food exports. From the factor proportion point of view, China’s current food export competitiveness mainly derives from agricultural activities rather than manufacturing processes. On the other hand, from a dynamic perspective, it is also possible for China to increase the comparative advantage in food manufacturing activities in the future, as rapid economic growth may eventually shift China’s factor endowment in the direction of more capital-intensive activities.

Domestic consumption pattern and the influence of distance

Relative commodity costs are not dictated solely by relative factor proportions. They may also be influenced by other factors, such as technical efficiency and the domestic
demand structure (Bhagwati 1964: 18). Linder (1961) emphasised the importance of the pattern of domestic consumption in determining the export potential for manufactured goods. His argument comprised three points: (1) domestic needs make entrepreneurs aware of and react to a potential profit opportunity by starting or expanding production; (2) domestic consumption provides incentives for innovation and invention; (3) easy feedback between producers and consumers through domestic markets nurtures development of the products (Linder 1961: 89-90). In light of this analysis, the factor of domestic consumption may have some effects on food export expansion by many developing economies, including China.\textsuperscript{9}

It is useful to separate Linder’s theory into two components. One is the analytical proposition outlined above and the other is its inference as to the likely trade pattern derived from the analytical perspective. The inference leads to Linder’s hypothesis that ‘the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries’ (Linder 1961: 94). Though there is empirical evidence rejecting Linder’s hypothesis using the level of per capita income as a gauge of domestic demand pattern (Hoftyzer 1984), a moment of reflection may reveal that theoretically the analytical perspective and the testable hypothesis are not entirely compatible in the context of food trade. To elaborate on this point, let’s assume that potentially there exists intensive food trade between two groups of countries with significantly different income levels, mainly due to resource endowment factors. We should further assume that export competitiveness is on the side of low-income economies. This potential trade pattern may contradict Linder’s hypothesis, as it is dominated by trade flow between groups of economies at different income levels. Nevertheless, the factor of domestic consumption could still play an important role in realising the potential competitiveness for individual low-income countries through the three effects outlined by Linder.

China’s expansion of food exports since 1980 coincided with unprecedented changes in its domestic food consumption. During the period 1952 to 1978, the consumption level showed limited growth for certain food products such as eggs and liquor (Table 8).\textsuperscript{10} For other food commodities, such as grain, poultry, beef and mutton, there was no increase in consumption over that period. The situation has changed dramatically since the late 1970s. Apart from direct grain consumption, which peaked in the mid-1980s and declined afterwards, consumption of other food experienced enormous growth. The ratio of quantities consumed in 1992 to that in 1978 ranged from 2.37 for pork to 5.75 for poultry. The increase in food consumption and improvement in diet quality indicate substantial changes in the pattern of China’s domestic food consumption. These trends are likely to have had some positive impact on China’s food export expansion.
Table 8  China’s per capita consumption of selected food products, selected years 1952–92 (kilograms)

<table>
<thead>
<tr>
<th>Year</th>
<th>Grain</th>
<th>Pork</th>
<th>Beef &amp; mutton</th>
<th>Poultry</th>
<th>Eggs</th>
<th>Aquatic products</th>
<th>Liquor</th>
<th>Fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>197.70</td>
<td>5.90</td>
<td>0.90</td>
<td>0.40</td>
<td>1.00</td>
<td>2.70</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>195.50</td>
<td>7.70</td>
<td>0.80</td>
<td>0.40</td>
<td>1.97</td>
<td>3.50</td>
<td>2.60</td>
<td>6.90</td>
</tr>
<tr>
<td>1985</td>
<td>251.70</td>
<td>13.84</td>
<td>1.30</td>
<td>1.60</td>
<td>4.90</td>
<td>4.80</td>
<td>7.60</td>
<td>11.10</td>
</tr>
<tr>
<td>1992</td>
<td>235.90</td>
<td>18.22</td>
<td>2.10</td>
<td>2.30</td>
<td>7.80</td>
<td>7.30</td>
<td>12.90</td>
<td>21.10</td>
</tr>
<tr>
<td>1992/1978</td>
<td>1.21</td>
<td>2.37</td>
<td>2.63</td>
<td>5.75</td>
<td>3.90</td>
<td>2.09</td>
<td>4.96</td>
<td>3.06</td>
</tr>
</tbody>
</table>

1 This row represents the ratio of 1992 consumption to 1978 consumption.

Sources: China Statistical Year Book (1993); the data on fruit are from A Statistical Survey of China, (1996).

The influence of distance on the pattern of international trade has also long been recognised. Empirical investigation of the impact is usually facilitated by a gravity model which is typically formulated as a log-liner relationship expressing bilateral trade between a pair of countries as a function of the two countries’ income levels, populations and distance. Studies using the gravity model have found a distance elasticity of about -0.6 (Leamer and Levinsohn 1995:1348). Distance may be more important for perishable foods such as vegetables and fruits, fish and shrimp. Most of China’s competitive food products are exported to Japan and Hong Kong. China’s proximity to these economies allows it to capitalise on its competitiveness. The following observation is indicative of the geographical advantage for China’s food export to these economies. There are three daily expresses each from Zhengzhou (the capital of Henan province in northern China), Wuhan (the capital of Hubei in the middle of the Yangzi river) and Shanghai to Hong Kong, to supply perishable food products such as live animals, and poultry. Of about 10,000 live hogs slaughtered in Hong Kong everyday, about 80 per cent are supplied from China (Chen 1991: 124,135). It is possible that Taiwan and South Korea will increase their imports of these food products. Close geographical links will be in China’s favour for the expansion of its competitive food products in these markets.

China’s food export and structural changes in the world food markets

The preceding section has analysed the economic rationale behind China’s food export pattern over the last 15 years or so. I will further examine the issue in the broad context
of structural change in world food markets and the food export performance of other developing economies.

The world food market has witnessed striking structural adjustments over the last two decades, underlined by dramatic changes in the pattern of food import demand. Total food imports in the world market increased to US$317.08 billion in 1994 from US$100.08 billion in 1975, at the average annual growth rate of 6.25 per cent (Table 9). However, the growth rates differ greatly among different food groups. Cereal and cereal preparation (03) only increased at 2.9 per cent per annum, the second lowest rate following sugar and sugar preparations (06) which virtually had no growth over the period. On the other hand, fish and fish preparations (03) achieved the second highest growth rate of 11.5 per cent per annum over the period, while those for meat and meat preparations (01) and fruits and vegetables (05) were 7.3 and 8.1 per cent, respectively—all registering above-average growth rates.

These growth rate differentials led to significant changes in the structure of the food import demand pattern in the world market, in part reflected in changes in the ranking order of different food groups according to their share in total food imports. The structural changes are dominated by the relative decline of the share of cereal trade and the increasing importance of trade in fish (03), fruit and vegetables (05), and meat (01), categories in which China’s exports have expanded greatly. For example, cereal and cereal preparations (04) occupied 28.4 per cent of total food imports in 1975, by far the single largest item. However, its share declined to 15.5 per cent in 1994 and has been surpassed by fruit and vegetables (05) which accounted for 21.2 per cent of total food imports. Similarly, fish and fish preparations (03) increased from 6.5 per cent in 1975 to 15.2 per cent in 1994, almost equalling the share of cereal and cereal preparations (04). In 1975 the first four largest food products (according to their share) were cereals (04), fish (05), sugar (06) and coffee (07). The order has changed substantially in the last two decades. In 1994 the first largest food products were fruits and vegetables (05), cereals (04), fish (03) and meat (04). The share of the three groups of food products (01, 03, 05) in total food import demand increased by 18 percentage points from 31.3 per cent in 1975 to 49.5 per cent in 1994. If the trend continues, it is possible that these three food products will become the three largest food items traded in the world food market.

Although the causes for the structural changes are many and complicated, a major factor is likely to be different demand elasticities with respect to income across various food commodities. It has been widely observed that when the consumer’s diet improves as a result of per capita income growth, expenditure on some food such as meats, fish and fruits tends to grow much faster than that on other food products such as staple grain. China’s recent experience of income-induced food consumption confirms this general pattern. As reported by Wu and Wu (1996), the income elasticity for food
Table 9  Growth and change of food import demand in the world market, selected years 1975–94 (US$billion)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Live animals (00)</td>
<td>3.15</td>
<td>3.1</td>
<td>5.31</td>
<td>3.4</td>
<td>8.75</td>
<td>2.8</td>
<td>6.25</td>
</tr>
<tr>
<td>Meat etc. (01)</td>
<td>10.08</td>
<td>10.0</td>
<td>18.14</td>
<td>11.1</td>
<td>41.41</td>
<td>13.1</td>
<td>5.52</td>
</tr>
<tr>
<td>Dairy (02)</td>
<td>6.50</td>
<td>6.5</td>
<td>12.04</td>
<td>7.4</td>
<td>24.67</td>
<td>7.8</td>
<td>7.70</td>
</tr>
<tr>
<td>Fish etc. (03)</td>
<td>6.03</td>
<td>6.0</td>
<td>17.08</td>
<td>10.5</td>
<td>48.06</td>
<td>15.2</td>
<td>7.27</td>
</tr>
<tr>
<td>Cereals etc. (04)</td>
<td>28.35</td>
<td>28.2</td>
<td>35.7</td>
<td>21.3</td>
<td>48.99</td>
<td>15.5</td>
<td>11.54</td>
</tr>
<tr>
<td>Fruit &amp; veg. (05)</td>
<td>15.38</td>
<td>15.3</td>
<td>30.31</td>
<td>18.7</td>
<td>66.95</td>
<td>21.1</td>
<td>2.92</td>
</tr>
<tr>
<td>Sugar etc. (06)</td>
<td>14.53</td>
<td>14.5</td>
<td>6.81</td>
<td>4.3</td>
<td>14.27</td>
<td>4.5</td>
<td>8.08</td>
</tr>
<tr>
<td>Coffee etc (07)</td>
<td>10.25</td>
<td>10.2</td>
<td>23.77</td>
<td>14.6</td>
<td>29.06</td>
<td>9.2</td>
<td>0.00</td>
</tr>
<tr>
<td>Feeding stuff (08)</td>
<td>4.67</td>
<td>4.7</td>
<td>9.78</td>
<td>6.0</td>
<td>20.42</td>
<td>6.5</td>
<td>5.76</td>
</tr>
<tr>
<td>Others (09)</td>
<td>1.48</td>
<td>1.5</td>
<td>4.23</td>
<td>2.7</td>
<td>14.11</td>
<td>4.5</td>
<td>8.07</td>
</tr>
<tr>
<td>Total food (0)*</td>
<td>100.08</td>
<td>100.0</td>
<td>163.08</td>
<td>100.0</td>
<td>317.08</td>
<td>100.0</td>
<td>12.60</td>
</tr>
</tbody>
</table>

* This is the ratio to total food import. The export values do not add up due to rounding up.

Source: UN Trade Data, International Economic Databank, The Australian National University, Canberra.

grain for rural consumers in 1991 was 0.05 while for meat and aquatic products, it was 0.91 and 2.60 respectively. Food trade expansion in recent years may also have benefited from the agricultural trade liberalisation process initiated with the Uruguay Round. A more liberalised trade environment facilitates the transmission of a larger proportion of income-induced demand for food into the increasing food import demand in the world market.

It should be noted that the impressive expansion in food exports in recent decades has not only happened in China and Taiwan but also in many other developing countries. Athukorala and Sen (1996) report that processed food exports by developing countries increased from US$6,445 million in 1970 to US$71,557 million in 1994, an average annual growth rate of 10.6 per cent. The share of processed food in non-manufacturing exports for developing countries increased from 23 per cent to 37.5 per cent during the same period. Of the different processed food products exported by developing countries, processed fish enjoyed the highest annual growth rate. Its share in total processed food exports from developing countries increased from 8.8 per cent in 1970 to 30.7 per cent in 1994. This is consistent with the structural change in world food import demand as well as with China's food export pattern.
To have a closer look at China's export performance in relation to other developing countries, growth rates of exports of the three food products as well as for the food sector as a whole for the period from 1980 to 1994 are reported in Table 10. China has done relatively well compared with the average export performance of developing countries in these three products. This is reflected by significantly higher growth rates of food exports of fish (03) and fruits and vegetables (05) as well as total food (0). Nevertheless, China's growth rate of meat exports (01) was lower than the average level for developing countries as a whole during the period. As for food export performance, developing economies have done much better than China. For example, Thailand's exports of meat (01) and fish (03) achieved an annual growth rate of over 20 per cent over the period. Chile has achieved higher growth rates than China for exports of all the three food products as well as total food, and Indonesia has had higher growth rates for the three food products. The evidence indicates that there is room for China to pursue further expansion of food exports in the future.

Several points emerge from the discussion in this section. From the global food market point of view, the exchanging food for food pattern evolved in China is not unusual. The strong export expansion in selected food products by China is consistent with dramatic changes in the structure of food import demand in the world market. It is also in line with the trend of food export growth in many other developing economies. In view of the growth of food import demand in the past, coupled with the current process of global agricultural trade liberalisation, the potential for further growth of food exports from China and other developing countries is likely to be great.

Table 10 Export of selected food products by selected developing economies (average annual growth rate, 1980–94, per cent)

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>Developing economies</th>
<th>Thailand</th>
<th>Chile</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat, etc. (01)</td>
<td>5.02</td>
<td>5.83</td>
<td>21.48</td>
<td>9.28</td>
<td>11.85</td>
</tr>
<tr>
<td>Fish, etc. (03)</td>
<td>14.81</td>
<td>10.98</td>
<td>20.68</td>
<td>17.31</td>
<td>15.47</td>
</tr>
<tr>
<td>Fruit &amp; veg. (05)</td>
<td>10.20</td>
<td>6.03</td>
<td>3.65</td>
<td>12.42</td>
<td>12.48</td>
</tr>
<tr>
<td>Total food (0)</td>
<td>9.80</td>
<td>3.66</td>
<td>8.69</td>
<td>11.30</td>
<td>7.49</td>
</tr>
</tbody>
</table>

Source: UN Trade Data, International Economic Databank, The Australian National University, Canberra.
Summary and policy implications

The paper has examined the likely pattern of China's food trade in the future should China's food trade policy be adjusted to accommodate her comparative advantage. It argues that in view of the heterogeneity of food products in factor proportion and cost structures, there may be diversified trade tendencies for different food products in a deregulated environment. Differing from the common perception that China's overall food sector will follow the path of grain trade and face an ever growing trend in net importing, this study has found an evolving pattern of exchanging food for food in China over the last 15 years. The pattern is in part characterised by strong export expansion of selected food products such as vegetables and fruits, aquatic products, and meats. The consistency between the China's food trade pattern and structural changes in the world food market indicates the potential for China to develop further this food trade pattern.

Although this study is preliminary in nature and questions remain with respect to many related issues, it yields important policy implications. For example, this study challenges the relevance of the question of 'who will feed China?' The relevant question instead is 'how will China feed its population?' This study suggests that China can feed its population through trade: not only manufactured goods for food, but also, to a significant extent, food for food.

More importantly, the exchanging food for food pattern and the underlying economic rationale analysed in this paper suggest a new choice for China's future adjustments in food policy. With respect to China's future food trade policy, two choices have been often suggested. The first is to maintain the self-sufficiency policy in grain as well as in the total food sector. This is technically possible but costly in economic terms. The second is the free trade option which will, as widely believed, result in large-scale growth of net food imports into China. Food import bills, however, may be paid by foreign exchanges generated by exports of labour-intensive manufactured goods. If the pattern of exchanging food for food could be further developed, it perhaps represents a third option for Chinese policy adjustments in this context.

Potential benefits of this option for China are significant. Food exports can have a positive impact on the Chinese economy through its strong backward linkages. A particularly important point for China is that food exports can make a significant contribution to income growth in the rural areas due to its large rural resource elements. Rural income is widely recognised as a fundamental issue in China. Given the current structure of resource endowment, shifting resources to the food products with export competitiveness can, at the margin, lead to income growth in rural areas. This study identifies three causes for this income growth effect. First, for the particular food products involved, their production can make more intensive use of abundant labour.
per unit of scarce arable land. Second, production of some export food commodities either does not require arable land as input (raising animals) or only needs marginal land (fruit). A policy adjustment in favour of food exports can extend the scope of agricultural activities by breaking the vital constraint of land scarcity in rural China. Third, largely conditioned by grain production activity, demand for labour in rural China tends to be highly seasonal. Other food production can be organised to absorb labour surplus in off-peak seasons and therefore increase rural income.15

Making full use of the potential benefits associated with food exports necessitates many policy adjustments. One crucial issue is to reconsider the traditional policy objective of grain self sufficiency. It is important to understand the linkages through which future food exports may interact with the potential adjustments in the grain self-sufficiency policy. Three points are noteworthy. First, to defend the traditional grain self-sufficiency policy, China has to maintain a high level of arable land utilisation in grain production.16 As discussed above, compared with the other land competing foodstuffs, such as vegetables, grain production makes use of land much more intensively. To the extent that exports of land-competing food products can be increased, the grain self-sufficiency policy at the margin imposes high opportunity costs for peasants and therefore gives away potential income growth in rural areas. It also imposes a constraint on China's agricultural system in responding to changes in the world food market.

Second, China's grain prices are converging towards world market prices (Gamaut, Cai and Huang 1996). Adherence to the grain self-sufficiency policy is likely to lead to a protection policy in the grain sector in the future. The resulting higher level of domestic grain prices in relation to the international prices may be detrimental to the prospect of food export growth, since production of many food products for export uses grain as inputs. Relatively higher domestic grain prices will inevitably feed into the cost of production of these foodstuffs and therefore erode China's export competitiveness in these commodities.17 Taiwan's experience is again useful on this point. Its food exports expanded together with massive growth of grain imports, especially animal feed. The cheap imported feed grain reduced the costs of livestock raising and other food products using feed as input and therefore strengthened the competitiveness of food exports.

Third, to approach the issue of grain self sufficiency in the food trade context yields an inference that the adjustment cost for China's further integration into the world food system can be reduced considerably. Food security has been one of the main concerns in China with regard to a liberalised policy scenario in the area of food trade. Central to the concern of Chinese researchers is the assessment of the risks and impacts of a grain trade embargo in the case of a grain trade policy that accommodates regular net grain importing. If, as suggested by the pattern of exchanging food for food, the arable land released by grain imports is partially used for vegetable and fruit cultivation,
the risk of an embargo would be reduced because it would be relatively easy to convert
land used for other food production quickly back to grain cultivation if it were necessary.

This study also has some broad implications for issues relating to the global food
system and agricultural trade liberalisation. On the one hand, if China adjusts its food
trade policy in line with the pattern of exchanging food for food, it will inevitably
have an impact on the world food system. For example, it would be good news for
grain farmers in the major grain exporting economies such as the United States,
Australia and Canada, since the adjustment is likely to result in growth of China’s
grain import requirements. On the other hand, collaboration from the international
community is a crucial factor—it is important that other countries accommodate
China’s exports of competitive food products.

Vigorously defending the grain self-sufficiency policy on behalf of the food security
objective at enormous economic costs is not a phenomenon confined to China. Policymakers in many other countries also face tense conflict between adherence to
the grain self-sufficiency policy on one side and increasing adjustment pressure
emanating from changes in the domestic economy and external environment on the
other side. Bearing in mind that grain self-sufficiency is a complicated issue concerning
many economic and political factors, the conventional perspective of confusing grain
with food in economic and policy analysis also helps, to some extent, to overemphasise
or exaggerate the necessity and importance of grain. Careful clarification of the
difference between grain and food emphasised in this study may be relevant to more
rational adjustments in food policy. As discussed in the Chinese case, the policy
adjustments may generate significant benefits to economic development in rural areas.
They may also contribute to strengthening the momentum of the agricultural trade
liberalisation process under the framework of both the WTO and APEC.

Endnotes

1 See World Bank 1985 and 1991; Anderson and Tyers 1987; China Academy of Agri-
cultural Science 1989; Cater and Zhong 1991; Chen and Buckwell 1991; Garnaut
and Ma 1992 and 1996; Lu 1994; Huang, Rozelle and Rosegrant 1995; Overseas

2 It should be noted that Brown’s analysis of China’s grain economy is incomplete and
unbalanced. This is in part reflected in his discussion of Taiwan’s experience. The
decline of competitiveness in domestic grain production and growth of net grain
imports in Taiwan during its rapid industrialisation figures prominently in Brown’s
study as evidence supporting his gloomy prediction for mainland China’s future
food situation (Brown 1995:25, 55-6, 61-2). Nevertheless, he has completely ignored Taiwan’s enormous expansion of some major food exports over the period of its economic transformation that will be reviewed in this study.

3 The concept of food used in this study covers the commodity category of ‘food and live animals’ in the United Nations commodity classification (SITC 0). Alternatively it may be more broadly defined to include the commodity group of ‘beverage and tobacco’ (SITC 02) plus ‘animal and vegetable oil and fats’ used as food (part of SITC 04).

4 The index is defined as the ratio of the share of exports of a certain commodity in the total exports for one country to the same share measurement for the whole world.

5 Though some empirical tests failed to support the model of comparative advantage in its simplest form, it has been shown that the modified theory of resource endowment is consistent with trade patterns (Tyers and Anderson 1992: 38-9).

6 There is evidence that China’s reported arable land has been underestimated and may be 20-40 per cent larger than reported. However, China would still be a poorly endowed agricultural land nation even if this underestimation is taken into account.

7 The Chinese government still imposes an implicit tax on grain producers by the compulsory purchase of about 50 million tons of grain per annum in recent years from farmers at administrated prices lower than market prices. Attempts have been made several times to abolish this policy discriminating against peasants, but all failed as the result of an interplay of factors including traditional thinking, vested interests and errors in reform tactics.

8 Although the expansion of town and village enterprises has absorbed many rural labourers, seasonal labour surplus is still a widespread problem in China’s rural areas, except in a few economically advanced regions such as Guangdong and South Jiangsu.

9 For example, Teitel (1989:335) noted the domestic demand pattern as one important factor for food exports in Latin America.

10 Though rapid growth and structural adjustments in China’s food consumption have been studied at length, accurate assessment of the changes is likely to be subject to data problems. There are three sets of official data concerning the changes in China’s food consumption. The first is on quantity of annual per capita consumption of major consumer goods including food. It covers foods (including processed food) supplied in the domestic market as well as those produced and consumed by peasants. This data set is useful for our purpose here. However, the release of this data series stopped after 1992. The second is nationwide household survey data which are reported for rural and urban areas respectively. Although conceptually household survey data may be most appropriate in recording actual consumption changes, there are two drawbacks in the urban data. On the one hand, the data set refers to the quantity of per capita food purchased and therefore may not cover various foods some urban residents may receive from working units as welfare in kind. On the other hand, there are serious data inconsistencies. For example, per capita purchases of beef and mutton, poultry, fresh eggs for 1985 are reported in China’s
Statistical Yearbook, 1986 to be 3.0, 3.84 and 8.76 kilograms respectively whereas in the 1995 volume of the Yearbook, the figures are 2.04, 3.24 and 7.08 kilograms respectively. The third data set is on per capita output. There are two difficulties in using output data to reflect actual food consumption. On the one hand, output data need to be adjusted by net export and changes in stock. On the other hand, data collecting criteria for certain food products are inconsistent with food consumption. For example, quantity of output data on meat refer to the weight at slaughter (the live animal weight minus head, hoof, hair and internal organs) rather then net meat used in consumption data collection. The first data set is used in this study to reflect changes of food consumption pattern since 1980.

For example, policy distortion may have had an impact in this context. The agricultural sector as a whole has been heavily protected in many economies. Nevertheless, the degree of protection for food grain may have been larger than other food products. This may in part explain the relatively slow growth of grain import demand.

The estimation uses the Almost Ideal Demand System and the Chinese household survey data in 1991. The estimated income elasticities are also reported for three urban consumer groups in towns, cities and large cities respectively. Significant differences in income elasticities between food grain, meat, and aquatic products also exist for urban consumers albeit with smaller magnitude.

Non-manufacturing exports are defined as total non-oil exports less conventional manufacturing exports defined by the SITC.

This is due to at least three considerations. First, the current income level in most rural areas is still extremely low. The average annual income per capita for rural areas as a whole was about US$188.00 at the official exchange rate in 1995. Even using the adjusted exchanged rate suggested by Garnaut and Ma (1992), the average annual income level was still less than US$600.00. The second factor is the sheer size of the rural population. In 1995 over 73 per cent the 1.2 billion Chinese population lived in rural areas. China simply cannot achieve sustainable development without delivering substantial income growth in rural areas. Third, a worrying problem has emerged in recent years: the income gap between the rural and urban sectors has been widening as a result of relatively slow income growth in rural areas. Against this background, increasing income, along with grain production, have been identified by the Chinese government as the two most important policy objectives for the rural economy (Ministry of Agriculture 1995).

Apart from the desired income effect, food exporting has two additional spread effects. On the one hand, expansion of food exports generates a derived demand for machinery and production process equipment. This in turn produces favourable spread effects on domestic machinery industries. On the other hand, rural areas and urban food processing sectors may benefit from food exports in terms of knowledge spill-over, that is, learning through interaction with foreign buyers and improving quality standards in the face of stringent export competition. Athukorala and Sen (1996) suggest that ‘in terms of “spread effects”, processed food would be superior to conventional manufactured goods, which by their very nature, are highly import dependant’.
The proportion of the land used in grain production was about 73 per cent in 1995. The competitiveness of food exports in China seems to increasingly rely on farm activities as the preliminary evidence discussed here suggests. The capital intensity for food manufacturing activity tends to be increasing relatively faster than other industrial sectors and China may not have strong comparative advantage in the food manufacturing sector. It is therefore particularly important for China to maintain competitiveness for farm activity in producing exported food products by keeping production costs low.

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