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Economic Growth and Trade Dependency in China

by
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1. Introduction

Since 1978, China has experienced the longest and most rapid period of economic growth in its modern history. The average rate of growth of GDP of over 9 per cent per year sustained over the past 18 years has meant that the economy has roughly quadrupled in size. It is now well on the way to becoming the world's largest economy. Meanwhile, consumption levels have risen substantially.[1] The result has been a transformation of the lives of ordinary Chinese citizens. What is more, these gains have been achieved despite periods of political uncertainty and economic fluctuations. There has been no blueprint for reform and growth, and the entire process has been characterised by a gradual and incremental program of experiments that contrasts sharply with the 'big bang' approach used in Russia. The Chinese experience to date, therefore, demonstrates that it is possible to 'grow out of the plan', without the dislocation of sudden and profound changes to the economic and political system.[2]

One of the most profound features of this transformation has been the extent to which China has joined the world economy. The acceleration in growth rates and the restructuring of the domestic economy has been associated with an increasing interaction with the rest of the world.[3] Since 1978 the underlying focus of China's development strategy has moved from import substitution to active engagement in foreign trade as an engine of growth. It has also joined most of the world's leading international financial and trade organisations, though it is still denied membership of the World Trade Organisation (WTO). As a result, its trading position has changed substantially. In 1978, it was ranked thirty-second in world trade.[4] By 1995, its two-way trade was worth US$280.9 billion, and it was eleventh in the list of the world's top trading countries.[5] Over the same period, its share of world trade had risen from 0.8 per cent to 2.9 per cent.[6] At the same time there was a significant change in the structure of its exports. Before the reforms, some 54 per cent of China's exports were typically primary products and imports were strongly biased towards producer goods.[7] By 1995, while imports still had a major producer goods content they included a diverse range of consumer goods, and some 86 per cent of exports were manufactured products.[8]

These changes in the volume and structure of trade were accompanied by equally significant changes in the domestic organisation of foreign trade, the management of foreign currency and the degree of openness to foreign direct investment. While all of these aspects retain features of earlier controls, they have been transformed by China's new openness. Foreign trade management has been decentralised to allow more direct trading links by local administrations and by trading enterprises. The controls over foreign exchange have been steadily reduced, and, by 1994, the planned exchange rate was abandoned in favour of a managed float. In addition, a set of policies ranging from the establishment of special economic zones to tax incentives have been adopted to attract foreign investment. By 1995, therefore, China had become one the major destinations for international investment flows. All of these developments tended to reinforce the changes taking place in China's trade. They meant that trade began to influence the structure of domestic production and consumption, that border prices began to affect domestic choices, and that foreign investment promoted the growth of export manufacturing to make use of China's abundant labour.

As a result, China's experience during the 1980s and 1990s tended to support the argument that openness to trade is a mechanism for achieving more rapid and efficient growth and better distribution of domestic resources.[9] China's increasing participation in the world economy has thus become an important factor promoting both growth and economic restructuring, and the linkage between trade and domestic reform is an essential element in China's economic success and in the effectiveness of gradualism in reform.

The transformation of China's international position has inevitably also increased the level of China's reliance on the rest of the world, as a source of raw materials, as a source of capital and as a market for products. While China has large resources of energy and raw materials, the quality, distribution and structure of those resources does not match the structure of demand, and the amount per capita is low. In particular, the shortage of arable land and the large population means that China has no competitive advantage in agricultural production.[10] Agriculture is declining as a proportion of the economy, and the competing demands for food and for agricultural raw materials places great pressures on supply. Furthermore, the huge size of the Chinese population and the expectations of demand growth as incomes rise mean that there will be rising imports for some raw materials. Though the current level of dependency should not be overstated and there are still many impediments in the way trade is organised and managed, the growth in imports of raw materials and in food has already been substantial.

The net effect of this process is to raise strategic questions about the extent to which China will become dependent on the rest of the world to sustain its current growth trajectory. Given its modern history and the legacy of the plan system's bias towards autarchic growth, it is not surprising to find a continuing sense of suspicion about the motives of the rest of the world and the dangers of becoming too dependent. As Li Peng expressed it at the recent meeting of the National people's Congress (NPC):

> With the ever-intensified international competition, we are faced with pressure from the supremacy of the economies and science and technology of developed countries. In international relations, we face the pressure of hegemonism and power politics. Making a comprehensive survey of the international and domestic situation at the turn of the century, we are faced with a rare historical opportunity and a severe challenge as well.[11]

The continuing rejection of China's bid to enter the WTO, the annual difficulty of the MFN approval by the US Congress, and the trend during 1995 and 1996 to define a 'China threat' as exemplified by the Spratley Islands and Taiwan issues, have given weight to China's strategic concerns. Nevertheless, China's commitment to its policy of interaction with the world economy remains strong.[12]

The following analysis will address these issues by first examining the relationship between growth, structural economic change and trade, and the meaning of 'dependency'. We argue that concerns about resource dependency cannot be separated from those about export market access. We stress this point in the next section. Our main focus, however, is resources and raw materials. Four key examples - grains, fibres, iron and steel, and energy - will be used to illustrate the nature of China's trade and its implications for the world. The conclusion will return to the discussion of the strategic issues involved.

2. Growth, structural change and trade

Trade growth and openness - how open?

Since the reforms, trade has consistently grown faster than output. The average rate of growth of exports between 1978 and 1993 was 14 per cent compared to 9 per cent for real GDP. The effects of the economic reforms on trade growth, it appears, have been an important contributor to overall economic growth.

There is, however, considerable uncertainty over the measurement of China's openness to trade. A common measure of the degree of openness is the ratio of imports plus exports to gross national product. As Lardy has pointed out, in China's case the calculations of the ratio are difficult since the conversion of the domestic data into US dollar terms is problematic.[13] In general, official exchange rates tend to understate the purchasing power of the domestic currency and thus to overstate the degree of openness expressed by the ratio. Using the official data, Lardy shows a ratio of over 26 per cent in 1989 and cites Chinese sources with estimates of up to 33 per cent.[14] According to the official Statistical Yearbook 1995, the ratio of trade to GNP in 1994 had risen to around 45 per cent.[15] This high ratio suggests a strikingly large degree of openness to trade, especially given the huge size of the Chinese economy. Lardy, however, challenges this assessment and cites competing analyses of China's GNP based on purchasing power parity which indicate a substantially lower ratio of around 10 per cent in 1988. Lardy subsequently updated this method to 1990 and finds a trade to GNP ratio in that year of a little over 9 per cent (using an estimate of real per capita income of about $US1100 in 1990).[16]

The Asia Pacific Economics Group has also done similar calculations to produce an estimate of real per capita income in 1994 of $US1543 and an exports to GDP ratio in that year of 6.6 per cent, implying a trade ratio of over 13 per cent.[17] Pomfret concludes his review of the degree of openness of the Chinese economy by arguing that China's rapid trade growth looks like a return to normalcy for a large country.[18]

Structure of trade - specialisation and concentration

This growth in trade has also been accompanied by major changes in the structure of trade. Tables 1 and 2 provide data on the composition of China's trade since the reforms.[19]

Table 1: Composition of Exports

YEAR	AGRICULTURAL INTENSIVE PRODUCTS %	CAPITAL INTENSIVE PRODUCTS %	LABOUR INTENSIVE PRODUCTS %	MINERALS INTENSIVE PRODUCTS %
1980	25.4	15.1	29.1	26.3
1981	24.6	15.9	31.4	27.6
1982	23.0	15.7	32.0	28.8
1983	23.6	15.4	35.1	25.4
1984	22.6	13.7	37.3	25.7
1985	21.7	12.9	35.5	28.8
1986	22.7	16.0	44.3	15.7
1987	19.3	18.3	47.6	13.6
1988	18.2	22.4	46.6	11.8
1989	15.3	25.1	49.4	9.4
1990	12.4	26.8	50.8	9.4
1991	11.8	27.0	53.1	7.7
1992	10.8	27.2	55.4	5.9
1993	9.5	28.9	56.3	4.8
1994	9.8	31.1	53.7	4.9

Source: International Economic Data Bank, ANU

The export table illustrates the dramatic changes in the composition of trade. Since the reforms, there has a large fall in the shares of agriculture and minerals intensive products - in 1980, these two categories accounted for over half of China's exports. By 1994, their share had fallen to 15 per cent. The share of minerals intensive products in exports fell faster than that of agricultural products. In their place were larger volumes of manufactured products, especially labour intensive products. The most important export items are clothing, toys and footwear.

China's exports therefore became highly concentrated within a particular product group, at least in the period up to the mid 1980s. It is interesting, however, that since then the share in exports of products classified as capital intensive has also increased rapidly. This suggests that the transition out of labour intensive products has already begun, and some analyses suggest that this has started much sooner than in other East Asian economies.[20] This could reflect the observation that 'China is not an integrated economy. Rather it is a set of provincial and regional economies with widely differing resource endowments and comparative advantages and separated by high resistances to trade and factor flows'.[21] The change in the aggregate trade pattern may thus be driven by adjustments in some coastal provinces rather than by the national economy as a whole.

Table 2: Composition of Imports

YEAR	AGRICULTURAL INTENSIVE PRODUCTS %	CAPITAL INTENSIVE PRODUCTS %	LABOUR INTENSIVE PRODUCTS %	MINERALS INTENSIVE PRODUCTS %
1980	32.6	51.0	7.8	4.0
1981	35.0	50.2	11.0	2.5
1982	36.1	46.3	11.7	4.8
1983	25.3	57.4	9.5	6.7
1984	17.5	65.7	10.3	5.5
1985	10.8	73.3	9.7	5.1
1986	11.3	71.8	10.3	5.3
1987	15.7	66.9	12.2	3.8
1988	18.3	65.9	10.8	3.5
1989	16.5	63.2	13.1	5.3
1990	16.2	60.7	16.0	5.1
1991	14.7	62.1	15.7	7.5
1992	12.0	64.4	14.4	8.6
1993	8.8	70.1	12.1	7.4
1994	12.3	65.7	13.8	6.4

Source: International Economic Data Bank, ANU

The main changes in the composition of imports have been the fall in the share of agricultural products and the rise in the share of capital intensive products. The latter now account for about two thirds of total imports. The share of resource sector (agriculture and minerals) products in imports has about halved.

In 1980, China was a net importer of agricultural products and capital intensive products. By 1994, it was back to being a net importer of agricultural products (after a period of net exports, a consequence of the productivity growth associated with the rural reforms), was still a net importer of capital intensive products and had become a net importer of minerals intensive products.[22]

The growth of the economy and the expansion of trade has both stimulated and reflected the long-term structural changes taking place in the economy.[23] One of the most fundamental of these has been the relative decline of agriculture. During the planned economy period, the emphasis on heavy industry had led to a decline in agriculture's share of national production and a bias towards the heavy industry share. Nevertheless, the separation between the urban and rural economies and the emphasis on self-sufficiency meant that a large proportion of the labour force continued to work in agriculture. In addition, primary products, although dropping from nearly 80 per cent of exports in 1953, were still over 50 per cent in the mid 1970s,[24] and agriculture accounted for nearly half of commodity exports up until the mid 1970s.[25] The reforms have tended to accelerate this process of change and to move it in different directions. The growth of labour-intensive manufactures has absorbed labour from agriculture and promoted the role of manufactures in exports. The role of agriculture in the national economy has continued to decline, and the emergence of township and village enterprises meant that by 1995, even in the rural sector, agriculture was only about 25 per cent of rural output value. In addition, as discussed above, the sectoral share of agricultural products in exports also fell substantially as the exports of mining and manufacturing rose. These structural changes have had important implications for the sectoral composition of both China's exports and imports.

Another significant aspect of this growth pattern has been the rise in incomes and the changes in the structure of demand. Before the reforms, incomes were controlled by the plan system. Wages were low, and housing, welfare and pensions were provided by the unit of employment. In the countryside, peasant incomes were constrained by the collective work point system and grew very slowly. There was thus substantial inequality between urban and rural areas.[26] The growth of incomes in the reform period and the emphasis on the market has been part of the stimulus for the rise of manufacturing and services. The income growth has implications for the pattern of resource

consumption, for example, in the energy sector. It has also changed the pattern of food demand, with implications for food trade which we discuss below.

Trade Policy - still work to be done

Zhang Xiaoguang's assessment of these changes in trade structure is that China has moved much closer to its comparative advantage.[27] The reform has therefore led to a better allocation of resources. Zhang argues, however, that the pattern of export trade has shown a much greater change than the pattern of import trade. He considers that this may be because exporting firms have had relatively greater management autonomy and because foreign investors have played an important role in exports. Ultimately, therefore, Zhang also argues that the influence of trade on the patterns of domestic production has been 'limited', despite the fact that trade has grown faster than output. This is because there remain important barriers to imports, and China continues to protect domestic industries and raw material producers with substantial import tariffs, quotas and licences. In the early 1990s, China's tariff rates were relatively high among APEC members at 37.5 per cent: only Thailand had a similar average rate with most other APEC members having average tariff rates less than 20 per cent. The frequency with which China used non-tariff barriers on merchandise trade was also relatively high in that period.[28] These reported tariff rates may, however, overstate the effective rates because of the extent of tariff exemptions. Furthermore, the lack of consistency and transparency in the administration of trade policy is sometimes argued to be more important than the border barriers.[29]

Nevertheless, the adoption of the first Foreign Trade Law in July 1994[30] and the announcement by Jiang Zemin at the Osaka APEC meeting in November 1995 that China would reduce tariffs on a wide range of commodities[31] are indications of the interest in achieving a greater degree of openness. A fall in the tariff rates will also reduce the range of uncertainty associated with the administration of trade policy.

Direction of trade - the importance of the world to China

The reform period is associated with changes in the direction of China's trade, particularly beyond the East Asia region. About a third of China's exports go to Hong Kong and Taiwan. Other important export markets are the NAFTA economies, then the EU followed by Japan (these economies are also the major sources of imports). Apart from the other Chinese economies (among which Hong Kong is playing an entrepot role), the major export markets for China are outside the East Asian region. One important change since 1980 has been the decrease in the importance of Japan as an export market and the increase in the importance of the NAFTA economies. APEC members account for 80 per cent of China's exports (compared to less than 60 per cent in 1980).

Foreign investment - China's experience unprecedented

Within this growth of trade, an important feature has been the role of foreign invested enterprises. From 1993, China became the second largest recipient of foreign direct investment in the world. It is the single largest developing country host. The stock of foreign investment rose from less that $US1 billion in 1979 to nearly $US96 billion in 1994.[32]

Lardy cites evidence to show that by 1994, foreign funded enterprises accounted for nearly 30 per cent of China's export value.[33] Moreover, most of these exports consisted of products assembled from imported parts and components, and made up nearly half of the value of manufactured goods exports. This clearly shows that the role of foreign investment in changing the structure of China's imports and exports has been very significant. It also underlines the extent to which imports of raw materials and parts contribute to the growth of exports. The significance of this foreign invested

sector means that there may be more gains in efficiency to be made as domestic manufacturing comes to play a bigger role in trade.

The importance of this issue was recognised by Zhao Ziyang's coastal strategy put forward in 1988, which aimed to ease controls over the imports of raw materials used for export processing in the coastal regions.[34] The goal was to ease the constraints on export industries caused by the then controls on foreign exchange and domestic raw materials supplies. As Lardy points out, the policy was never fully developed.[35]

Dependency or interdependency?

In economic terms, there are two main forces for a protectionist trade policy in China: one is the motivation for protecting particular sectors of the economy from import competition, and the other is a concern about reliance on world markets. The second motivation is our focus in this paper. It arises, firstly, from the perception within China of the size of the Chinese economy in world markets and the impacts of China's decisions on world prices. There is the possibility that, in the case of a large country, rapid trade growth will shift the terms of trade against it (by lowering its export prices and raising its import prices). The large country, especially one which is recipient of a large capital inflow which also drives export growth, could then lose from the terms of trade changes (although still gain overall from the growth in trade).

There is a question, however, of whether these price changes will be sustained in the long term. There may be a short run price response, but that is expected to lead to longer-run adjustments, through such things as the disappearance from world markets of competing exporters or the emergence of new sources of supply of imports. Part of the concern about 'dependency' is therefore the fear that these longer run adjustments may not occur. As we illustrate in the discussion below of particular sectoral issues, there is not a lot of evidence to support this perception of how world markets work. The other part of the concern about dependency is that even if there are long run adjustments to changes in relative prices, there will still be some adjustment required within China, or at least there will be some uncertainty about the extent and timing of the long run responses. Both involve costs from the Chinese perspective. It is to avoid those costs that Chinese policy makers may prefer to limit the degree of openness of the Chinese economy.

The perception of those costs depends, however, on the responsiveness of the rest of the world to China's trade reform and growth. The key issue in that case is one of 'interdependency' and not 'dependency'. China's choices are not independent of those taken in the rest of the world. According to this argument, rather than concerns about terms of trade changes or reliance on particular sources of supply of raw materials, the response of the rest of the world is the more important dilemma facing a 'big' country. Seen from this perspective the economic choices are thus also open to strategic considerations of the political pressures that can be brought to bear by outside forces, should dependency become too great. Nevertheless, this is also a two-sided issue. Fluctuations and instability in China's trading behaviour can have powerful negative effects on trading partners, especially those who have a big stake in trade with China.[36]

The management of domestic policy and trade policy are thus affected by perceptions of the problems of dependency. We note examples below in the section on sectoral issues where Chinese policy has exaggerated the degree of instability in world markets or has shifted China's trade position away from its comparative advantage and created a situation of a crisis in the supply of raw materials. The other force for a protectionist policy are those domestic interests associated with sectors of the economy which would shrink in a more open economy. One argument that might be used by such groups to promote a more protectionist or self-reliant strategy is that based on the dependency issue. We note examples below, particularly with reference to discussion of grain sector trade policy.

Shares in world trade

Table 3 shows China's shares in world imports by product group. China's shares in total world imports are less than 3 per cent. Its share in world imports of minerals intensive products are about half that. These small numbers on import shares seem unlikely to be the basis of serious concerns about dependency in the way that term was defined above. However these aggregate data may hide significant issues for particular products which we examine in more detail below.

Table 3: Shares in world imports

YEAR	AGRICULTURAL INTENSIVE PRODUCTS %	CAPITAL INTENSIVE PRODUCTS %	LABOUR INTENSIVE PRODUCTS %	MINERALS INTENSIVE PRODUCTS %	TOTAL %
1980	1.8	1.1	0.8	0.1	0.9
1981	1.8	1.0	1.1	0.1	0.8
1982	1.9	0.8	1.0	0.1	0.8
1983	1.5	1.2	0.9	0.2	0.9
1984	1.3	1.7	1.3	0.3	1.2
1985	1.3	2.8	1.8	0.4	1.9
1986	1.2	2.1	1.4	0.5	1.6
1987	1.6	1.8	1.5	0.4	1.5
1988	2.1	2.0	1.6	0.4	1.7
1989	1.8	1.8	1.7	0.5	1.6
1990	1.6	1.5	1.7	0.4	1.3
1991	1.8	1.8	2.0	0.8	1.7
1992	1.8	2.3	2.2	1.3	2.0
1993	1.8	3.4	2.5	1.5	2.8
1994	2.5	3.1	2.9	1.4	2.7

Source: International Economic Data Bank, ANU

The more important issue, on the face of it, lies on the export side. Table 4 shows China's share of world exports in the same product groups. China's share of world exports of labour intensive products has risen from 3 per cent to 18 per cent. Lardy notes however that despite the rising shares of China in some export markets, the prices it received for its exports actually rose between 1980 and 1992.[37]

Pomfret[38] points out that a combination of rapid export growth and the absence of falling prices received for exports could be due to a high elasticity of demand for China's exports, a shift in the demand for exports of those types or the upgrading of exports which kept Chinese products competitive. Pomfret argues that the main contributor, given the composition of China's exports, has been the first of these. He goes on to note that the growth in exports occurred despite the application of tariff and non-tariff barriers to China's exports, such as the Multi-Fibre Arrangement. He concludes that 'there is little evidence from the past that the aggregate growth in the value of China's manufactured exports has been substantially impeded by protectionism'.[39] Another point is that China's emergence into world markets was also facilitated by adjustment by other suppliers to its export markets, particularly the NIEs and Japan. Their exit from the market was related to China's entry.

Table 4: China's shares in world exports year

YEAR	AGRICULTURAL INTENSIVE PRODUCTS %	CAPITAL INTENSIVE PRODUCTS %	LABOUR INTENSIVE PRODUCTS %	MINERALS INTENSIVE PRODUCTS %	TOTAL %
1980	1.5	0.3	3.0	0.8	0.9
1981	1.7	0.4	3.7	1.0	1.1
1982	1.8	0.4	3.8	1.2	1.2
1983	1.9	0.4	4.2	1.2	1.2
1984	2.0	0.4	4.9	1.4	1.4
1985	2.3	0.4	5.2	1.9	1.6
1986	2.5	0.5	6.1	1.6	1.6
1987	2.4	0.6	7.0	1.6	1.8
1988	2.6	0.8	8.1	1.8	2.1
1989	2.6	1.1	9.7	1.5	2.4
1990	2.4	1.2	10.3	1.6	2.6
1991	2.8	1.5	12.8	1.7	3.2
1992	2.9	1.7	14.5	1.6	3.6
1993	3.0	2.1	17.1	1.5	4.2
1994	3.4	2.4	17.9	1.8	4.5

Source: International Economic Data Bank, ANU

There is however the question of what might have been. Could China's labour intensive exports have been even greater? China, for example, may then have taken longer to switch to capital intensive products. Assessments of the MFA indicate that China will gain substantially, and that its export growth could have been even greater, if the MFA had been removed.[40] The strong growth of exports in spite of the current restrictions, therefore, should not be taken to imply that the restrictions are not significant. Furthermore, those restrictions may also feed into the Chinese perception of the lack of benefit from relying on the world market and therefore limit the extent to which production in the economy shifts towards China's comparative advantage.

3. Sectoral issues

With this background on the patterns of development in China's trade and openness we now turn to a series of sectoral issues.

3. 1 Grains[41]

The low level of arable land per capita is the source of China's lack of competitive advantage in agricultural products. It has led to substantial concern within China over food and raw material supplies. The pressure of population on land also presents important environmental challenges.[42] While the official figure of around 100 million hectares for the total amount of arable land is probably an underestimate by as much as 40 per cent,[43] the potential to increase farming land is limited. Furthermore, since the mid 1980s there has been a substantial loss of land to urban development and to non-agricultural production, and this accelerated during the real estate boom of 1992-94.[44] The issue of the need to preserve arable land has thus become a major concern for the government, and in recent years major efforts have been made to ensure a minimum grain sown area.[45] The under-reporting of arable land area does mean that actual yields are likely to be lower than official calculations, and that there is some potential to continue to increase output. The realisation of that potential, however, requires further technological investment, and it conflicts with the economic incentives to shift resources out of agriculture towards other sectors.

When this basic situation is related to rapid economic growth which raises incomes and demand, the pressures facing agricultural resources are intensified. During the 1980s, China began to import substantial amounts of grains, fibres, sugar, timber and other agricultural raw materials. Official

intervention in domestic production to try to maintain high levels of self-sufficiency was also associated with subsidies to producers and substantial opportunity costs for the resources used. By the mid-1990s, there was growing evidence that some domestic prices for grain were already above world market levels.[46] and border prices began to represent a measure of the costs of self-sufficiency policies. The pressure of demand thus presented significant challenges for the supply of agricultural raw materials.

Since 1949, grain self-sufficiency and stable grain supplies at low prices have been among the primary goals of China's agricultural policies. This strategic perspective was embedded in the relatively rigid grain planning system, with the use of sown acreage and production quotas, purchase and sales quotas, rationing and price controls. Though full self-sufficiency was never realised and from the 1960s onwards China consistently imported food grains, the aim of imports was to balance grain variety supplies and to overcome difficulties in regional distribution. There was also a trade-off between the costs of wheat imports and the returns from rice exports.

The deep-seated commitment to self-sufficiency and fears of food instability led to considerable caution on the part of government in its management of change in the grain sector after 1978. As a result, grain has been among the last of the agricultural commodities to be considered for full liberalisation. This wariness was most clearly demonstrated by the stalling of grain system reforms in the mid-1980s. It was not until the economic growth and structural changes of the 1980s had become consolidated that grain market reform began to move ahead again after 1992, and even then the fluctuations in market supplies and the rise in prices have led to a further phase of uncertainty.

During the 1980s, there was an increase in the role and volume of grain trade, although the trading position remained deeply influenced by the self-sufficiency goal. In many years China was a net exporter, but it is necessary to disaggregate the trade by different grains in order to get a full picture of developments. During the 1980s, China was a consistent wheat importer and, apart from 1989, a consistent rice exporter. The two-way trade in rice reflected the differences in the quality of domestic production and of imports, and also regional differences in availability. The growth in imports of Thai rice, for example, was in response to a consumer shift towards better quality. Maize shifted to a net export position from 1984, and soybean from a couple of years earlier.

Table 5 China's role in the world wheat trade

Year	World Wheat Prod'n (Mt)	Wheat prod'n in China (Mt)	World trade in wheat (Mt)	China's wheat imports (Mt)	Apparent wheat consumption in China (Mt)	China's share of world wheat trade %	China's imports as a share of world output %	The ratio of imports to wheat cons'n in China %
1987-88	505	85.8	107	15.4	101.2	14.4	3.7	15.2
1988-89	500	85.4	98	15.9	101.3	16.2	3.8	15.7
1989-90	537	90.8	95	12.9	103.7	13.6	2.9	12.4
1990-91	592	98.2	92	9.4	107.6	10.2	1.9	8.7
1991-92	543	96	108	15.9	111.9	14.7	3.6	14.2
1992-93	561	100.5	105	6.7	107.2	6.4	1.5	6.3
1993-94	558	106.4	93	4.5	110.9	4.8	1.0	4.1
1994-95	527	102	95	10.2	112.2	10.7	2.4	9.1

Source: Australian Bureau of Agricultural and Resource Economics, *Australian Commodity Statistics 1995* (Canberra: ABARE, 1995)

Details of China's position in the world wheat trade are reported in Table 5. The import share of consumption has fluctuated since the late 1980s from a high of nearly 16 per cent to low of just over 4 per cent. Some of the origins in output and trade are discussed below. This discussion illustrates the important impacts on China's trade of shifts in domestic policy. China's share of world wheat

trade has moved in a similar pattern. Its share of world output (net of its own production) has however never exceeded 4 per cent in this period.

Table 6 China's role in the world rice trade

Year	World rice prod'n (Mt)	Rice prod'n in China (Mt)	World trade in rice (Mt)	China's rice imports (Mt)	China's rice exports (Mt)	Apparent rice cons'n in China (Mt)	China's (net import) share of world rice trade %	China's (net) imports as a share of world output %	The ratio of imports to rice cons'n in China %
1988-89	330	126.8	12	0.06	0.33	126.555	-2.3	-0.1	-0.2
1989-90	343	135.1	12	0.07	0.69	134.455	-5.2	-0.3	-0.5
1990-91	351	142.0	15	0.09	0.93	141.135	-5.6	-0.4	-0.6
1991-92	349	137.9	16	0.11	1.37	136.59	-7.9	-0.6	-0.9
1992-93	352	139.7	16	0.7	1.52	138.83	-5.1	-0.4	-0.6
1993-94	353	133.3	20	2	0.1	135.175	9.5	0.9	1.4
1994-95	360	131.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

All data in milled terms.

Source: Australian Bureau of Agricultural and Resource Economics, *Australian Commodity Statistics 1995* (Canberra: ABARE, 1995)

Table 6 reports China's role in the world rice trade. The rice market is relatively 'thin', with only a small trade volume relative to output. China's position has, however, swung from net exports to net imports in the final year of the table, when it also accounted for a large share of world trade. Nevertheless, the importance of its trade in world output (net of its own output) is insignificant, and the role of imports in domestic consumption is also very small.

After the grain market crisis of late 1993, the Chinese government acted to reduce the level of maize and rice exports. It was reported by the China Newsagency on 1 December 1994 that China would immediately cease all rice and maize exports as a means of stabilising domestic prices. [47] Recent trends therefore indicate that the constraints on trade remain important and that trade policy is still subject to the key domestic goals of stability and maximising self-sufficiency.

A number of policy factors shaped these developments in the grain trade. In the early 1980s, the growth in food grain imports was influenced by the deliberate policy of reducing the quota burdens on the peasants. As domestic production grew under the stimulus of the rural reform policies, however, the need for imports declined, and the large harvest of 1984 was taken as a sign that China's long-term shortage in grain supplies had eased. As a result the unified purchase and sales system was abandoned. The impact of this reform and the subsequent changes in marketing and pricing, however, soon undermined this optimistic picture.[48] The shift of resources to non-agricultural production and the diversification of production within agriculture led to a stagnation and fluctuation in grain output. The situation thus reflected the underlying resource endowment and economic relationships. The returns to investment in agriculture were limited, and the opportunity costs of the resources used were high. Market forces were encouraging a shift to other types of production. Imports began to rise, and the political pressures to sustain a high degree of self-sufficiency once again came to the fore.

During the late 1980s and early 1990s, the Chinese government therefore adopted a series of policies to restore controls in domestic grain production. These included enforcing contract quotas more rigidly and providing producers with incentives to produce and sell to the state. The greater stability in domestic production that ensued was associated with a high cost of food subsidies in the state budget. The period also saw growing exports of maize and rice. These exports reflected the lack of infrastructure to transport grain between regions in China and the changes in the international market

used by the US pressures to open up the Japanese grain market to imports. Maize and rice exports from northeast China thus became very attractive to the regional governments.

Against this background of a more relaxed supply situation and renewed growth in total output, a second round of major reform to the grain system was attempted after 1992. The remaining levels of state intervention in grain marketing were reduced, and the system was opened to the free market. The ensuing market crisis of late 1993 cut this experiment short. A decline in rice output set off panic buying in major cities and the markets were not able to respond.[49] Although the underlying target of market reform remained in place, the government was forced to reintroduce a series of measures to stabilise production and market supplies. In addition, as noted above, an end to rice and maize exports was declared.

This cycle has led some observers to speculate that China is beginning to follow the path of agricultural development experienced in other Asian economies as growth occurs, and it may be on the brink of shifting from taxing agriculture in order to promote industrial growth towards protecting agriculture through trade controls and subsidies.[50]

The other major development during the 1980s was the increase in domestic grain consumption and the changes in its composition. After many years of grain rationing, the growth in production during the 1980s led to a rise in consumption levels. By the mid 1980s, per capita grain availability was in the region of 400 kg. At the same time, the growth in urban incomes during the 1980s and the changes in the structure of food consumption meant that grain and oil costs had declined to be a smaller proportion of consumer budgets, falling from 24.25 per cent of urban living expenses in 1964 to 8.36 per cent in 1989.[51] Consumers began to shift from grains towards better quality foods and greater variety. Direct consumption of grain fell from 135 kg per head in 1985 to 112 kg in 1992, and the consumption of pork, other meat and fish, and eggs rose. This growth in the indirect demands for grain had major implications for the mix of grains required, and there was a growing emphasis on the role of feed grains.

Against this background, many observers in China and outside argue that it will not be possible for China to maintain full grain self-sufficiency. It is assumed that the combination of the lack of arable land, the growth in population, increases in demand as income grows and changes in the composition of demand will lead to a greater level of dependency on imports.[52] There is thus a variety of scenarios for China's international trade in grain over the next couple of decades. A sample of the assessments are summarised in Table 7.

The outlooks differ significantly. Some project rapid growth in consumption, for example, Garnaut and Ma, as well as the OECF study. Others are pessimistic about the outlook for production growth: 500 mt is the upper limit in all the projections for the year 2000. Brown forecasts a dramatic decline in output, mainly ascribed to the loss of arable land associated with salinisation and erosion. Projections differ in the outlook for output beyond the year 2000. Some are optimistic about production growth relative to consumption growth, and others are more pessimistic. The differences in these scenarios are reflected in their ratios of imports to consumption. These range from less than 3 per cent for Mei by 2020 to over 20 per cent for the OECF (at 2010) and around 50 per cent in 2030 in the case of Brown. All of them, however, anticipate some level of dependency on imports.

An important issue in this discussion is the mix of grain imports required. In the early 1990s, the bulk of China's grain imports were wheat. But the studies reviewed above suggest a change in the import mix towards feed grain. This switch is associated with the growth in demand for meat, egg and aquatic products. Once again, however, there are large variations in the projections for import mix. The OECF study suggests that the bulk of the import grain will be feed grain at the end of the

projection period. China will maintain its self sufficiency in rice, remain a net importer of wheat (but the import volume is projected to remain roughly the same at about 15 mt) while maize imports boom. The IFPRI study notes that the rise in meat and other product consumption will raise the share of feed grain in total consumption from 20 per cent in 1991 to nearly 40 per cent in 2020. In their projections, feed grain demand rises from 76 mt in 1991 to 108 mt in the year 2000 and 232 mt in 2020. However the study also reports that by 2020 'wheat will still account for most imports'.

Garnaut and Ma discuss the likely change in the mix of grain demand in China in detail. In their high growth scenario, the share of feed grain in total grain consumption rises from 25 per cent in 1990 to 33 per cent in the year 2000 (30 per cent in the lower growth scenario: see their Table 42, p. 98). They note that the mix of grain output is highly sensitive to shifts in relative prices. They expect, however, that the growth in imports will be concentrated in feed grains and to a lesser extent in wheat and barley.

The overall balance of most studies of this kind suggest that China will continue to be dependent on grain imports into the next century. It also seems likely that while a certain level of wheat imports will be maintained, there is a strong potential for feed grain imports to grow. The environmental and resource limits on the growth of domestic agricultural production combined with the growth in domestic demand as incomes rise suggest that such an outcome is very likely. To some extent the eventual level may be influenced by the extent to which the shift towards indirect consumption continues. What is more, as one observer not noted for his excessive optimism towards China's agricultural production argues, there is still capacity within China to make up for some of the demand growth provided better management, pricing, technology and environmental management can be developed.[53]

Table 7: Projections of China's grain trade

Source	Date of Publn. & Period of projection	Consumption at end point (B)	Production at end point	Net imports at end point (A)	A/B (%)
Garnaut and Ma	*1992/*				
	1990- 2000	Normal growth (6% pa income growth:	Upper limit of 500mt	Normal growth (6% pa income growth:	
					9.1
		547.2mt in 2000		50mt in 2000	
		High growth (7.2% pa income growth):		High growth (7.2% pa income growth):	
					15.2
		593mt in 2000		90mt in 2000	
Brown	*1994/*				
	1990-2030	No rise in consumption pc:	272mt in 2030	No rise in consumption pc:	
					43.0
		479mt in 2030		207mt in 2030	
		Rise in consumption pc and rise in population:		Rise in consumption pc and rise in population:	
		641mt in 2030		369mt in 2030	58.0
Huang, Rozelle and Rosegrant (IFPRI)	*1995/*				8.8
	Early 1990s to 2000, 2010 and 2020	450mt in 2000	410mt in 2000	40 mt in 2000,	
		600mt in 2020	550 mt in 2020	50 mt in 2020	8.3
OECF	*1995/*				
	1993 to 2000, 2005 and 2010	508mt in 2000	484mt in 2000	24mt in 2000,	4.7
		571mt in 2005	502mt in 2005	69 mt in 2005	12.1
		645mt in 2010	509mt in 2010	136mt in 2010	21.0
Mei	*1995/*				
	1993 to 2000, 2010 and 2020	511mt in 2000	500mt in 2000	11mt in 2000	2.2
		593mt in 2010	578mt in 2010	15mt in 2010	2.5
		695mt in 2020	675mt in 2020	20mt in 2020	2.9

Sources:
Ross Garnaut and Ma Guonan, *Grain in China*, (Canberra: East Asian Analytical Unit, Department of Foreign Affairs and Trade, 1992).

Lester R. Brown, 'Who will feed China?', *World Watch*, September-October 1994, pp. 10-18.

Jikun Huang, Scott Rozelle and Mark Rosegrant, 'China's Food Economy to the 21st Century', paper presented to a seminar at the Chinese Economy Research Unit, University of Adelaide, January 1996. [summarised in Huang, Rozelle and Rosegrant, 'China and the Global Food Situation', IFPRI 2020 Brief 20, May 1995].

The Overseas Economic Cooperation Fund Japan (OECF), 'Prospects for Grain Supply-Demand Balance and Agricultural Development Policy in China', Press Release, September 25 1995, Beijing.

Mei Fangquan, 'Sustainable food production and food security in China', paper presented to the FAO 1995 World Food Day Symposium, 16 October 1995, Bangkok.

In theory, increases in imports should be paid for by the expansion of exports of labour-intensive manufactures, which is where China's competitive advantage lies. Such an outcome, however, involves assumptions about China's strategic choices. The priority under the plan system was grain self-sufficiency and food security. The cautious path taken in the reform of the grain marketing system underlines that this is still central to policy concerns. While greater trade in food and raw materials has become a feature of the reform period, the debate in China is about the degree of dependency on imports, and there is a profound concern that there should be limits. Given the size of

the population, China's government can be expected to be very sensitive to any dangers of such a situation arising and to the strategic implications of greater dependency on the rest of the world for its food. A higher level of self-sufficiency implies directing domestic resources towards grain production that might, if allocated by market forces, have been used more efficiently elsewhere. The opportunity cost is the lost output of other goods, the higher prices paid for domestic output, and a slower overall rate of economic growth. Despite these costs, however, such policies would presumably be adopted well short of the prospect of international food dependency predicted by Lester Brown.

From the point of view of the rest of the world, the potential size of China in the international grain market means that a large growth in demand from China or major fluctuations in China's trade would be difficult to manage. It is therefore in the interests the world's grain producers to look for ways of lessening China's strategic concerns so that a stable relationship can grow and the effects of fluctuations in domestic production during the transition to a market system are not perceived within China as a threat to national security.

3.2 Fibres

The constraints facing natural fibre production in China, primarily wool and cotton, are in many ways tighter than those facing food grains.[54] Apart from the competing claims of fibre and grains for agricultural land use, the steady rise in incomes can be expected to have a significant impact on demand. Citing comparative evidence from Taiwan and Korea, Anderson predicts a continued growth in per capita consumption of cotton and wool as incomes rise, despite an equally rapid growth in the use of synthetic fibres.[55] The question then is whether the agricultural system can respond to the potential demand for these fibres.

In the case of cotton, there is competition with grains for land use. This was amply shown in the early stages of the reform period when the favourable price ratio between grain and cotton led to a rapid expansion of cotton production. In areas of northwest Shandong, which have a natural advantage in cotton production, cotton output rose substantially and concerns grew about the threat to wheat output.[56] Lardy also points out that the emphasis on grain self-sufficiency in north China had undermined cotton output and caused substantial poverty in areas with a comparative advantage in its production.[57] The recovery in cotton output in the early years of the reform reflected the price advantage given to cotton by the price reforms and the growing freedom for producers to specialise in crops in which they had an advantage. The subsequent decline and fluctuation in output after 1984 was caused by the drop in relative prices and continued government intervention in the market. Given the strong demand for cotton fibres by consumers and exporters, there may be potential for renewed growth in domestic production through technical improvements to raise yields. Ultimately, however, there is a trade-off between grain self-sufficiency and cotton supply and the evidence of the past forty years suggests that the grain need is always likely to be given priority.

In the case of wool, the development of production since 1978 indicates that a number of constraints are operating.[58] Wool production takes place in two distinct farming systems: the pastoral system of the north and northwest and the agricultural system of the north. In the former, which produces most wool and the best quality, production is managed by national minorities in strategic border areas. The substantial growth in output since 1949 has been based on improvements in breeds and increased stocking rates. It is now broadly recognised that overstocking is threatening the environment and limiting the potential for further growth in these areas. Lin Xiangjin has shown that during the 1980s wool production in the pastoral areas has become relatively stable and that it is price inelastic. The fact that it does not respond to price changes indicates both that the capacity to grow is limited and that there is limited opportunity to divert resources to other activities.[59] In the agricultural regions, wool production can be increased using crop residues to raise sheep. Much of the growth in wool

production in more recent years has taken place in these areas. The constraints on that growth, however, include the difficulty of maintaining sheep quality and wool management quality across large numbers of small flocks, the problems of providing technical inputs, and the sensitivity of small, part-time producers to the relative prices between meat and wool and between sheep product prices and other animal product prices.

Against that background, the capacity of domestic production to respond to the predicted doubling of cotton and wool fibre demand by the end of the century is very limited. Anderson notes that should such a doubling occur, it would amount to a 'doubling in world trade for cotton and a one third increase in the world trade in wool over the mid-1980s'.[60] The challenges facing the world market caused by such a demand are thus substantial.

Table 8: China's role in the world cotton trade

Year	China's raw cotton production (kt)	China's raw cotton exports (kt)	China's raw cotton imports (kt)	China's net imports of raw cotton (kt)	China's apparent domestic raw cotton cons'n	Ratio of net imports to cons'n %	World imports of raw cotton (kt)	Share of world trade %
1987-88	4246	506	19	-487	3759	-13.0	6648	-7.3
1988-89	4159	356	315	-41	4118	-1.0	7326	-0.6
1989-90	3788	188	408	220	4008	5.5	7123	3.1
1990-91	4507	202	480	278	4785	5.8	6675	4.2
1991-92	5683	131	355	224	5907	3.8	6370	3.5
1992-93	4507	149	53	-96	4411	-2.2	5884	-1.6
1993-94	3744	163	176	13	3757	0.3	6145	0.2
1994-95	4333	40	874	834	5167	16.1	6667	12.5

Source: Australian Bureau of Agricultural and Resource Economics, *Australian Commodity Statistics 1995* (Canberra: ABARE, 1995)

China's cotton trade has shown remarkable variation since the late 1980s, both in terms of its importance in domestic consumption and its importance in world trade. These variations reflect the shifts in domestic marketing arrangements for both cotton and its substitutes in production.[61] Table 8 ends at a peak where China's cotton imports had risen to over 12 per cent of world trade, but, as stocks accumulate, these are expected to decline in the following year. Reinforcing this decline will be the effects of the rise in prices paid to cotton producers on domestic output and on the willingness of farmers to sell to the state systems. China is expected to become a consistent net importer of cotton over the rest of this decade. Its share of world trade will, however, remain relatively low, and other economies, in ASEAN for example, could be just as important in world import markets.

Because of its size (China accounts for about a quarter of world cotton output), relatively small variations in output in China lead to large variations in trade. The relationship between domestic reforms, and the cycles in the reform program, that lead to swings in China's trade position have a more significant impact on world markets than would a consistent series of purchases by such a large consumer. These events are another example of how changes in domestic policy can have a destabilising effect on world markets. It is those sources of instability rather than the presence of a large buyer which causes problems for both China and its suppliers.

In the case of wool, imports have passed through a cycle which has been shaped by policy developments during the 1980s.[62] In the early 1980s, domestic output declined as a result of continuing price controls at a time when processing capacity was expanding and meat prices were deregulated. Imports were needed to make up the deficit. As domestic production recovered in response to price increases and a push to break the plan controls, competition broke out for wool supplies. This led to a 'wool war', an intense struggle by local governments and processors for wool supplies. This wool war flowed into the world market, leading to a jump in China's imports, and

world prices reached record levels. The crash in the wool industry caused by the austerity period after 1988 led to a sharp drop in demand and a fall in domestic prices. China withdrew from the world market, with a consequential collapse of the Australian wool reserve scheme. Since 1991 and the return to rapid growth in China, the underlying demand growth has picked up again, and imports have been back at previous high levels.

The wool trading story is, however, influenced by the fact that a significant proportion of domestic producers are national minorities in sensitive areas. By the mid-1990s, therefore, China was attempting to protect these producers by the use of tariffs, quotas and licences, with consequent uncertainties for the world market. The world trading position is thus made more complex by domestic political considerations.[63]

Table 9 reports one projection for wool trade in the year 2000. This projection was prepared by officials from the Ministry of Textiles. They argue that there is scope to increase domestic wool output, which will lead to a slowdown in import growth. The official outlook is for wool product exports to continue to account for about a quarter of total wool consumption and for wool imports to account for about two thirds of total wool consumption. Total exports of raw wool by the major exporters have been about 1.3 to 1.4 million tonnes for the last three years. So according to this outlook China will remain a substantial market, accounting for around a quarter of the world trade in wool.

Table 9: Wool Production, Consumption, Import and Export of China

Year	Domestic wool output (million tons)	Domestic wool consumption (million tons)	Wool products exports (million tons)	Per capita wool consumption (kg/per head)	Wool imports (million tons)
1990	0.091	0.089	0.031	0.08	0.056
1991	0.091	0.212	0.042	0.18	0.157
1992	0.091	0.226	0.083	0.19	0.207
1993	0.091	0.226	0.083	0.19	0.237
1994	0.097	0.287	0.111	0.23	0.313
2000	0.15	0.32	0.12	0.25	0.29

Source: Song Zhongsan and Wang Xiaobin, 'The current situation of and trends in China's wool production and international trade', *Economy and Information*, No. 12, 1995, pp. 31-32.

Notes: (1) Domestic wool output = raw wool output ¥ 0.38.
(2) Domestic consumption includes some commercial wool stocks.
(3) Wool imports include import of wool top.

We noted above that textiles have become a very significant aspect of China's export performance. Their growth symbolises China's comparative advantage in labour-intensive manufactures. It also underlines how China's participation in this trade has encouraged a restructuring of manufacturing and trade in the east Asian region. Textile production in Japan, Hong Kong, Taiwan and South Korea has tended to decline or move into specialised areas in the face of the challenge from China. What is more, China has sustained this high growth of exports despite difficulties associated with quotas and barriers to trade such as the Multi-Fibre Arrangement. Ultimately, therefore, China's ability to sustain its level of imports and trade depends in part on its capacity to export textile products. This, in turn, implies a continued reliance on imports of raw materials to provide the fibres to meet both domestic demand and imports. To some extent, China may try to segregate these two sectors by insisting that imported fibres are re-exported and by using domestic product for domestic consumption. The experience of wool, however, indicates that it is not feasible to do this when requirements for fibre length and quality are taken into account. The lack of comparative advantage in domestic production also, as in the case of grain, creates substantial opportunity costs.

The conclusion to be drawn from this analysis, therefore, is that there is a significant level of interdependence between China and the rest of the world in this sector. Raw material producers need to anticipate China's potential growth in demand in order to keep the world market stable. At the same time, they share an interest with China in keeping world markets open to Chinese textile exports. From the Chinese perspective such imports are needed both for re-exporting finished products and for meeting domestic demand. It is therefore likely that China will continue to depend on fibre imports to enable the growth and structural changes occurring in its economy to be maintained.

3.3 Iron and steel

Table 10: China's role in world iron ore trade

	World iron ore prod'n (Mt)	World trade in iron ore (Mt)	China's iron ore prod'n (Mt)	China's iron ore imports (Mt)	China's share in world trade %	Apparent cons'n in China (Mt)	Import share of cons'n %	China's trade as a share of world production (a) %
1987	945.5	367.8	152.5	12.3	3.30	85	14.50	1.6
1988	964.4	400.9	154.4	10.4	2.60	84	12.40	1.3
1989	991	424.3	162.2	12.6	3.00	90	14.00	1.5
1990	980.6	397.3	169.4	14.3	3.60	95.1	15.00	1.8
1991	952.1	398.9	175.3	18.6	4.70	102.2	18.20	2.4
1992	921.3	367.3	195.9	25.2	6.90	118.6	21.20	3.5
1993	931.8	397.2	224.7	33	8.30	140.2	23.50	4.7
1994	970.7	423.4	229	37.3	8.80	146.5	25.50	5.0

Source: Australian Bureau of Agricultural and Resource Economics, *Australian Commodity Statistics 1995* (Canberra: ABARE, 1995)
Note: Chinese ore production has been converted to a similar Fe content to imports.
(a): World production net of China's production

Table 10 shows that China has become a major importer of iron ore. China has large reserves of iron ore and is a relatively large producer. But its ore is of relatively low quality (about half the Fe content of internationally traded iron ore), and the movement of ore around China is restricted by the congestion in the transport system. Consequently as steel output has increased - see below - the imports of ore have also increased. The import share in consumption is now over 25 per cent. However China's share in world trade is less than 10 per cent and China's trade as a proportion of world output (other than China's own output) is now about 5 per cent. These latter shares are rising and are now high relative to China's overall trade shares but not so high as to induce strategies other than those usually applied by iron ore importers to diversify their sources of supply.

Table 11 refers to steel production. Between 1984 and 1993, apparent steel consumption grew at 9.5 per cent a year. The import volume however has fluctuated. Unlike iron ore, there is no clear trend. The ratio of imports to consumption was higher in the mid 1980s than in the peak import year of 1993. China's share of world trade and of world production (net of China's production) has also fluctuated over this period, peaking in 1993 at 13.5 per cent and 5 per cent respectively.

The intensity with which steel is used in the Chinese economy is high. The measure of intensity (tonnes of finished steel per million dollars of GDP) is over 200 in China compared to 50 in India and around 100 in Korea and Taiwan.[64] A number of factors affect steel intensity. It tends to increase in the early stages of development as infrastructure is accumulated and as an economy industrialises. In China however steel intensity fell in the 1980s but increased again in the 1990s. The fall has been attributed to the effects of economic reform which improved the efficiency with which steel was used and which affected the relative growth rates of steel intensive industries.

Table 11 China's role in world steel trade

Year	World prod'n	World exports	China's finished steel prod'n	Steel prod'n imports	Steel prod'n exports	China's apparent cons'n	Ratio of imports to cons'n %	China's share of world trade %	China's trade as a share of world output[a] %
1984	588.4	158.8	33.7	13.5	0.2	47	28.7	8.4	2.4
1985	597.9	170.4	36.9	19.6	0.2	56.3	34.8	11.4	3.5
1986	595.8	161.1	40.6	17.4	0.2	57.8	30.1	10.7	3.1
1987	616.4	160.7	43.9	11.7	0.3	55.3	21.2	7.1	2.0
1988	656.9	168.3	46.9	8.5	0.2	55.2	15.4	4.9	1.4
1989	664.5	169.4	48.6	8.2	0.9	55.9	14.7	4.3	1.2
1990	653.6	169.3	51.5	3.7	2.1	53.1	7.0	0.9	0.3
1991	628.2	176.4	56.4	3.3	3.3	56.4	5.9	0.0	0.0
1992	619.6	197.1	66.9	6.2	3.3	69.8	8.9	1.5	0.5
1993	629.5	215.7	77.1	30.3	1.1	106.3	28.5	13.5	5.3

Source: International Iron and Steel Institute
Note: data are millions of metric tonnes in terms of finished steel.
a Share of world production net of China's production

If China's GDP grows at 9 per cent a year to the year 2005, and if the net outcome of the forces just discussed is a fall in the steel intensity of use, then finished steel consumption by 2005 may be 154 mt.[65] Other views are that the steel intensity of use could even increase in China, and finished steel consumption in that case would be much greater. [66]

Chinese steel production growth is constrained by the opportunity costs of capital, high incremental costs of energy (including the power used in the electric arc route to steel making), the scarcity of sites for large scale steel plants and the environmental effects of steel production. Assuming a growth in finished steel production to 2005 to 107 mt (based on current and prospective steel plant construction) then imports in 2005 would be about 47 mt. This figure suggests a long term trend of rising steel imports into China. The ratio of imports to consumption then rises to about 30 per cent, and China's share of world trade would also increase. Its significance by that time in world trade is difficult to pinpoint, however, since there are other significant changes likely to occur in the location of steel production and in patterns of trade.[67] One of these trends is a shift to net steel imports in the East Asian region. Depending on supply responses, China's import requirements are then likely to be met from the wider world market.

Assuming that the local iron ore industry contributes very little to the iron requirements of the expanding steel industry, then another 50 mt of ore will have to be imported to supply the growth in steel output.[68] That is, China's iron ore imports would more than double over the next decade.

These projections focus on the production and trade in finished steel. While there has been a substantial growth in iron ore imports into China, another strategy for China is to import semi-processed products. This strategy has some advantages in relaxing the constraints noted above on domestic production. It would also reduce the volume of iron ore imports directly into China (although not reduce the total volume of ore produced outside China and sold in some form to China).

In their review of these issues, Drysdale, Findlay and Kang[69] argue that meeting the challenge of China's steel demand will require both careful investment choices about the stages of production in which to invest (guided by China's comparative advantage) and a high level of transfer of capital, technology and skills to China. It will also require an open market for steel products in China. Recent evidence is that there are substantial gaps between domestic and international prices so that further trade liberalisation should lead to substantial adjustment in the steel sector.[70] Drysdale, Findlay and Kang also stress that growth in China's steel imports requires 'confidence in China that it will be able to expand exports (of other products) in line with its comparative advantage without the imposition of discriminatory and arbitrary safeguards and other restrictions'. [71]

3.4 Energy

China's energy and mineral endowment is extensive and the potential for finding further reserves still remains.[72] According to one study, in 1986 it had around 29 per cent of world reserves of coal, 2.6 per cent of oil and 0.8 per cent of natural gas.[73] Nevertheless, the large population means that its mineral and energy resources per capita is below that of other resource rich countries. Furthermore, the distribution and quality of resources does not always match demands. Coal and oil resources, while abundant, are concentrated in the north and northwest. Hydro-electricity resources are in the south and southwest. The bulk of industrial development, however, is along the coastal zone and often distant from the sources of energy raw materials. In addition, there is an imbalance between resource endowment and processing capacity, so that China's own reserves cannot be extracted and processed at a level demanded by its industrial growth.

China also uses much higher levels of energy than most other developing economies. It also relies primarily on coal as its primary energy source. This has consistently accounted for over 75 per cent of consumption, with consequent pollution problems.[74] Drysdale and Huang[75] argue that, if the value of China's GDP is adjusted as discussed in respect of trade ratios above, China's energy intensity ratios (energy consumption per dollar of GDP) move closer to those of other countries, but they also note that the intensity ratio for China is still very high compared to other East Asian developing economies. They argue that this implies substantial scope for improving the intensity with which energy is used in the Chinese economy.[76] Their projections shown in Table 12 are therefore based on the assumption that the energy intensity in China falls to slightly below the current average for other East Asian developing economies.

Table 12: Energy consumption in China, 1990 and 2010

		1990 Amount (mt)	Share (%)	China's share in world cons'n %	2010 Amount (mt)	Share (%)	China's share in world cons'n %	Annual growth %
China								
Total		682	100	8.5	2484	100	19.1	6.7
	Oil	113	16.6	3.7	447	18	9.8	7.1
	Solid fuels	498	73	21.8	1689	68	43.3	6.3
	Gas	12	1.8	0.7	75	3	2.7	9.6
	Electricity	59	8.7	5.7	273	11	15.0	8
World								
Total		8059	100		12990	100		2.4
	Oil	3061	39.4		4547	35		2
	Solid fuels	2286	29.4		3897	30		2.7
	Gas	1678	21.6		2728	21		2.5
	Electricity	1034	13.3		1818	14		2.9

Source: Table 6 in Peter Drysdale and Yiping Huang, 'Growth, energy and the environment: new challenges for the Asia Pacific Economy', mimeo, Australia- Japan Research Centre, ANU. The projections are the based on the IEA's *World Energy Outlook, 1993* but adjusted by the authors for their own projections of the growth in energy consumption in China and East Asia.

Assuming particular growth rates in China (8.5 per cent a year in real terms over the projection period) as well as the above trends in energy intensity yields, the projections indicate:

- the growth in China's share of world energy consumption;
- the shift in the mix of China's energy consumption pattern towards that of the world on average; and
- the high share of solid fuel consumption in China, with more than twice the world average and low shares of oil and gas.

An implication stressed by Drysdale and Huang is that the projections imply the aggravation of environmental pollution problems associated with the growth and the mix of energy consumption.

Overall, during the 1980s and early 1990s, China was a net exporter of energy and maintained a positive energy trade balance.[77] In terms of particular sectors, however, China is expected to become a net importer of crude oil. Its imports by the year 2005 could be over 40 per cent of Chinese consumption, and it would then account for more than half of East Asia's total crude oil imports, the region itself becoming a large net importer by that time.[78] Over this period the share of the Middle East in the region's oil imports is expected to rise to a range of two-thirds to three quarters.[79] This potential reliance on the world market, particularly on supplies outside East Asia, is likely to lead to considerable efforts in China to reduce oil consumption, including efforts at energy conservation. There are constraints, however, on further substitution into solid fuel consumption. These include the anticipated growth in demand for liquid fuels by the transport sector, and environmental issues, in which case the application in China of 'clean coal technologies' becomes even more valuable.[80]

Coal is the key sector accounting for over 75 per cent of primary energy use. China is also a net coal exporter. It exported 18 mt of black coal in 1994-95 (about 8 per cent of world thermal coal trade) and its exports are expected to rise to 22 mt by 2000-01 (about 6 per cent of world thermal coal trade).[81] These export volumes are, however, a relatively small share of total production. Policy changes, including the interaction with developments in other energy sectors, can have significant effects on trade volumes. These projections of coal trade also allow for the growth in consumption of coal in the electricity sector in China.

China's energy trade patterns have been distorted by pricing policies in which domestic prices were capped below world prices.[82] Both the pricing of coal and oil have been reformed during the 1990s. This change and the removal of trade barriers contributed to the switch in 1993 from net oil exports to net imports. On the other hand, higher coal prices also contributed to increased coal output and increases in coal exports.

This review of the issues in the energy sector highlights a number of points including:

- the interaction between sub-sectors and the availability of substitutes for items thought to be in short supply and for which prices may be rising;

- the importance of domestic policy and its influence on trade outcomes and the degree of reliance on world markets; and

- the long run implications of price changes (as illustrated by the scope for energy conservation China) which must be noted in assessing concerns about dependency, especially those exacerbated by short run price changes.

4. Conclusion

The above analysis of China's overall trading position and of particular sectors suggests that it would be a mistake to argue that China has a 'dependency problem'. First, the level of the Chinese economy's openness to trade is less than the official figures suggest. A closer analysis of the data indicates that it is what we would expect of such a large economy and that it is similar to other countries which are both large economies and major traders. While China's involvement in world trade has grown at a faster rate than its economic growth, this has brought great benefits to the economy. Certainly the changes in the composition of China's trade has reflected both the structural changes taking place in its economy as a result of growth and reform and the gains in efficiency achieved by shifting towards China's comparative advantage.

Second the analysis of particular sectors indicates that a problem, if it exists, is not currently related solely to the size of the Chinese economy and its role in world trade. The data even for the commodities which people indicate are likely to be highly sensitive still show small shares for China.

Problems of dependency are thus more likely to be the consequence of perceptions. In the first place, these are related to swings in domestic policy in China and to the feedbacks from the world market inside China. Swings in domestic policy lead to fluctuations in China's production and consumption which, even at low trade shares, can lead to large fluctuations in world trade and prices. These, in turn, can feed back into Chinese prices and create the impression of a problem caused by reliance on the world market. Further changes in policy to counteract that effect can have a second round of feedbacks, which serves to reinforce the original perception. Exporters, meanwhile, are less likely to gear up to supply China in the face of this sort of uncertainty. In that respect, suppliers also fear

becoming dependent on a single market, since a large volume but unstable purchaser can bring large risks.

Chinese policy makers are not, however, solely responsible for their own perceptions! A second factor is the problem of restricted access to world markets for China's exports, the proceeds from which are used to pay China's import bills for these supposedly sensitive products. If the rest of the world moves to limit China's exports, this will not only affect China's growth pattern but also reduce the volume of China's imports. This outcome will be reinforced by policy initiatives in China which reflect perceptions of the unreliability of the export market.

These are the immediate issues. Over the next decade, however, the shares of China's imports in world trade of some products will rise - grain and crude oil for example. Import volumes will increase. There may be some short run effects both on the growth of China's trade and on China's terms of trade. Given the volume of effort that is being made now to anticipate China's impact on world markets, however, even this seems unlikely, or at least unlikely to create major problems.

Even if there were a short run impact on prices, the question then is why China cannot rely on the world market for supply in the longer run. Changes in relative prices can induce:

- diversions of product out of other uses (as suggested by China's still low shares of world output even in products in which China accounts for large shares of trade);

- new sources of supply; and

- economising behaviour in China, since some commodities where dependency is an issue are those whose use has been most severely distorted by the wrong pricing signals.

If there is an issue of 'dependency', therefore, we argue here that it is actually one of 'interdependency'. The careful management of China's trade interdependency is a major issue both for China and for the rest of the world. China's size alone means that world markets need to take account of its behaviour in their own interests. All sides thus have a shared benefit in minimising the risks involved. Apart from the strategic political concerns, it is also important for China's trading partners to build a stable trading framework so that the large fluctuations which sudden changes in China's trading position can bring to world markets are evened out. Policies and mechanisms which reduce China's sense of strategic risk and build stable relationships are thus vital for both sides of the trading relationship.

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[1] Some argue that, analysed in terms of consumption, the economy is much bigger than the figures currently suggest. See Ross Garnaut and Ma Guonan, 'How rich is China?: evidence from the food economy', *The Australian Journal of Chinese Affairs*, No. 30, July 1993, 122-46.

[2] See Barry Naughton, *Growing out of the Plan: Chinese Economic Reform 1978-1993,* London: Cambridge University Press, 1995 for an overview of the reform process.

[3] See Nicholas R. Lardy, *Foreign Trade and Economic Reforrm in China 1978-1990*, (Cambridge: Cambridge University Press, 1992), 'The role of foreign trade and investment in China's economic transformation', in *The China Quarterly*, 144, December 1995, pp. 1065-82, and *China in the World Economy* (Washington: Institute for International Economics, 1994) for an overview of foreign trade reform.

[4] Lardy, *Foreign Trade and...* , p. 1.

[5] *Summary of World Broadcasts, Part 3, Asia-Pacific* (SWB), FEW/0425/WG/1, 6 March 1996.

[6] Ho Yin-ping, 'Foreign trade and China's growing international presence', in Lo Chin Kin, Suzanne Pepper and Tsui Kai Yuen (eds) *China Review 1995*, (Hong Kong: The Chinese University Press, 1995), pp. 23.12.

[7] Lardy, *Foreign Trade and...* , pp. 29-32.

[8] SWB, FE/W0425/WG/1, 6 March 1996.

[9] See Anne O. Krueger, 'The role of trade in growth and development: theory and lessons from experience', in Ross Garnaut, Enzo Grilli and James Riedel (eds), *Sustaining Export-Oriented Development: Ideas from East Asia*, (Cambridge: Cambridge University Press, 1995), pp. 1-30. and Lardy, *Foreign Trade and...* , Chapter 1.

[10] For a discussion of this issue see Kym Anderson, *Changing Comparative Advantages in China: Effects on Food, Feed and Fibre Markets*, (Paris: OECD Development Studies Centre, 1990)

[11] Li Peng, 'Government Work Report on the Draft Ninth Five-year Plan', 5 March 1996, SWB, FE/2553/S1/3-4.

[12] Ibid, SWB, FE/2553/S1/10-11.

[13] Lardy, *Foreign Trade and...* , pp. 150-155.

[14] Ibid, p. 151.

[15] GDP was 4500.6 billion yuan and the two-way trade value of US$236.73 billion, converted at the average exchange rate of 8.6187. State Statistical Bureau, *Zhongguo Tongji Nianjian 1995* [China Statistical yearbook, 1995], (Beijing: Zhongguo Tongji Chubanshe, 1995), p. 21, p. 25 and p. 537.

[16] Lardy, *China in the World Economy*, p. 18.

[17] Asia Pacific Economics Group, *Asia Pacific Profiles, 1995* (Canberra: APEG, 1995), Tables 4.2 and 4.4. The exports to GDP ratio in India in 1994 was 10.5%.

[18] Richard Pomfret, *China's Trade Miracle*, Seminar Paper No. 96-03, Centre for International Economics Studies, University of Adelaide, February 1996.

[19] There is a residual unclassified category of exports so the shares in these tables do not sum to 100%.

[20] See for example Australia-Japan Research Centre, 'China and East Asia Trade Policy', (Canberra: AJRC, 1995).

[21] Ibid, p. 14.

[22] Zhang Xiaoguang, 'How successful is China's trade reform: an empirical assessment', Economics Division Working Papers, 4/94, (Canberra: ANU) comments on the use of shares of product groups in exports and imports for this sort of analysis. He presents a more complex measure which takes account of competing imports and shares in world trade. Here we discuss these components separately.

[23] See Kym Anderson, *Changing Comparative Advantages in China: Effects on Food, Feed and Fibre Markets*, (Paris: OECD Development Studies Centre, 1990) for a full discussion of these issues, especially Chapter 3, 'China's economic growth and structural changes since 1949'.

[24] Lardy, *Foreign Trade and...* , p. 32.

[25] Anderson, *Changing Comparative Advantage...*, p. 39.

[26] Mark Selden, *the Political Economy of Chinese Socialism* (New York: M. E. Sharpe, 1988), Chapter 6, 'City versus countryside? The social consequences of development choices in China', pp. 153-180.

[27] Zhang Xiaoguang, 'How successful....'

[28] These data are reported in Pacific Economic Cooperation Council, *Survey of Impediments to Trade and Investment in the APEC region*, A report by the PECC for APEC (Singapore: PECC, 1995).

[29] Australia-Japan Research Centre, 'China and East Asia Trade Policy'...

[30] Ho Yin-ping, 'Foreign trade and China's growing international presence', in Lo Chin Kin, Suzanne Pepper and Tsui Kai Yuen (eds) *China Review 1995*, (Hong Kong: The Chinese University Press, 1995), pp. 23.1-41

[31] *China Daily*, 20 November 1995, p. 1,

[32] These values of dfi inflows could be overstated as a consequence of 'round-tripping' through Hong Kong. See Chen Chunlai, 'Foreign Direct Investment in China', (University of Adelaide, Chinese Economy Research Unit Working Paper, 1996, forthcoming) for a more detailed discussion.

[33] Nicholas Lardy, 'The role of foreign trade and investment in China's economic transformation', in *The China Quarterly*, 144, December 1995, pp. 1074-75.

[34] *Renmin Ribao* [People's Daily], 23 January 1988, 'Zhao Ziyang cong tan yanhai diqu jingji fazhan zhanlüe [Zhao Ziyang discusses the coastal areas economic development strategy]. See also SWB, FE/00060/C/1-5, 28 January 1988.

[35] Lardy, *Foreign Trade and...* , pp. 132-136

[36] Australia's experience of the fluctuations in China's wool trade is a striking example of this need. See Australia-Japan Research Centre, *China's Wool Market: Trade and Investment Issues*, (Canberra: ANU, 1995).

[37] Lardy, *China in the World Economy*, Table 2.3, p. 41

[38] Pomfret, *China's Trade Miracle*, pp. 13-14.

[39] Ibid, p. 14

[40] Australia-Japan Research Centre, 'China and East Asia Trade Policy'..., Yang Yongzheng, 'China's Textile and clothing exports: challenges in the post-MFA period', (National Centre for Development Studies, mimeo, November, 1995) reports that the major part of the expected gain from the Uruguay Round outcome for China (assuming China is not discriminated against as a consequence of its non-membership of the WTO) comes from the MFA reform.

[41] The following discussion draws on Andrew Watson and Christopher Findlay, 'Food and profit: the political economy of grain market reform in China', paper presented to the conference on *Grain Market Reform and its Implications*, East-West Centre, University of Hawaii, 16-19 September 1995 and Christopher Findlay and Andrew Watson, 'Grain Market Reform in China: Implications for the Grain Trade Mix', mimeo, Chinese Economy Research Unit, University of Adelaide, March 1996.

[42] Richard Louis Edmonds, *Patterns of China's Lost Harmony: a survey of the country's environmental degradation and protection* (London: Routledge, 1994).

[43] Frederick W Crook, 'Under-reporting of China's cultivated land area: implications for world agricultural trade', in *China: Situation and Outlook Series*, United States Department of Agriculture, Economic Research Service, RS-93-4, July 1993, 33-9.

[44] Li Ruihuan, 'Guanyu nong-yong tudi de jige wenti [On some problems of agricultural land], *Renmin Ribao* [People's Daily], 2 July 1994, p. 1, and *Summary of World Broadcasts, Part 3, The Far East*, (SWB), FE/2236/S1/3-4, 24 February 1995.

[45] Peng Jiahua, 'Wo guo liangshi bozhong mianji di yu jingjiexian [China's grain sown area is below the danger line]', *Jingji Xiaoxi Bao* [Economic Reporter],19 March 1995, p. 4.

[46] Christopher Findlay and Cheng Enjiang, 'Trade reforms and integration of China's domestic and international grain markets since the middle 1980s - the case of wheat and maize', paper presented to the conference on *Grain Market Reform and its Implications*, East-West Centre, University of Hawaii, 16-19 September 1995

[47] SWB, FE/2169/S1/6, 3 December 1994. These swings in China's net trade positions can have substantial effects on world markets at times when China's share is large.

[48] See, for example, the discussion in Guo Shutian (ed), *Duanque yu Duice: Zhongguo Liangshi Wenti Yanjiu* [Shortage and Countermeasures: Research into Grain Issues in China], (Beijing: Zhongguo Renmin Daxue Chubanshe 1988)

[49] For a full discussion of the issues involved see Luo Yousheng and Huang Yanxin, '1993 nian Zhongguo liangshi shichang bodong de yuanyin yu qishi [The causes of and lessons from the fluctuations in China's grain market in 1993], *Nongcun Jingji Wengao* [Papers on the Rural Economy], No. 5, 1994, pp. 7-15, Chen Xiwen, 'Dangqian Zhongguo de liangshi gongqiu yu jiage wenti [Current issues in grain supply, demand and prices in China]', *Zhongguo Nongcun Jingji*, [China's Rural Economy], No. 1, 1995, pp. 3-8, Wen Jiafang, '1993 nian liangjia shangzhang yinfa de sikao [Considerations brought about by the 1993 rise in grain prices]', *Jiage Lilun yu Shijian* [Price Theory and Practice], No. 3, 1994, pp. 14-18, and Zhang Shusen and Sun Wenbo, 'Liangjia fengbo ji qi qishi [The grain price turmoil and its lessons], *Zhongguo Wujia* [China Prices], No. 4, 1994, pp. 19-21.

[50] Ross Garnaut, Cai Fang and Huang Yiping, 'A turning point in China's agricultural development', paper presented to the conference on *Grain Market Reform in China and its Implications*, East-West Centre, University of Hawaii, 16-19 September 1995.

[51] *The China Quarterly*, 'Quarterly Chronicle and Documentation', No. 127, September 1991, p. 663

[52] The Chinese Academy of Sciences Research Team into the National Situation, for example, estimated a shortfall of between 177 and 202 mt by the year 2000. *Shengcun yu Fazhan* [Survival and Development], (Beijing: Kexue Chubanshe, 1989), pp. 39-50. The estimate was based on a high annual requirement for per capita supply of 500 kg.

[53] Vaclav Smil, 'Who will feed China?', *The China Quarterly*, No. 143, September 1995, pp. 801-813.

[54] The following discussion is based on Kym Anderson, *Changing Comparative Advantages in China: Effects on Food, Feed and Fibre Markets*, (Paris: OECD Development Studies Centre, 1990) and 'China's industrialisation and fibre self-sufficiency', in Christopher Findlay (ed), *Challenges of Economic reform and Industrial Growth: China's Wool War*, (Sydney: Allen and Unwin, 1992), pp. 78-96.

[55] Anderson, *Changing Comparative...* , pp. 71-73.

[56] Zheng Guibin, 'Shandong sheng liang-mian bijia qingkuang de diaocha [A survey of the relative price between grain and cotton in Shandong], in *Jingji Diaocha* [Economic Surveys] (Beijing: Hongqi Chubanshe), No. 1, 1983, pp. 97-103.

[57] Nicholas Lardy, *Agriculture in China's Modern Economic Development*, (Cambridge: Cambridge University press, 1983), pp. 57-64 and pp. 176-180.

[58] See Christopher Findlay (ed), *Challenges of Economic Reform and Industrial Growth: China's Wool War*, (Sydney: Allen and Unwin, 1992) for a discussion of this issue.

[59] Lin Xiangjin,:*Wo Guo Mianyangmao de Shengchan yu Yunxiao* [Wool Production and Transportation and Sales in China], (Beijing: Nongye Chubanshe 1993). See also Zhang Cungen, 'Zhongguo yangmao chanye xianzhuang ji fazhan qianjing [The current situation in wool production in China and the prospects for development]', *Nongye Jingji Wenti* [Issues in Agricultural Economics], No. 8, 1994, pp. 23-28.

[60] Anderson, *Changing Comparative...* , p. 102.

[61] One estimate by an organisation of Australian producers is that by 2000-2001 China will be importing 652kt a year. This will be about 20 per cent of total East Asian cotton imports at that time, according to these projections. See Mary Scott Gilbert, 'Future export markets for Australian cotton', *Agriculture, Outlook 96*. (Volume 2, (Canberra: ABARE, 1996).

[62] See Andrew Watson, Christopher Findlay, and Du Yintang, 'Who won the 'wool war'?: A case study of rural product marketing in China', *The China Quarterly*, No.118, June 1989, pp. 213-241.

[63] See also John Longworth, *Agribusiness Reforms in China: The Case of Wool*, (Oxford: CAB International, 1995), Chapter 11.

[64] East Asian Analytical Unit, *Iron and Steel in China and Australia*, (Canberra: EAAU, 1995), p. 53.

[65] Ibid, p. 78.

[66] Feng Lintong, 'China's steel industry: its rapid expansion and influence of the international steel industry', *Resources Policy*, vol. 20, no. 4, 1994, pp. 219-234.

[67] See Peter Drysdale, Christopher Findlay and Jong-soon Kang, *Steel in East Asia* (Canberra: Australia-Japan Research Centre, ANU, 1994) for a review.

[68] EAAU, *Iron and Steel in China and Australia*, p. 80. This growth in ore imports in China will occur at the same time as a growth in ore imports into the rest of Asia.

[69] Drysdale, Findlay and Kang, *Steel in East Asia.*

[70] Ibid, p. 32.

[71] Drysdale, Findlay and Kang, Steel in East Asia, p. 9.

[72] See James P. Dorian, *Minerals, Energy and Economic Development in China* (Oxford: Oxford University Clarendon Press, 1994), especially Chapter 4, pp. 91-106; Yan Changle (ed) *Zhongguo Nengyuan Fazhan Baogao* [China's Energy Development Report], (Beijing: Jingji Guanli Chubanshe, 1994); and Tatsu Kambara, 'The energy situation in China', in *The China Quarterly*, 131, September 1992, pp. 608-636.

[73] Peng Zhaoyang, 'Challenges to China's Energy Market Reforms', CERU Working Paper (University of Adelaide, forthcoming).

[74] Yan Changle (ed) *Zhongguo Nengyuan Fazhan Baogao* [China's Energy Development Report], (Beijing: Jingji Guanli Chubanshe, 1994), pp. 127-128.

[75] Peter Drysdale and Yiping Huang, 'Growth, energy and the environment: new challenges for the Asia Pacific Economy', mimeo, Australia- Japan Research Centre, ANU.

[76] See Binsheng Li, James Dorian and Kirk Smith, 'China's Energy Conservation Potential: A preliminary sector-by-sector assessment', East West Centre Working Papers, Energy and Minerals Series, No. 13, June 1995 (Hawaii: East West Centre) for a more detailed assessment of the scope for energy conservation in China.

[77] James P. Dorian, *Minerals, Energy and Economic Development in China* (Oxford: Oxford University Clarendon Press, 1994), p. 145.

[78] For more detail of the crude oil outlook for China and the rest of East Asia, see Michael Baugh, 'Factors affecting crude oil production in South East Asia', in *Minerals and Energy*, Vol.3 of the proceedings of the National Agricultural and Resources Outlook Conference, (Canberra ABARE, February 1996).

[79] Fereidun Fesharaki, Allen Clark and Duangjai Intarapravich, 'Energy outlook to 2010: Asia-Pacific Demand, Supply and Climate Change Implications', *Asia Pacific Issues*, No. 19, April 1995 (Hawaii: East West Centre).

[80] See Peng Zhaoyang, 'Challenges to China's Energy Market Reforms', CERU Working Paper (University of Adelaide, forthcoming).

[81] This projection is reported in C. Millstead, R. Stuart and A. Kicic, 'Outlook for world seaborne steaming coal trade' in *Minerals and Energy*, Vol.3 of the proceedings of the National Agricultural and Resources Outlook Conference, (Canberra, ABARE, February 1996). They also note that China's national coal trading corporation wants to export about 50 mt by that time.

[82] See Peng, 'Challenges to China's Energy Market Reforms'

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