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III. INDUSTRIAL BRANCH PROFILES

A. FOOD PRODUCTS

STARCHY STAPLE FOODS

The Resource Base

Due to the size and geographical diversity of China a vast range of agricultural activities are performed, though grain production has long been the most important. The chief staple products produced and consumed in China are rice, wheat and maize. Also of importance are soya and coarse grains such as sorghum and millet. In 1993 grain crops accounted for 75 % of total sown area¹. The central and northern parts of China are the most significant for grain production, accounting for 60 % of China's grain output between 1978 and 1986².

Regional imbalances are characteristic of grain production. Whilst the North East has in the past stockpiled surplus maize and some soya beans, but had unsatisfied demand for rice and wheat, the central region has had surplus rice but a deficit of maize and soya beans. Since 1984 grain production in the coastal provinces has fallen and as a consequence the North has gradually overtaken the South as the main supplier of grain.

Recent Trends

The abolition of mandatory production planning in 1985, along with price incentives to grow cash crops and the rapid surge in rural industry, have encouraged farmers to switch away from grain production, leading to a decline in the grain sown area and an expansion of economic crops. Between 1980 and 1994 the amount of land planted to grain fell by 4.46 million hectares³. At the same time rapidly rising per capita incomes in the reform era have increased demand for fine grains such as rice and wheat, resulting in a decline in the sown area for coarse grains such as potatoes, millet and sorghum⁴. Despite the fall in total grain sown area national grain production and average grain yields per sown hectare have increased (see Table III.1.). Following the drop in grain output in 1994, the government raised purchase prices of grain to encourage cultivation of this crop.

Most grain is produced and consumed in-country. For reasons of national security the government is keen that China remain self-sufficient in grain production as far as possible and is particularly reluctant to become dependent on US grain imports. Hence China's concern to exempt the farm sector from trade liberalisation discussions in the Asia-Pacific Economic Cooperation Forum.

Table III.1. Total Grain Crops Sown Area and Total Grain Output 1985-1994

	Total Grain Crops Sown Area (million ha)	Total Grain Output (million tons)
1985	108.84	379.11
1986	110.93	391.51
1987	111.26	402.98
1988	110.12	394.08
1989	112.20	407.55
1990	113.46	446.24
1991	112.31	435.29
1992	110.56	442.65
1993	110.50	456.48
1994	109.00	444.60 ^a

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp 342, 345 for 1985-1993; a) 'A new reform on contract farming proposed' in *China Economic Digest*, Spring 1995, p. 25.

Production of coarse grains has risen from 82.7 million tons in 1985 to 117.7 million by 1994, an increase of 42 % (see Table III.2.). China is a net exporter of coarse grains.

Table III.2. Output, Exports and Imports of Coarse Grains 1985-1994, (million tons)

	Output	Exports	Imports
1985 ^{a/}	82.701	6.968	0.122
1986	87.270	6.492	0.787
1987 ^{b/}	96.527	4.184	1.768
1988	94.899	4.372	0.190
1989 ^{c/}	94.289	4.494	0.314
1990	114.511	3.768	1.021
1991	110.466	8.210	0.752
1992 ^{d/}	110.318	10.939	0.829
1993	119.519	n.a.	n.a.
1994	117.756	n.a.	n.a.

Sources: UN, UNCTAD, *Commodity Yearbook 1994*, UN, New York, 1994, pp 131-132; a/ figures for exports and imports 1985/6 from UN, UNCTAD, *Commodity Yearbook, 1992*, UN, New York, 1993, p. 131 and for output from FAO, *FAO Yearbook, 1987-8*, FAO, 1988, p. 120; b/ figures for 1987/8 output, c/ figures for 1989,1990-1 output, d/ figures for 1992-4 output from FAO, *FAO Yearbooks, 1989-90, 1991 and 1995*, FAO, pp 74, 75 and 73 respectively.

RICE

Recent Trends

Rice is primarily grown in the centre, south and south-west of China. In the decade between 1985 and 1994 the total area dedicated to rice-growing has fallen from 32 million hectares to 30.3 million hectares, a drop of 5.3% (see Table III.3.). Total output of rice increased slightly in the years between 1989 and 1992 but thereafter began to decline (see Table III.3.).

Table III.3. Total sown area of rice and total output of rice 1985-1994

	Total sown area (million hectares)	Total output of rice (million tons)
1985	32.07	168.57
1986	32.26	172.22
1987	32.19	174.26
1988	31.98	169.11
1989	32.70	180.13
1990	33.06	189.33
1991	32.59	183.81
1992	32.09	186.22
1993	30.35	177.70
1994 ^{a/}	30.37	178.25

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp 342, 345; a/ 1994 figures are estimates by FAO in FAO, FAO Yearbook, Production, Vol. 48, 1994, FAO, 1995, p. 70.

Rice is consumed primarily as a grain and further processing into flour, noodles or confectionery is very limited.

Whilst farmers are veering away from rice production to more profitable crops, some are already moving into high-quality and speciality rices such as *simiao* rice and Liaoning Japonica rice which command good prices on the free market⁵.

Exports of rice have consistently exceeded imports since the mid-1980s (see Table III.4.). For the remaining decade China will probably export lower-quality rice to Cuba, Europe and Africa, Japonica rice to other Asian countries and import high-quality rice from Thailand and Vietnam⁶.

**Table III.4. Exports and Imports of Rice
(1,000 tons), 1985-1992**

	Exports	Imports
1985 ^{a/}	1,006.2	210.8
1986	949.5	322.3
1987	1,021.8	550.8
1988	697.9	310.3
1989	315.1	1,203.2
1990	326.0	58.9
1991	688.8	142.8
1992	953.2	103.6
1993	n.a.	n.a.
1994	n.a.	510.0 ^b

Sources: UN, *UNCTAD Commodity Yearbook, 1994*, UN, New York, 1994, pp 128-129; a/ 1985 and 1986 figures from UN, *UNCTAD Commodity Yearbook, 1992*, UN, New York, 1994, p. 128; b/ from *China's Customs Statistics, 1994*, 12, p. 26.

WHEAT

Recent Trends

Wheat is mainly grown in the north and north-west of China. Both the total area devoted to wheat production and total output have expanded steadily between 1985 and 1994 (see Table III.5.).

**Table III.5. Total sown area of wheat and total output of wheat
1985-1994**

	Total sown area (million hectares)	Total output (million tons)
1985	29.21	85.81
1986	29.61	90.04
1987	28.79	85.90
1988	28.78	85.43
1989	29.84	90.81
1990	30.75	98.23
1991	30.94	95.95
1992	30.49	101.58
1993	30.23	106.39
1994 ^{a/}	30.50	101.20*

Sources: *1994 Statistical Yearbook of China*, China Statistical Publishing House, pp 342, 345; a/ 1994 figures from FAO, *FAO Yearbook, Production, Vol. 48, 1994*, FAO, 1995, p. 68; * is an unofficial figure.

China is a net importer of wheat and wheat flour (see Table III.6.). In 1992 for example imports exceeded exports by 10,581,600 tons and were equivalent to 10.5 % of output that year.

Table III.6. Exports and Imports of Wheat and Wheat Flour (1,000 tons), 1985-1994

	Exports	Imports
1985 ^{a/}	12.5	5,518.9
1986	18.6	6,110.0
1987	12.6	13,841.9
1988	11.7	14,687.9
1989	5.0	15,080.6
1990	5.8	12,638.9
1991	29.7	12,582.8
1992	146.8	10,728.4
1993	n.a.	6,420.0 ^{b/}
1994	n.a.	7,180.0 ^{c/}

Sources: UN, *UNCTAD Commodity Yearbook, 1992*, UN, New York, pp 124-5; a/ 1985 figures and 1986 export figures from UN, *UNCTAD Commodity Yearbook, 1992*, UN, New York, pp 124-5; b/ 1994 *Statistical Yearbook of China*, China Statistical Publishing House, p. 518; c/ from *China's Customs Statistics, 1994*, 12, p. 26.

Wheat is processed into high and medium gluten flour for bread, noodles, mantou and dumpling wrappers and into low gluten flour for cakes. China has around 2,000 flour mills throughout the country⁷ but equipment is outdated. In 1990 the Shanghai Municipal Flour Company was the largest flour producing enterprise in China with a daily wheat processing capacity of 2,000 tons. Joint venture mills such as Lianyungang Municipal Flour Mill in Jiangsu province, which exports 50 % of its products, have been set up in the reform period.

With rising living standards baked foods are becoming increasingly popular in China. Currently over 2 million tons of baked foods are produced annually, of which 1 million tons are pastries, 300,000 tons are bread and 700,000 tons are biscuits⁸. In order to meet this growing demand over 1,300 bread production lines and more than a dozen biscuit production lines have been imported since the reforms began. Guangdong is host to ten of the imported biscuit production lines, which account for 20 % of the market in large cities.

Foreign bread-making companies such as Vie de France and OK Jimmy have also started since the late 1980s to set up business in

China to satisfy expanding demand. By 1994 there were over 22 such joint venture bakeries, posing a challenge to domestic bread makers who have already lost one third of their market to foreign competitors⁹. However, domestic producers' sales still exceed those of joint ventures as prices are lower. As quality, taste and packaging become increasingly important factors in future sales, domestic industry with its backward technology and equipment is likely to come under increasing pressure.

MAIZE

Recent Trends

Maize is largely produced in the north and north-east of China. Heilongjiang's state farms provide the backbone of this crop. The total area of land devoted to maize has increased by 17 % from the low of 17.6 million hectares in 1985 to 20.6 million hectares in 1993 (see Table III.7.), with a 61 % increase in output. In 1978, however, 19.9 million hectares of land were devoted to maize. The increase in area of land dedicated to maize is related to the rise in living standards and the concomitant increase in demand for meat which in turn has intensified the demand for feedgrain. As a result maize has been used more for livestock feed than for human consumption. Whilst in 1979 70 % of corn output was used for human consumption, by 1993 an estimated 69 % was used for livestock feed¹⁰.

About 10 % of maize is exported but at times at the expense of domestic needs. Shortages of maize in the south in 1994 were related in part to the reluctance of some grain bureaus to transfer grain southward when exports could earn much needed foreign exchange¹¹. In December 1994 corn exports were even suspended to guarantee domestic supplies. Despite this China is expected to have 1.5 million net imports of corn in 1995¹², the main export markets being Japan, Korea, Russia and other Asian countries. However transportation problems, slow procurement and slow drying are continuing obstacles to the efficient transfer of maize to the livestock-producing south.

Table III.7. Total sown area, total output and total exports and imports of maize, 1985-1994

	Total sown area (million hectares)	Total output (million tons)	Total Imports (million tons)
1985	17.69	63.83	5.38 ^{a/}
1986	19.12	70.86	6.11
1987	20.21	79.24	13.20
1988	19.69	77.35	0.10
1989	20.35	78.93	0.07
1990	21.40	96.82	
1991	21.57	98.77	
1992	21.04	95.38	

1993	20.69	102.70
1994 ^{b/}	20.57*	103.55*

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp 342, 345; a/ import figures for 1985-1989 from UN, 1988, 1989 International Trade Statistics Yearbooks, vol. 1, UN, New York, 1990; b/ 1994 figures from FAO, FAO Yearbook, Production, vol. 48, 1994, FAO, 1995, p. 78; * = FAO unofficial figure.

Constraints and Prospects

An estimated population of 1.282 billion in 2000 as well as rising standards of living will combine to increase the demand for grain in the future. In 1995 the Worldwatch environmental research group warned that China could face a shortfall of 216 million tonnes of grain by the year 2030. Other estimates have been more modest, such as the 136 million tonnes suggested by Japan's OECF aid organisation. A goal of 500 million tons of annual grain production has thus been set for the year 2,000.

The gradual shrinkage of total arable land as well as a rising population are significant constraints on China's ability to increase grain production. Given the trend towards a decline in the area of land devoted to grains and the concomitant move towards the cultivation of more profitable crops such as fruit and vegetables, the prospects for self-sufficiency in grain crops will depend very much on agricultural investment, scientific and technological research and appropriate government policy. Loans from international agencies such as the World Bank for the introduction of new seeds, afforestation and land reclamation are already contributing to efforts to develop agricultural production. But the lack of government investment in agriculture in the past has constrained technological advance and hindered the development of this sector. Between 1985 and 1992 central government allocated only 3.5 % of the capital construction budget to agriculture¹³. As a result there has been a general decline in agricultural output between 1988 and 1994.

Since the mid-1990s, however, the government has placed a high priority on the development of agriculture, and in particular on grain production, as reflected in the emphasis given to it in the new Ninth Five Year Plan. Moreover in the new guidelines on foreign investment issued in mid-1995, foreign companies are encouraged to invest in this sector, particularly in the reclamation of land and the development of high-quality and high-yield crops¹⁴.

As well as investing more in agriculture the government is also seeking both to increase per-unit yields and expand the area farmed. It is also developing more commodity grain centres, increasing the number from 508 in 1995 to 886 by the end of the century¹⁵. A further measure to offset the grain shortage and promote self-sufficiency is to promote greater meat consumption,

particularly of sheep, poultry and cattle but not pigs. Floods and droughts are, however, a continuing threat to the achievement of these goals and it is likely nevertheless that imports of grain will continue.

TUBERS

Recent Trends

Whilst tubers are grown in most parts of China, Sichuan province devotes the largest area of land to these crops (see Table III.8.). Since 1985 output of tubers has increased 25%, finally recovering the 1978 level of 31 million tons.

Table III.8. Total sown area of tubers and total output of tubers

1985-1994

	Total sown area (million hectares)	Total output (million tons)
1985	8.57	26.04
1986	8.68	25.34
1987	8.86	28.20
1988	9.05	26.97
1989	9.09	27.30
1990	9.12	27.43
1991	9.07	27.16
1992	9.05	28.44
1993	9.22	31.81

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp 342, 345.

SOYBEANS

Resource Base

China is one of the world's twenty top producers of soybeans, accounting in 1992 for 8.5 % of world output. The north-east provinces of China are the main producers of soybeans, with state farms in Heilongjiang account for the bulk of soybean production.

Recent Trends

Total output of soybeans has increased in the decade since 1985, with 1994 output being 30 % higher than in 1985 (see Table III.9.). A small quantity of soybeans is exported and an even smaller amount imported. In 1993 for example exports accounted for 7 % of total output. The following year, however, this dropped to only 2.8 %.

Table III.9. Total Output, Exports and Imports (1,000 tons) and Area cultivated (million hectares) of Soybeans 1985-1994

Crop Year	Area	Output	Exports	Imports
1985 ^{a/}	7.71	10,500	1,135 ^{b/}	0.60
1986	8.29	11,614	1,368	290.90
1987	8.44	12,480	1,710	273.10
1988	8.12	11,640	1,477	151.80
1989	8.03	10,220	1,247	0.80
1990	7.55	11,000	940	0.90
1991 ^{c/}	7.04	9,710	1,090	0.13
1992	7.22	10,300	300	0.15
1993	9.45	15,310	1,100	0.12
1994	10.00	16,000	450	0.15

Sources: a/ 1985-1990 area and output figures from USDA, 'China Soybean Trip Report', *World Agricultural Production*, WAP 10-1995, October 1995, p. 60; b/ 1985-1990 export and import figures from UN, *UNCTAD, Commodity Yearbook, 1992*, UN, New York, 1993, p. 196-7; c/ 1991-94 figures from USDA report cited in a/ p. 56.

Soybeans are processed into soybean oil, soybean meal and soybean protein. Rapid income growth has increased the demand for these products and in the case of soybean oil has led to increased imports (see Table III.10). Imports in 1994 were 45 times that of 1985 and were higher than domestic output.

Table III.10. Total Output, Exports and Imports of Soybean Oil (1,000 tons), 1985-1994

Crop Year	Output	Exports	Imports
1985	240.0 ^{a/}	1.3 ^{b/}	32.1
1986	380.0	1.1	171.2
1987	550.0	0.4	406.0
1988	633.0	0.3	138.0
1989	696.0	0.1	421.4
1990	665.0	7.3	524.9
1991	520.0	1.4	322.9
1992	640.0	3.6	223.1
1993 ^{a/}	1,080.0	3.8	640.0
1994	1,200.0	60.0	1,450.0

Sources: UN, *UNCTAD Commodity Yearbook 1994*, New York, 1994,

pp 197-201; a/ output figures for 1985-1990 from UN, *Industrial Statistics Yearbook, 1990: Volume 2, Commodity Production Statistics, 1981-1990*, UN, New York, 1992, p. 159; b/ export and import figures for 1985-6 from UN, *UNCTAD, Commodity Yearbook, 1992*, UN, New York, p. 198; c/ 1993 and 1994 figures from 1992, UN, New York, p. 198; c/ 1993 and 1994 figures from USDA, 'China Soybean Trip Report', *World Agricultural Production, WAP 10-1995*, October 1995, p. 59.

Production and exports of soybean meal have increased substantially in the 1990s (see Table III.11.). For example between 1991 and 1994 output more than doubled and exports more than trebled.

Table III.11. Total Output, Imports and Exports of Soybean Meal (million tons)

Crop Year	Output	Imports	Exports
1991	2.74	0.14	1.48
1992	3.48	0.04	3.12
1993	5.83	0	4.78
1994	6.48	0	5.28

Sources: USDA, 'China Soybean Trip Report', *World Agricultural Production, WAP 10-1995*, October 1995, p. 57.

Soybean protein manufacture is an area that foreign investors are beginning to enter. For example, the Japanese Fiji Oil Corporation is planning to set up a soybean joint venture to process soybeans into soybean protein¹⁶.

Constraints and Prospects

Government policy and market prices currently favour grains and cotton over soybeans so output is expected to remain stable over the longer term. Increased yields as well as new growth from soybeans planted on newly drained land in Heilongjiang could lead to expanded output. Projected output for the year 2,000 is 20 million tons from 10 million hectares¹⁷. This is to be achieved through planting improved varieties, using better technologies, increasing inputs, reclaiming land and double and triple cropping.

Oil-bearing crops and edible oil

Recent Trends

The agricultural reforms have given an important boost to oil-bearing crops. In the period between 1985 and 1994 output has increased 14 % (see Table III.12.). Whilst output of peanuts and

rapeseed has increased during that period, sesame output has fallen from 6.91 million tons in 1985 to 5.63 tons in 1994. The 41 % increase in peanut output in 1993 over the preceding year was the result of increased planting in response to a poor harvest and subsequent higher prices. Rapeseed production fell in 1993 because of bollworm outbreaks and falling prices. 1994 proved to be a record year for the output of oil-bearing crops.

**Table III.12. Total Output of Oil-bearing Crops, 1985-1994
(million tons)**

	Total	Peanuts	Rapeseed	Sesame
1985	15.78	6.66	5.60	0.69
1986	14.73	5.88	5.88	0.61
1987	15.27	6.17	6.60	0.52
1988	13.20	5.69	5.04	0.40
1989	12.95	5.36	5.43	0.33
1990	16.13	6.36	6.95	0.46
1991	16.38	6.30	7.43	0.43
1992	16.41	5.95	7.65	0.51
1993	18.03	8.42	6.93	0.56
1994 ^{a/}	19.84	9.64	7.46	0.54 ^{b/}

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 345-6; a/ Statistical Communique of the State Statistical Review of the PRC on 1994 National Economic and Social Development, Feb. 28, 1995, in *Summary of World Broadcasts*, FE/2245 S2/1, 07.03.1995; b/ FAO estimate from FAO, *FAO Yearbook, Production, Vol. 48, 1994*, FAO, 1995, p. 113.

Oil seeds, edible and shelled peanuts are also exported. Between 1992 and 1993 the amount exported rose from 480,000 tons to 630,000 tons, an increase of 31%. These exports made up 2.2 % of total output in 1993. However growing domestic demand, particularly for soybeans, is likely to restrain exports.

Although China is one of the twenty leading producers of palm oil in the world, it imports more than it produces domestically (see Table III.13.).

**Table III.13. Total Output, Exports and Imports of Palm Oil,
1985-1994, (1,000 tons)**

	Output	Exports	Imports
1985 ^{a/}	192	0	56.8
1986	195	0	193.9
1987	200	0.1	254.6
1988	205	0	398.6
1989	210	11.0	734.1
1990	215	74.1	1,133.4

1991 ^{b/}	200	n.a.	n.a.
1992	144*	n.a.	n.a.
1993	150*	n.a.	n.a.
1994	150*	n.a.	n.a.

Sources: a/ Figures 1985-1990 from UN, *UNCTAD Commodity Yearbook, 1992*, UN, New York, pp. 210, 212; b/ figures for 1991-94 from FAO, *FAO Yearbook, Production, Vol. 48, 1994*, FAO, 1995, p. 122; * = unofficial FAO figure

Constraints and Prospects

With rising per capita incomes, consumption of edible oils is likely to increase over the next decade and so imports are expected to rise. Currently per capita consumption of edible oils is low - 5 kilos per capita compared with 17 kilos per capita in Japan and 13 kilos per capita in South Korea. However, as farmers move away from oil seed production to more profitable cash crops such as fruit and vegetables, the gap between domestic supply and demand is likely to widen.

SUGAR

Recent Trends

Beet production is concentrated in Xinjiang in the northwest and in the northeastern provinces of Heilongjiang, Inner Mongolia and Jilin. Whilst Guangdong and Fujian provinces were key areas for sugarcane cultivation, in the 80s and 90s the western provinces of Guangxi and Yunnan have become increasingly strong in this crop.

China has an annual sugar processing capacity of about 8.0 million tons¹⁸. The cultivation of sugar-beet and sugar cane and their processing into sugar have increased rapidly in the reform years. Sugar is processed into granulated sugar for domestic consumption and increasingly also as an input into the expanding beverages and biscuit industries.

Since 1985 there has been a 35% rise in the output of sugar-beet (see Table III.14.), higher yields per hectare contributing towards this increase. Whereas in 1985 one hectare yielded 15,915 kilos, by 1993 this had risen to 20,124 kilos¹⁹. However in 1994 the area devoted to sugarcane declined by 13 % to 233,000 hectares as farmers turned to more profitable crops²⁰.

Table III.14. Total Output of Sugarcane and Sugarbeet (million tons), 1985-1994

	Total	Sugarcane	Sugarbeet
1985	60.45	51.54	8.91
1986	58.31	50.21	8.30

1987	55.50	47.36	8.14
1988	61.87	49.06	12.81
1989	58.03	48.79	9.24
1990	72.14	57.62	14.52
1991	84.17	67.89	16.28
1992	88.07	73.01	15.06
1993	76.23	64.19	12.04
1994	73.39 ^a	60.86	12.53

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 346; a) 'Statistical Bureau Communique on China's Economic Development in 1994' in *Summary of World Broadcasts*, FE/2245 S2/2, 07.03.1995

Sugar production has increased by only 29 % since 1985, with a 25% drop in output in 1994 over 1993 (see Table III.15.). The processing of sugarbeet and sugarcane into sugar has not been able to keep pace with the rising demand. In 1986, for example, 1.2 million tons of sugar were imported²¹ and by the end of the following year rationing was reintroduced. In 1991 government controls over sugar pricing were lifted to stimulate production but new guidelines for prices were introduced again in 1995 to regulate the market. Further plans were drawn up that year to enhance production. These included providing farmers with low interest loans and raising the purchase price of sugar cane²².

Table III.15. Output of Sugar (million tons), 1985-1995

1985	4.51
1986	5.25
1987	5.06
1988	4.61
1989	5.01
1990	5.82
1991	6.40
1992	8.29
1993	7.71
1994	5.92

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 410.

Small quantities of raw and refined sugar are exported and imported (see Table III.16.). Between 1991 and 1992 exports of raw sugar increased more than twelve times whilst exports of refined sugar rose almost five times. In 1993 1.85 million tons of sugar were exported, accounting for 2.8 % of that year's total output whilst 419,635 tons of sugar were imported.

Table III.16. Exports and Imports of Raw and Refined Sugar
1985-1994, (1,000 tons)

	Total Exports	Raw Sugar	Refined Sugar	Total Imports	Raw Sugar	Refined Sugar
1985 ^{a/}	n.a.	0	180.4	1,904.0	1,868.7	40.0
1986	n.a.	3.2	263.3	1,182.5	1,114.2	68.3
1987	452.5	3.7	448.8	1,826.7	1,760.3	66.4
1988	247.8	3.0	244.8	3,708.9	3,351.4	357.5
1989	429.7	3.5	426.2	1,580.6	1,480.2	100.4
1990	570.5	4.6	565.9	1,132.2	958.9	173.3
1991	343.3	6.0	337.3	968.0 ^{c/}	n.a.	n.a.
1992	1,670.0	79.5	1,590.5	1,079.9	n.a.	n.a.
1993	1,850.0 ^{b/}	n.a.	n.a.	419.6	n.a.	n.a.
1994	n.a.	n.a.	n.a.	1,550.0 ^{d/}	n.a.	n.a.

Sources: UN, *UNCTAD Commodity Yearbook, 1994*, UN, New York, 1994, p. 146; a/ 1985-6 figures and all import figures from UN, *UNCTAD Commodity Yearbook, 1992*, UN, New York, 1993, p. 145-6; b/ 'Industry and Marketing Opportunities' in *China Economic Digest, Summer 1995*, p. 33; c/1991-1993 import figures from UN, *1993 International Statistics Yearbook, Vol. 1.*, UN, New York, 1995, p. 184; d/ from *China's Customs Statistics, 1994*, 12, p. 26

Following a 23 % drop in sugar output in 1994 over the preceding year, 350,000 tons of sugar were imported in the first quarter of 1995, suggesting a further sharp rise in imports²³. Given the sharp drop in imports from Cuba, imports from other sources are expected to increase. However, the government has kept tight controls over sugar import quotas as it regards sugar as a non-essential item. Cuts in import duty on this crop are expected in the future which could lead to a further rise in imports.

Constraints and prospects

Whilst there is potential for increasing the yields per hectare of sugar-cane and sugar-beet, large investments are needed to improve production and processing. Self-sufficiency in sugar is not yet an achievable goal. Rising production costs as well as better returns from crops such as fruits and vegetables imply that sugar output is not likely to increase substantially in the near future. However the growing beverage, alcohol and sweet biscuit industries are pushing up demand for domestic sugar supplies. As rising living standards and higher expectations of a more varied diet increase per capita sugar consumption, which is currently estimated at 6 kilograms a year, well below the Asian average of 11 kilos a year and 45 kilos of developed nations, demand for domestic sugar will come under further pressure. In the next decade we can therefore expect a rise in sugar imports.

TOBACCO

The Resource Base

Tobacco is chiefly grown in Yunnan and Guizhou provinces in the South and Henan in the central part of China. There are 391 large-scale and medium-scale units engaged in tobacco processing of which the majority, 305, are state-run. There are also a further 33 small-scale township-run and 323 small-scale village-run enterprises processing tobacco.

Recent Trends

Whilst 1993 tobacco output was 42% higher than that of 1985, tobacco output fell by a third in 1994, putting total output below the 1985 level (see Table III.17.). The amount of land devoted to this crop has risen 60 %. However supply has constantly exceeded demand. In order to address the problem of poor quality, the government proposed in the Seventh Five Year Plan that production of tobacco be concentrated in those regions where quality was good²⁴.

Table III.17. Total Sown Area of Tobacco and Total Output of Tobacco, 1985-1994

	Total Sown Area Tobacco (million ha)		Of which flue-cured	Total Output Tobacco (million tons)	Of which flue-cured
1985	1.31	1.07	2.42	2.07	
1986	1.12	0.89	1.70	1.37	
1987	1.12	0.91	1.94	1.63	
1988	1.55	1.30	2.73	2.33	
1989	1.79	1.50	2.83	2.40	
1990	1.59	1.34	2.62	2.25	
1991	1.80	1.56	3.03	2.67	
1992	2.09	1.84	3.49	3.11	
1993	2.08	1.83	3.45	3.00	
1994	n.a.	n.a.	n.a.	1.95 ^a	

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp. 344 and 347; a) 'Statistical Bureau Communique on China's Economic Development in 1994' in *Summary of World Broadcasts*, FE/2245 S2/1, 07.03.1995.

Tobacco is primarily consumed in-country with small amounts being exported (see Table III.18.). For example in 1993 58,676 tons of such tobacco was exported, representing barely 2 % of total output.

Table III.18. Exports and Imports of Tobacco, 1987-1993
(1,000 tons)

	Exports	Imports
1985 ^{a/}	17.8	29.0
1986	19.4	16.5
1987	19.0	26.1
1988	21.6	37.4
1989	25.4	20.7
1990	32.4	13.2
1991	74.0	14.7
1992	72.3	20.5
1993	58.67	n.a.

Source: UN, *UNCTAD Commodity Yearbook 1994*, UN, New York, 1994, pp 215, 217-8; a/ UN, *UNCTAD Commodity Yearbook 1992*, UN, New York, 1992, p. 215.

China is the largest producer and consumer of tobacco products in the world. Cigarette manufacturing has increased 45% since 1985 (see Table III.19.). Faced with declining sales in the West, international companies view China, with its estimated 300 million smokers, as an enormous potential market. Foreign companies such as R.J. Reynolds and Philip Morris of the USA and Rothmans International of the UK have already set up joint ventures in China. Better packaging, quality and strategic advertising have combined to make foreign cigarettes highly popular on the domestic market, although higher prices deter those with lower incomes purchasing foreign brands.

Table III.19. Output of Cigarettes, 1985-1994,
(million cases)

1985	23.70
1986	25.96
1987	28.81
1988	30.96
1989	31.95
1990	32.98
1991	32.26
1992	32.85
1993	33.76
1994	34.32

Sources: *1995 Statistical Yearbook of China*, China Statistical Publishing House, p. 410

Constraints and Prospects

The government has an ambivalent attitude towards cigarette consumption, particularly as tobacco is the largest source of tax revenue. To the extent that the government ignores anti-smoking advocates, the development of this sector is enhanced. A new law on advertising, which came into effect in February 1995, bans tobacco advertising not only on radio, TV and in print, but also in public places. Whether or not this proves a real constraint on cigarette promotion depends on how effectively the law is implemented at local level. Foreign cigarette manufacturers are doubtful that the law will be effectively enforced²⁵. Moreover the cigarette industry has faced similar restrictions in other countries and has developed other imaginative ways of promoting products.

TEA

Recent Trends

China is the world's second largest producer of tea, with India taking first place. Tea production has increased steadily in the years between 1985 and 1994, total output rising 39% in that period (see Table III.20.). The leading tea province is Zhejiang which accounted for 20 % of total tea production in 1993. Fujian and Hunan rank second and third respectively, accounting together for about a quarter of all tea output. The primary tea grown in China is green tea for domestic consumption whilst black tea is produced primarily for export. A substantial amount of domestic output is exported, the total amount in 1993 accounting for one third of total tea production.

Table III.20. Total Output, Exports and Imports of Tea, 1985-1994 (1,000 tons)

	Output	Exports	Imports
1985	432.0	136.7 ^{b/}	0 ^{c/}
1986	460.4	172.0	13.5
1987	507.9	174.3 ^d	12.1
1988	545.4	198.4	15.7
1989	534.8	204.6	3.9
1990	540.0	195.5	5.7
1991	541.5	184.9	4.2
1992	559.8	175.5	3.9
1993	599.9	201.4	
1994	588.0 ^a		

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp. 347, 515; a) 'USDA, 'China Soybean Trip Report', World Agricultural Production, WAP 10-1995, October 1995, p. 61; b) 1985/6 export figures from UN, 1988 International Trade Statistics Yearbook, vol. 1, UN, New York, 1990, p. 175; c) 1985/6 import figures from UN, UNCTAD Commodity Yearbook, 1992, UN, New York, p. 172; d) export and import figures 1987-1992 from UN, UNCTAD Commodity Yearbook 1994, New York, 1994;

Constraints and Prospects

With the consumption of alternative hot beverages such as coffee and cocoa still very low in China, tea can be expected to hold its dominant share of the hot beverages market.

FRUITS, VEGETABLES AND BEVERAGES

The Resource Base

With its climatic and ecological diversity China produces a range of fruits and vegetables. The main fruit crops are apples, citrus fruits, pear, grapes and bananas. Apples are grown mainly in the north and north-eastern provinces such as Liaoning, Shandong and Hebei as well as in central Shaanxi and Henan. China is now the world's largest producer of apples, forecast to yield 12.24 million tons in 1995/6²⁶. Crop increases are accounted for primarily by a growth in the number of trees. Between 1991 and 1994 the number of apple trees increased by 53 %²⁷. Traditional varieties form the bulk of the apple crop but improved varieties such as Fuji and Red Delicious are expanding. The main citrus-producing provinces are Sichuan, Guangdong and Zhejiang. New kiwi plant species from New Zealand were introduced into Sichuan in the early 1980s, making Sichuan a major centre of kiwi production in China. The western border-province of Xinjiang is by far the largest producer of grapes whilst southern Guangdong is the stronghold of bananas.

Recent Trends

Since 1985 total fruit output has more than doubled (see Table III.21.), yet the performance of individual crops has been even more spectacular. The output of bananas, for example, has more than quadrupled whilst grape and citrus fruit production has increased over three times.

Table III.21. Fruit Output (million tons)

	Total	Apples	Citrus	Pear	Grape	Bananas
1985	11.63	3.61	1.80	2.13	0.36	0.63
1986	13.47	3.36	2.54	2.34	0.44	1.25
1987	16.67	4.26	3.22	2.48	0.64	2.02
1988	16.66	4.34	2.56	2.72	0.79	1.82
1989	18.31	4.49	4.56	2.56	0.87	1.40
1990	18.74	4.31	4.85	2.35	0.85	1.45
1991	21.76	4.54	6.33	2.49	0.91	1.98
1992	24.40	6.55	5.16	2.84	1.12	2.45
1993	30.11	9.06	6.56	3.21	1.35	2.70
1994	34.78 ^b	11.12 ^a				

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 347; a) 1994 apple figure from USDA, WAP 8-95, World Agricultural Production, August 1995, p. 38; b)

'Statistical Bureau Communique on China's Economic Development in 1994' in *Summary of World Broadcasts*, FE/2245 S2/1, 07.03.1995

This rise in output has in turn been accompanied by an expansion of the total area given over to orchards (see Table III.22.) and a concomitant reduction in area of land devoted to grains. In 1993 orchards covered over twice the area of land than eight years previously.

Table III.22. Orchards at year-end (million ha), 1985-1994

1985	2.73
1986	3.67
1987	4.50
1988	5.06
1989	5.37
1990	5.17
1991	5.31
1992	5.81
1993	6.43
1994	n.a.

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 344.

The amount of land devoted to vegetables has also increased, rising by 70 % since 1985 (see Table III.23.). The main areas for vegetable cultivation are Sichuan, Guangdong and Shandong. According to FAO statistics vegetable output in 1994 was 30 % higher than in 1985.

Table III.23. Total Sown Area and Output of Vegetable Crops, 1985-1994

	(million h.a.)	(1,000 tons)*'
1985	4.75	99,374
1986	5.30	104,898
1987	5.57	109,808
1988	6.03	109,963
1989	6.29	112,655
1990	6.33	117,008
1991	6.54	118,604
1992	7.03	123,094
1993	8.08	125,513
1994		128,811

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, 1994, p. 344; a/ output figures from FAO, *FAO Yearbooks, Production, 1987-8, 1989-90, 1991, 1994*, FAO, pp 174, 173, 125 and 124 respectively.

Apples, oranges and mandarins are all exported (see Table III.24.). Whilst exports of mandarins and oranges rose 70 % between 1993 and 1994, exports of apples dropped by 10 %. Other exports include dried apricots, plums and raisins.

**Table III.24. Exports of Fruit, (tons)
1992 and 1993**

	1992	1993	1994
Fruit	145,602	319,723	500,000*
Mandarins and oranges	61,392	81,047	137,600*
Apples	38,317	119,419	107,000*
Pears		70,000*	97,000*

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 515 ; a) 'Fruit exports increased sharply in the first five months' in *China Economic Digest*, Autumn 1995, p.36.

Fresh, prepared and preserved vegetables are also exported (see Table III.25).

Table III.25. Exports of fresh, prepared and preserved vegetables, 1985-1994, (1,000 tons)

	Fresh and simply preserved vegetables	prepared and preserved vegetables
1985	362.6	234.7
1986	0.4	288.5
1987	415.6	329.8
1988	n.a.	345.8
1989	n.a.	332.1
1990	623.7	503.9
1991	1,279.6	547.9
1992	1,000.0	509.4
1993	747.6	556.4
1994	n.a.	n.a.

Sources: UN, 1988, 1989, 1993 *International Trade Statistics Yearbook*, Vol. 1, UN, New York, 1990, p. 175; 1991, p. 172; 1995, p. 188.

Edible vegetable oil

Edible vegetable oil production has increased by 80 % between 1985 and 1994 (see Table III.26.). In 1994 Shandong and Jiangsu were the leading provincial producers of this product, accounting for 21 % of total production. Exports of edible vegetable oil

doubled between 1992 to 1993, rising from 67,847 tons to 136,095 tons. At the same time there was a decline in the volume of imports, dropping from 420,000 tons in 1992 to 240,000 tons in 1993.

Table III.26. Output of Edible Vegetable Oil
1985 - 1994 (million tons)

1985	4.01
1986	4.41
1987	4.78
1988	4.80
1989	4.96
1990	5.44
1991	6.44
1992	6.61
1993	9.65
1994	7.23

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 410.

The rapid expansion in fruit cultivation has been accompanied by a growth in the canning industry. Fruit and vegetable canning account for the bulk of canned foods, comprising 67 % of total canned food output in 1993, the remainder being canned meat, poultry and aquatic products. Production has increased very steadily in the 1990s (see Table III.27.).

Table III.27. Output of Canned Foods including Canned and Bottled Fruit and Vegetables
1985-1994, (1,000 tons)

	Canned Foods ^{a/}	Fruit	Vegetables
1985	1,425.0	n.a.	n.a.
1986	1,641.0	n.a.	n.a.
1987	1,615.0	721.1 ^{b/}	459.9
1988	2,209.0	853.4	653.9
1989	2,325.0	947.8	715.5
1990	1,571.0	581.0	546.0
1991	1,930.0	754.3	648.1
1992	2,243.0	942.1	651.5
1993	2,303.0	880.9	665.7
1994	2,473.0	n.a.	n.a.

Sources: a/ Canned Foods from 1995 Statistical Yearbook of China, China Statistical Publishing House, 1995, p. 410; b/ 1987-1990 figures on fruit and vegetables from UN, Industrial Statistics Yearbook, 1990: Volume 2, Commodity Production Statistics, 1981-1990, UN, New York, 1992, pp 142-143, p. 145; 1991-1993 figures on fruit and vegetables from 1994 Statistical Yearbook of China, China Statistical Publishing House, pp. 412.

In 1993 34 % of canned foods was exported (see Table III.28.). Over a half of all canned vegetables and a quarter of all canned fruit were exported in this year.

Table III.28. Exports of Canned Fruit and Vegetables, (1,000 tons), 1991-1993

	1992	1993
	Export	Export
Canned Food	532.7	779.7
of which		
Fruit	103.6	236.2
Vegetables	335.1	373.5

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp. 515.

Constraints and Prospects

Farmer preference for growing fruit and vegetable crops, which have commanded more favourable prices than grain crops, provides a sound basis for the further development of the canning industry. However further investment in canning technology is required before any substantial progress in this sector can be made. Distribution and transport networks pose a constant constraint not only on the canning industry, but more generally on the food industry.

Beverages

The main beverages produced in China include alcoholic drinks such as beer, spirits and wines and non-alcoholic drinks such as juices, carbonated drinks and mineral water. China now has the world's second largest beer market, next to that of the US, enjoying a 20 % growth rate over the past decade. Alcoholic beverage production has increased 2.5 times since 1995, with beer accounting for two thirds of the total (see Table III.29.). There are 12,705 enterprises in this sector, of which 3,415 are state-run. In addition there are 6,355 township-run and 17,488 village-run enterprises engaged in manufacturing beverages.

Table III.29. Output of Alcoholic Beverages, Selected Years Between 1985-1994, (million tons)

	Alcoholic Beverages	of which Beer	Grape Wine	Spirits
1985	8.51	3.10		
1986	9.85	4.13		
1987	11.95	5.40		
1988	13.57	6.56		

1989	12.85	6.43		
1990	13.86	6.92		
1991	15.39	8.38	0.24 ^{a/}	5.24
1992	17.53	10.21	0.24	5.47
1993	19.71	11.92	0.24	5.94
1994	22.33	14.15		6.51

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, pp. 410, 412; a/ 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 412.

In 1979 China had 200 breweries with a total capacity of 700,000 tons²⁸. By 1995 there were around 850 local and regional brewers, with a total output of 14.15 million tons. But the beer market is consequently highly fragmented and regionalised. Moreover, most of the breweries are small-scale, often with a capacity of less than 30,000 tons, when the minimum capacity needed to be efficient is 50,000 tons. Their products are often of a low quality and wasteful of grain. Whilst the average grain consumption per ton of beer is less than 190 kilos, some breweries have an average of 420 kilos, compared with under 100 kilos in some developed countries.

Chinese brands make up the bulk of the market. The largest market share is taken by the popular Tsingtao which, however, lays claim to only 3 %. Whilst Tsingtao is exported all over the world, most beer is consumed domestically. Given the size of the beer market foreign companies have been eager to get a foothold.

By 1994 over 40 joint ventures had been set up or were in negotiation, involving contractual investment of US\$ 500 million²⁹. Joint ventures are concentrating on upgrading local beers though international brands are also starting to enter the market. Ginsber, one of the top ten brewers, set up a joint venture with Bass, a large UK brewer, in Jilin province in the north-east. Foster's Brewing Group from Australia also has set up joint ventures in Tianjin, Shanghai and Zhuhai³⁰. Singapore's Asia Pacific Breweries, which produces Tiger Beer, has formed a joint venture in Hainan Island; the Australian brewer Lion Nathan announced plans in October 1994 to open three breweries in China; San Miguel Brewery is expanding production in China; Budweiser has bought into a Sino-German brewer in Wuhan; and ASIMCO of the USA has set up a joint venture with Beijing Shuanghesheng Five Star Brewery Co. Ltd, China's second largest brewery³¹. The most popular foreign brand is Pabset Blue Ribbon, with annual sales of about 200,000 tons or 1.4 % of the market³².

As well as beer China has also started wine production on a joint venture basis. In 1994, for example, the French Group Pernod Richard set up a joint venture in Beijing to produce sweet and white wines³³. Martell, the high-quality brandy producer has two joint ventures in Tianjin and Shanghai³⁴.

Demand for soft drinks has increased rapidly in the reform period, particularly in the 1990s. In 1993 average annual per capita consumption of soft drinks came to 3.5 litres, less than 10 % of the world's average of 39.3 litres. China is currently the sixth largest international soft drinks market and is likely to become the world's largest soft drinks market by the year 2,000. There are at least 2,700 firms producing soft drinks, most of which use outdated technology, sell at low prices in local markets. Guangdong province is the leading soft drinks producer in China, accounting for almost 34 % of national output in 1994³⁵. Local brands account for 70 % of sales and market. Brand preferences differ in rural and urban areas. In the large cities famous brands such as Coca Cola, Pepsi, Sprite, Jianlibao, Jinmeile Xuefeili and Tianfu Cola dominate the market whilst in small towns and rural areas soft drinks produced by medium and small factories predominate.

The small scale and local nature of soft drinks manufacturers in China means there is much scope for national, regional and international producers. Carbonated soft drinks account for about 75 % of the drinks market in China³⁶. Both Coca-Cola and Pepsi-Cola have already entered the market and are in fierce competition with each other. Pepsi-Cola set up its first joint venture in 1983 and by 1994 had 12 joint venture bottling plants with a total investment of US\$ 175 million and two concentrate plants in Guangzhou. Coca-Cola entered the market in 1979 and by 1994 claimed 19 % of the market, outpacing Pepsi-Cola. The rest of the market was accounted for by lemon and lime drinks, which claimed 40 %, and orange, which claimed 34 %. Coca-Cola has 12 bottling plants. Together Pepsi-Cola and Coca-Cola account for 22 % of national production.

Mineral water consumption has increased rapidly in the 1990s. Output rose fifty times from 6,000 tons in 1985 to 300,000 tons in 1993³⁷, accounting for 5.7 % of the soft drinks market. Whilst in 1992 there were 250 mineral water factories, by 1994 this had doubled to 500. Leading the market is Shenzhen I-Li Mineral Water Company, although foreign companies such as Watson's are starting to enter the market.

China is not a major coffee producer or consumer. Yunnan province is the main coffee-producing area in China. Exports and imports are minimal. In 1992, for example, exports from China came to 100 tons, accounting for only 0.01 % of total exports in South and South East Asia (see Table III.30.).

In 1992 3,968 tons of coffee and coffee extracts were imported. In 1993 this figure was reduced by more than half to 1,453 tons. Rising coffee prices in 1995 following a poor harvest the previous year have encouraged farmers to devote more land to coffee.

Table III.30. Total Exports and Imports of Coffee, 1985-1992, (1,000 tons)

	Exports	Imports
1985 ^{a/}	5.0	5.2
1986	2.0	1.3
1987	2.1	0.7
1988	1.4	1.8
1989	5.7	5.3
1990	1.9	0.5
1991	0.5	1.4
1992	0.1	3.3
1993	n.a.	n.a.

Sources: UN, *UNCTAD Commodity Yearbook, 1994*, UN, New York, 1994, pp 157-158; a/ 1985-6 figures from UN, *UNCTAD Commodity Yearbook, 1992*, UN, New York, p. 156-7.

Likewise China is not a major producer or consumer of cocoa beans and its products. Imports of cocoa beans exceed exports (see Table III.31.) and this ratio has steadily increased over the decade.

Table III.31. Total Exports and Imports of Cocoa Beans, 1985-1994, (1,000 tons)

	Exports	Imports
1985 ^{a/}	0	6.3
1986	3.1	27.2
1987	3.1	14.5
1988	2.6	16.8
1989	1.9	24.0
1990	0.7	10.1
1991	0.1	30.3
1992	0.0	30.9
1993	n.a.	34.0
1994	n.a.	n.a.

Source: UN, *UNCTAD Commodity Yearbook 1994*, UN, New York, 1994, pp 164-165; a/ 1985-6 figures from UN, *UNCTAD Commodity Yearbook 1992*, UN, New York, 1992, pp 163-4.

Exports of cocoa products exceed, however, imports (see Table III.32.), apart from 1988 when imports exceeded exports by 5,500 tons.

Table III.32. Exports and Imports of Cocoa Products, 1985-1994, (1,000 tons)

	Exports	Imports
1985 ^{a/}	5.9	0
1986	9.5	4.3
1987	10.2	2.3
1988	11.1	16.6
1989	10.7	3.0
1990	11.1	0.2
1991	14.2	2.4
1992	15.5	0.7
1993	n.a.	n.a.
1994	n.a.	n.a.

Sources: UN, *UNCTAD COMMODITY YEARBOOK, 1994*, UN, New York, 1994, pp 167-8; a/ Export and Import figures for 1985-6 from UN, *UNCTAD COMMODITY YEARBOOK, 1992*, UN, New York, 1992, p. 165.

Fruit and vegetable juice production has also taken off in the reform period but compared to carbonated drinks, accounts for only a small share of the total soft drinks market, namely 1.7 %. Fruit juice producers in China include Chengbao, a Tianjin-based joint venture producing orange juice, Beijing-based Huabei, and Great Lakes Fresh Food Juice. Orange juice accounts for half of the Chinese market for fruit juices. Foreign companies have also entered the market. Beijing Oasis, a Hong Kong joint venture, started production of apple, pear and apricot juices in January 1995. A second factory in Wanxian, Sichuan, a major orange growing region, is planned to start production in January 1996. In North East China the Jiamusi City Concentrated Fruit Juice Factory has started production of gooseberry juice, exporting 70 % of its output to Europe and Asia²⁸. In Heilongjiang the development of a melon drink won state and international prizes and is exported to Japan, Russia and the Republic of Korea²⁹. Apart from some well-known brands such as Coconut, Qianqli, Weijia, Jianlibao and Shenmei, most juice factories are small-scale and low capacity. Leading health drinks brands include Tain Chi Pollen, Ko-Fu-I and Wu-Gi-Bei-Fon.

Constraints and Prospects

Although beer consumption in China is low by world standards - for example, average annual per capita consumption in China comes to 11 litres compared with the US average of 83 litres - beer consumption is growing at the rate of 20 % per year. The beer market thus has great potential. By the year 2,000 it is expected that China will become the world's largest beer market. Whilst the beer industry has enjoyed an annual average growth rate of 25 % since the 1980s, over the next five years growth is planned at 5 to 8 % as the focus will be on quality. Still it is expected that total production will reach 20 million tons by the year

2,000⁴⁰.

Reliance on malt imports is one important constraint on the development of the industry. Currently China imports one million tons of barley a year and still is not able to produce a regular supply of top quality malt. Storage and distribution are also major constraints. If beer is not properly stored, it has to be consumed quite soon after brewing, which has implications for the extent of marketing. Inefficient distribution operations also constrain the development of the industry. For example Harbin brewery distributes its product through 400 wholesalers within Harbin⁴¹. Inadequate rail and road capacity is a further constraint.

The next few years are likely to see increasing foreign brand competition in fruit juice production. Well-known companies such as the Canadian Tropicana and Sunripe are expected to enter the market in the near future. Given the lower quality of soft drinks produced by medium and small factories, it is likely that these will gradually be pushed out of the market by the end of the century. Given the popularity of vegetable juices, cold tea and health drinks, production of these soft drinks is likely to expand over the next decade. Competition for these niche sectors will be particularly strong amongst smaller international drinks companies from Asia, which are familiar with the Chinese taste profile.

With ownership of household refrigerators set to grow rapidly, it is likely that soft drinks will be consumed increasingly in the home. In the 1990s 80 % of consumption took place in hotels, bars and restaurants, compared with an average of 40 % in developed economies. Supermarkets and other retail outlets account for only 3 % of the soft drinks market, again auguring well for growth in this sector. Since 1988 China has accounted for 55-60 % of the growth in consumption of carbonated drinks in Asia, suggesting that there is great scope for the expansion of this industry. The production volume of soft drinks is set to expand by 62 % between 1994 and 1997.

One potential constraint on the expansion of foreign brand names such as Coca Cola and Pepsi Cola is political opposition. At three National People's Congress sessions in the 1990s the dominance of the market by these companies was debated. Again in 1995 a motion was tabled to restrict their influence but this was rejected by a majority of delegates on the basis of the need to step ahead with the reforms.

Mineral water consumption is expected to double over the coming five years. With improvements in hygiene standards and better packaging, growth could be even higher.

MEAT AND POULTRY PRODUCTS

The Resource Base

Since 1978 year-end animal inventories as well as the value of livestock production have increased substantially (see Table III.33.). China leads world pork production and is second only to the USA in overall meat production. The main meat produced and consumed in China is pork but poultry production and consumption have increased rapidly in the 1980s.

Table III.33. Number of Livestock, 1985-1994, (million head)

	Cattle and Buffalo	of which cows	Slaughtered Fattened Hogs	Hogs Year-end	Goats	Sheep
1985	86.82	1.62	238.75	331.39	61.67	94.21
1986	91.66	1.84	257.21	337.19	67.22	99.00
1987	94.65	2.16	261.77	327.73	77.68	102.65
1988	97.94	2.22	275.70	342.21	90.95	110.57
1989	100.75	2.52	290.23	352.81	98.13	113.50
1990	102.88	2.69	309.91	362.40	97.20	112.81
1991	104.59	2.94	328.97	369.64	95.35	110.85
1992	107.84	3.13	351.69	384.21	97.61	109.71
1993	113.15	3.42	378.23	393.00	105.69	111.61
1994	123.30 ^a		414.62 ^b			

Source: 1994 Statistical Yearbook of China, pp 350-1; a) from 'Table 22 Cattle and Buffalo Inventories, Selected Countries', FAS, USDA, October 1995, p. 50; b) from 'Table 24 Hog Inventories, Selected Countries', FAS, USDA, p. 52.

The contribution of animal husbandry to overall agricultural production has increased over the last decade. Whilst in 1985 animal husbandry accounted for 19.3 % of agricultural production, by 1991 this had risen to 22.3 %². The ratio of the value of livestock production to that of crop output is one measure of the relative importance of livestock production. In China this ratio rose from 1:4 in 1979 to almost 1:2 in 1988, implying that the value of livestock production is about half that of crop output³.

Cows are raised in the north and west of China, namely, in Xinjiang, Tibet, Heilongjiang, Inner Mongolia and Hebei provinces. The main hog-producing area is Sichuan which in 1993 accounted for 18 % of total stock. Other key areas for hogs are Jiangsu, Shandong, Hubei, Guangdong and Hunan. Guangdong, for example, has 100 farms raising over 5,000 pigs each. Goats are mainly raised in Shandong which laid claim to 20 % of total stock in 1993. Henan is the next major home to goats. Xinjiang accounted for 21 % of all sheep in 1993, followed by Inner Mongolia, Tibet and Qinghai.

The key meat producing areas are Sichuan, Shandong, Guangdong, Hunan and Jiangsu. In 1993 Guangdong produced 2.6 million tons of meat, ranking second in the country^a. Sichuan leads pork production whilst Shandong and Henan produce most beef. Mutton is produced mainly in Shandong, Xinjiang and Inner Mongolia. Guangdong, Jiangsu and Sichuan are the main producers of poultry. Shandong leads in rabbit meat, accounting for 38 % of total rabbit meat in 1993.

Pastoral areas in the north and north-west of China tend to have higher average per capita meat consumption rates than cropping areas in the south and south-east and eat more beef and mutton. High grain-producing provinces such as Sichuan, Jiangsu and Hunan tend to produce and consume more pork. Urban residents have higher meat consumption rates than rural inhabitants though there is considerable regional variation.

Guangdong is the largest fodder producer in China. With over 300 fodder factories it produces an annual volume of 3.6 million tons.

Recent Trends

Whilst meat output more than doubled between 1985 and 1994, the performance of individual varieties was more impressive (see Table III.34). Beef output rose fivefold, poultry and rabbit meat output quadrupled. High output increases were also scored by pork, which doubled and mutton, which almost trebled between 1985 and 1994. Egg production has also doubled in that period, the first provincial statistics only being published in 1984.

Table III.34. Output of Livestock Products, 1985-1994

	Output of Meat (million ton)	of which					
		Pork	Beef	Mutton	Poultry	Rabbits	Eggs
1985	19.26	16.54	0.46	0.59	1.60	0.05	5.34
1986	21.12	17.96	0.58	0.62	1.87	0.07	5.55
1987	22.15	18.34	0.79	0.71	2.19	0.10	5.90
1988	24.79	20.17	0.95	0.80	2.74	0.11	6.95
1989	26.28	21.22	1.07	0.96	2.82	0.10	7.19
1990	28.57	22.81	1.25	1.06	3.22	0.09	7.94
1991	31.44	24.52	1.53	1.18	3.95	0.10	9.22
1992	34.30	26.35	1.80	1.25	4.54	0.18	10.19
1993	38.41	28.54	2.33	1.37	5.73	0.20	11.79
1994	43.00 ^{a/}	32.04 ^{b/}	2.41 ^{c/}	1.60 ^{d/}	6.47 ^{e/}		

Source: 1994 Statistical Yearbook of China, pp 352-3;

a/ 'Statistical Bureau Communique on China's Economic Development in 1994' in *Summary of World Broadcasts*, FE/2245 S2/1, 07.03.1995; b/ from 'Table 25, Pork Production, Selected Countries', FAS, USDA, p.53; c/ from 'Table 23 Beef and Veal Production, Selected Countries', FAS, USDA, p. 51; d/ from 'Table 27, Lamb, Mutton, Goat Meat Production, Selected

Countries', FAS, USDA, p.55; e/ from FAO, FAO Yearbook, Production, Vol. 48, 1994, FAO, 1995, p. 210.

The government has actively promoted the development of poultry and ruminants on the basis of an assumption of more favourable feed conversion rates. For example it is argued that whilst 2.5 to 3 kilos of feedgrain are needed to produce 1 kilo of poultry, almost double that amount is needed to yield one kilo of pork. Demand for poultry meat and eggs has been particularly vigorous around big cities as a result of rising incomes.

Both live animals such as hogs, cattle and chicken as well as frozen meat are exported, the key market of the former being Hong Kong and the latter the Middle East and Eastern Europe. The main exported meat is pork but its percentage contribution to total frozen meat has fallen since 1985 (see Table III.35.). Whilst in 1985 frozen pork accounted for 61.8 % of exports, by 1993, this had dropped to 25.5 %.

Table III.35. Exports of Frozen and Dried, Salted and Smoked Meat, 1985-1994, (1,000 tons)

	Frozen Meat	Frozen Pork	Dried, Salted Smoked Pork
1985	179.4	111.0	98.5
1986	172.3	104.6	88.6
1987	170.8	99.9	93.7
1988	n.a.	63.4	81.5
1989	n.a.	88.4	86.3
1990	301.6	124.2	n.a.
1991	332.3	116.6	n.a.
1992	202.4	48.3	n.a.
1993	229.7	58.7	n.a.
1994	n.a.	n.a.	n.a.

Sources: UN, 1988, 1989, 1993 *International Trade Statistics Yearbook*, Vol. 1, UN, New York, 1990, p. 175; 1991, p. 172; 1995, p. 188.

The rapid expansion of fast-food restaurants, particularly in southern China, is likely to push up demand for meat such as beef and poultry. Joint venture fast-food restaurants include MacDonald's, which had 22 restaurants by 1994, Kentucky Fried Chicken and California Beef Noodle King. MacDonald's has a commitment to 100 % local sourcing which is already having an impact on the baking and meat processing industry. For example in 1992 a meat plant opened in Shenzhen, producing meat patties, chicken patties, chicken McNuggets and hamburgers for sale in southern China and Hong Kong.

The processing of meat into canned meat has also increased (see Table III.36.)

Table III.36. Total Output of Canned Meat, 1985-1994
(1,000 tons)

1985	n.a.
1986	n.a.
1987	235.7
1988	402.9
1989	305.5
1990	234.5
1991	285.5
1992	280.3
1993	264.6
1994	n.a.

Sources: 1987-1990, UN, *Industrial Statistics Yearbook, 1990: Volume 2, Commodity Production Statistics, 1981-1990*, UN, New York, 1992, p. 110; 1991-1993, 1994 *Statistical Yearbook of China*, China Statistical Publishing House, p. 412

Constraints and Prospects

The livestock sector will continue to grow over the next decade but the rate will be more modest due to the slow growth in grain output. The expansion of the livestock sector will depend on the growth of feedgrain supplies and the development of feed manufacturing. In the pre-reform period the livestock industry was not made up of specialised divisions for feed, feeding, slaughtering and distribution and there was virtually no feed industry. Processed feed made up less than 10 % of total grain supplies to animals⁵⁵. Although feed manufacturing has progressed rapidly in the 1980s, domestic supplies in 1988 still only accounted for around 30 % of total grain fed to animals. Key constraints on the development of the feedgrain industry include the poor availability of feedgrain in rural areas, a lack of protein meals used in mixing feed and a shortage of new machinery and blending technology. Thus China will continue to rely on imports of feedgrain, oilseed meal and feed additives over the next decade.

Rising living standards are likely to continue to increase the demand for meat. Annual per capita consumption of pork has risen from 13.84 kilos in 1985 to 18.22 kilos in 1992, an increase of 31 %. whilst annual per capita consumption of beef and mutton rose 56 % from 1.31 kilos to 2.05 kilos. Annual per capita consumption of poultry rose from 1.56 kilos in 1985 to 2.31 kilos in 1992, an increase of 48 %. These figures are way below world average consumption rates. For example annual world average per capita consumption of red meat came to 35 kilos in 1988 and of poultry to 11.1 kilos⁵⁶. Thus there is considerable potential for growth in this industry.

Pork is likely to continue to be the main meat produced and consumed in China though its relative importance in total meat output is likely to decline as the poultry and dairy industries continue to expand. Any significant expansion of ruminant meat production will require, however, considerable investment in the pasturelands.

Livestock pricing policy is an important constraint on the development of the livestock sector. Currently prices are not sufficiently sensitive to regional and seasonal variation and do not adequately reflect the different production costs of various meats, such as poultry and pork. Additionally maize pricing policy and pig-raising are closely related. For example the rise of the price of maize in 1994 led to a concomitant rise in the price of pigs. As farmers increased pork production, the subsequent oversupply led to a fall in the price of pigs and a shrinking of supply in 1995. Further inhibiting factors on the development of the livestock sector are the poor transport and storage facilities, poor information and lack of research into the economic aspects of the livestock industry.

DAIRY PRODUCTS

Recent Trends

In the 1980s the reformers vigorously promoted the dairy industry based on the assumption of a more favourable feed conversion rates in comparison with pigs. The stock of cows and cow milk production has thus doubled since 1985, especially in Heilongjiang and around large urban centres like Beijing, Tianjin, Shanghai, Nanjing, Xian and Wuhan (see Table III.37.).

Table III.37. Output of Milk (million tons), 1985-1994

	Milk	of which cow milk
1985	2.89	2.49
1986	3.32	2.89
1987	3.78	3.30
1988	4.18	3.66
1989	4.35	3.81
1990	4.75	4.15
1991	5.24	4.64
1992	5.63	5.03
1993	5.63	4.98
1994	n.a.	5.30*

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, pp. 352-3; a) 'Statistical Bureau Communiqué on China's Economic Development in 1994' in *Summary of World Broadcasts*, FE/2245 S2/1, 07.03.1995.

Although dairy products increased steadily in the 1990s (see Table III.38.), China is not self-sufficient in dairy products, with imported dairy products accounting for 40 % of the market⁴⁷.

Table III.38. Output of Dairy Products (tons), 1991-1993

	1991 ^{a/}	1992	1993	1994
Dairy products	376,0625	412,865	417,368	424,521
Of which				
Milk powder	293,856	336,545	294,404	299,431

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 416; 1991 figures from 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 413.

Milk powder is the main product, accounting for 70% of total dairy products output in 1993. In order to alleviate demand for fluid milk the World Food Programme has donated skimmed milk powder and assisted in the expansion of the industry⁴⁸.

Other products include icecream, yoghurt and condensed milk. Production of condensed cream and milk has increased over the decade but China still remains a very small contributor to the overall market, accounting in 1990 for only 1.4 % of the world market (see Table III.39.).

Table III.39. Total Output of Condensed Milk and Cream, and Dried Milk and Cream, 1985-1990, (1,000 tons)^{a/}

	Condensed milk and cream	Dried milk and cream
1985	52.4	19.2
1986	55.9	19.8
1987	59.6	19.6
1988	61.4	20.5
1989	63.4	21.0
1990	66.9	21.5

Sources: UN, Industrial Statistics Yearbook, 1990: Volume 2, Commodity Production Statistics, 1981-1990, pp. 121 and 123, UN, New York, 1992; a/ figures for 1991-94 are not available.

Similarly China is also a very minor producer of dried milk and cream, accounting in 1990 for only 0.27 % of world production (see Table III.39.).

With the expanding market in dairy products, foreign companies have already begun to enter the market. Nestle's has four joint

ventures in China. Shuangcheng City Dairy Industry Corporation in Heilongjiang province was the first to become operational in 1990, producing infant formula, infant cereals and full-cream milk powder". The second joint venture went into operation in November 1991 and produces instant coffee and coffee creamer. Another joint venture in Guangzhou produces icecream. Other new joint ventures plan to produce milk powder, sweet condensed milk, icecream and yoghurt.

Since 1990 domestic production of icecream and sales have increased at an annual rate of 20 %. At the end of 1994 China had over 500 large and medium-sized icecream enterprises and an even larger number of smaller producers, with an estimated total output that year of 800,000 tons of icecream⁵⁰. Half of China's 200 icecream production lines are imported. Several foreign companies such as Anglo-Dutch Unilever Ltd. (Walls), Meadow Gold, Nestle, Kraft have set up joint ventures to produce icecream. Foreign brands dominate the higher end of the market because of their superior quality, packaging and promotion. In Beijing Wall's icecream and a local brand, New Continent, account for 30 % of the market, whilst the remaining 70 % is shared by 260 enterprises.

Fermented milk drinks are also produced and marketed mainly for children in China. Market leaders are Wa-Ha-Ha though Guangdong Hwa-Shien-Mei-Lo Groups is the largest producer, turning out one million bottles a day. Other products are yoghurt drinks, which are produced mainly in the north-west of China.

Constraints and Prospects

As with meat production the price of maize is an important determinant of the profitability of raising cows for milk production. With rising incomes, higher ownership rates of refrigerators and demand for a more varied diet demand for icecream and other dairy products is likely to rise over the next decade.

FISH PROCESSING

The Resource Base

With 147 million hectares of fishing ground in the coastal areas China has an expansive area for the development of aquatic products. In addition an extensive network of rivers provide ideal territory for freshwater fishing. In the reform period the rapid development of artificially raised fish, both freshwater and seawater, have added significantly to the resource base. As well as fish, China is also a major producer and consumer of shell-fish, shrimps, prawns and crabs as well as algae. Jiangsu, Hubei and Guangdong provinces in the centre and south of China are the main sites for freshwater aquatic products.

Recent Trends

Since 1985 the total amount of fresh and seawater aquatic products has more than doubled and the percentage of agricultural production accounted for by fishery has risen from 2.4 % in 1985 to 3.7 % in 1991. (see Table III.40.).

Table III.40. Total Output of Aquatic Products (million tons), 1985-1994

	Total Aquatic Products	Seawater Aquatic Products	Freshwater Aquatic Products
1985	7.05	4.19	2.85
1986	8.23	4.75	3.48
1987	9.55	5.48	4.07
1988	10.60	6.05	4.55
1989	11.51	6.61	4.90
1990	12.37	7.13	5.23
1991	13.50	8.00	5.50
1992	15.57	9.33	6.23
1993	18.23	10.76	7.46
1994*	20.98	12.08	8.90

Sources: Adapted from 1994 *Statistical Yearbook of China*, China Statistical Publishing House, p. 354; a) 'Statistical Bureau Communique on China's Economic Development in 1994' in *Summary of World Broadcasts*, FE/2245 S2/1, 07.03.1995

Artificial cultivation of both seawater and freshwater aquatic products has contributed significantly to the rapid rise in output of aquatic products. For example artificially cultured seawater aquatic products have quadrupled since 1985, from 712,300 tons to 3 million tons in 1993. Fish account for half the total output of seawater aquatic products and 95 % of freshwater aquatic products. Also important are shellfish which make up 27 % of seawater aquatic products. Since 1985 the output of fish has doubled (see Table III.41.).

Table III.41. Total Output of Fish (million tons)

	Total fish output	of which seawater	of which freshwater
1985	5.51	2.74	2.76
1986	6.45	3.09	3.36
1987	7.45	3.51	3.93
1988	8.03	3.62	4.40
1989	8.55	3.83	4.72
1990	9.28	4.23	5.04
1991	9.96	4.66	5.30
1992	11.16	5.17	5.98

1993	12.67	5.57	7.10
1994	n.a.	n.a.	n.a.

Sources: Adapted from 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 355.

The output of shellfish from seawater has grown six times since 1985, whilst shrimp, prawn and crab output has doubled (see Table III.42.).

Table III.42. Output of Seawater and Freshwater Shellfish, Shrimp, Prawns and Crabs, (million tons) 1985-1994

	Seawater Shellfish	Shrimp, Prawns, crabs	Freshwater Shellfish	Shrimp, prawns C r a b s
1985	0.473	0.706	0.033	0.055
1986	0.658	0.769	0.056	0.062
1987	0.889	0.840	0.053	0.810
1988	1.144	1.033	0.059	0.850
1989	1.375	1.057	0.073	0.950
1990	1.473	1.071	0.076	0.940
1991	1.586	1.194	0.850	1.070
1992	2.044	1.274	1.050	1.240
1993	2.855	1.386	1.629	1.333
1994	n.a.	n.a.	n.a.	na.

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 355.

Fish is processed through salting, drying and smoking (see Table III.43.). Imports of salted, dried or smoked fish outweigh exports and in 1993 accounted for 5 % of world imports.

Table III.43. Total Output, Exports and Imports of Fish, salted, dried or smoked, (1,000 tons), 1985-1994

	Output	Exports	Imports
1985	125.7	0*	19*
1986	151.3	0	23*
1987	89.9	1.9	26.9
1988	90.6	1.1	8.9
1989	110.7	1.8	12.7
1990	180.6	2.7	6.9
1991	200.9	3.5	5.3
1992	202.3	6.4	15.8
1993	202.1	6.2	25.9
1994	n.a.	n.a.	n.a.

Sources: UN, Industrial Statistics Yearbook, 1990: Volume 2, Commodity Production Statistics, 1981-1990, UN, New York, 1992, p. 149; a/ All export and import figures and output figures for 1990-1993 from FAO, FAO Yearbook, Fishery Statistics, Vol. 77,

1993, FAO, Rome, pp. 157, 180; * = FAO estimates.

Whilst China was a net exporter of fresh, frozen and chilled fish between 1985 and 1987, by 1988 it was already on the way to becoming a net importer (see Table III.44.). By 1993 imports exceeded exports by 0.17 million tons. China has yet to develop this field of production. Processing technological capacity is an important constraint on this sector.

Table III.44. Total Output, Exports and Imports of Fresh, chilled and frozen fish, 1985-1994, (1,000 tons)

	Output	Exports	Imports
1985	668.0	65.0	43.0*
1986	878.3	85.0	47.0*
1987	849.0	93.0	49.0
1988	977.3	91.9	99.6
1989	988.9	104.7	159.0
1990	1,298.1	121.2	121.6
1991	1,326.0	146.8	125.7
1992	1,347.6	188.8	329.4
1993	1,466.1	211.0	390.2

Source: FAO, *FAO Fishery Statistics, Vol. 77, 1993*, FAO, Rome, pp 110, 145-4; * FAO estimates.

Unlike fish, exports of fresh, frozen and salted crustaceans outweigh imports (see Table III.45.).

Table III.45. Total Exports and Imports of Fresh, frozen and salted crustaceans, 1985-1994, (tons)

	Exports	Imports
1985	45,000*	5,300*
1986	84,800*	6,000
1987	123,212	7,959
1988	171,129	8,152
1989	187,279	10,202
1990	230,485	11,909
1991	209,703	16,323
1992	239,109	42,285
1993	239,233	79,616
1994	n.a.	n.a.

Source: FAO, *FAO Yearbook, Fishery Statistics, Vol. 77, 1993*, pp 196, 212, 213; * = FAO estimates.

Both fish products and preparations as well as crustacean and mollusc products and preparations are produced and exported (see Table III.46.). The latter products refer, for example, to canned crab meat, canned prawns, shrimps and molluscs. Between 1985 and 1993 China exports of fish products and preparations as a percentage of total output rose from 13 % to 25 %. China is a net exporter of crustaceans and mollusc products and preparations, with exports accounting for 80 % of output in 1993. China accounts for almost 6 % of world exports of crustaceans and mollusc products and preparations.

Table III.46. Total Output, Exports and Imports of Fish products and preparations and crustacean and mollusc products and preparations, 1985-1994, (1,000 tons)*'

	Fish			Crustaceans and molluscs		
	Output	Exports	Imports	Output	Exports	Imports
1985	49.7	6.5	n.a.	8.7*	n.a.	n.a.
1986	65.6	7.5	n.a.	10.8*	n.a.	n.a.
1987	69.2	8.0	0.0	14.6*	0.8	0.01
1988	70.5	9.5	0.3	14.5	1.9	0.03
1989	72.9	10.2	0.5	16.3	2.0	0.05
1990	72.0	11.2	0.2	16.2	1.9	0.08
1991	79.8	14.8	0.3	21.0	2.8	0.2
1992	82.0	17.7	0.3	21.9	17.0	2.8
1993	93.0	23.4	1.6	24.0	19.3	1.2
1994	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Source: FAO, *FAO Yearbook, Fishery Statistics, Vol. 77, 1993*, FAO, Rome, pp 110, 144-5, 258, 274-5; * = FAO estimate; a/ figures include both products contained or not contained in airtight containers.

As well as canned fish, crustaceans and molluscs, China also produces various kinds of oils and fats from aquatic sources, but is not a leading producer in this field, accounting in 1993 for only 0.8 % of total world production (see Table III.47.). Exports are negligible and imports equalled 35 % of output in 1993.

Table III.47. Total Output, Exports and Imports of Oils and Fats of Aquatic Origin, 1985-1994, (tons)

	Output	Exports	Imports
1985	14,429	n.a.	n.a.
1986	6,141	n.a.	n.a.
1987	11,187	5	968
1988	13,798	2	1,114
1989	14,000	0	1,030
1990	10,695	44	752

1991	10,000	13	1,399
1992	10,000	203	2,045
1993	10,000	257	3,501
1994	n.a.	n.a.	n.a.

Source: FAO, *FAO Yearbook, Fishery Statistics, Vol. 77, 1993*, FAO, Rome, pp 286, 300-1.

China is a major importer of meals, solubles and similar animal feedstuffs of aquatic animal origin, accounting for 11 % of world imports in 1993 (see Table III.48.). Although output has increased 1.8 times since 1985, China is far from self-sufficient in this product, importing more than four times the volume it produces.

Table III.48. Total Output, Exports and Imports of Meals, solubles and similar feedstuffs of aquatic animal origin, 1985-1994, (tons)

	Output	Exports	Imports
1985	54,500*	n.a.	191,262*
1986	51,200*	n.a.	201,447*
1987	56,800*	432	220,680
1988	58,700*	801	456,835
1989	90,000	1,046	472,310
1990	110,000	2,233	223,904
1991	100,000	2,327	634,291
1992	100,000	1,077	639,546
1993	98,000	491	434,197
1994	n.a.	n.a.	663,396 ^{a/}

Source: FAO, *FAO Yearbook, Fishery Statistics, Vol. 77, 1993*, FAO, Rome, p. 312; a/ from *China's Customs Statistics, 1994, 12*, p. 26.

Constraints and Prospects

The processing of aquatic products is hampered by the lack of advanced technology. Currently China is only able to process 30.7 % of its annual aquatic output into value-added finished products⁵¹. The Ministry of Agriculture plans to process 50 % of annual fish production by the year 2,000.

13. Confectionery and chocolates

Past Trends

China is not a major producer of chocolate or confectionery. However rising incomes, advertising and changing taste profiles imply a growing demand for such products. Foreign companies are securing a strong position in the growing biscuit market. UB Asia Pacific, a wholly owned subsidiary of the British United Biscuits (Holdings) set up a joint venture in 1988 in Shekou, producing

20,000 tons of biscuits a year. In 1995 it also set up a wholly owned factory in Hangzhou, Zhejiang Province, in part to get around the problems of transporting and distributing a product with a short shelf-life from south to north. A key rival is the French company Danone which has a joint venture in Shanghai. The US biscuit manufacturer Nabisco has a joint venture in Beijing. The Singaporean Khong Guan also has two joint ventures in China⁵².

Constraints and Prospects

Given the short shelf-life of these products, the inadequate distribution infrastructure poses a key constraint on the development of this industry. Expansion of domestic production is also constrained by growing pressure on sugar supply as well as the limited output of the emerging dairy industry.

14. Instant convenience foods

In 1990 it was estimated that less than 30 % of food in China had been processed⁵³. However food processing is gradually emerging as an important export industry. There are over 800 instant noodle manufacturers with about 1,200 production lines⁵⁴. Foreign companies have also begun to enter this market. For example in September 1994 Nestle's third joint venture, Maggi Dongguan Ltd., started production of instant noodles, chicken bouillon, Maggi seasoning. Canned food production has also taken off in the reform period, with output quadrupling between 1980 and 1990. By 1990 China accounted for 5 % of total world trade in canned goods.

Constraints and Prospects

The lack of efficient distribution networks, refrigerated transport and cold storage facilities are important constraints on the expansion of this sector. Considerable domestic and foreign investment are needed to develop this sector more rapidly.

B. TEXTILES AND GARMENTS

TEXTILES

The resource base

Cotton: China's textile industry is based heavily on domestic cotton. The most important cotton-growing provinces are Xinjiang in the far interior, and Henan, Jiangsu and Hubei. The textile industry normally absorbs some 95% of domestic cotton production, and the remainder, which is exported, is matched by a slightly larger volume of cotton imports. Cotton imports increased sharply in 1994 as a result of shortfalls in domestic cotton production.

For many decades China has been the world's largest producer of cotton, accounting for about a quarter of world output. It is not a major player in international trade in cotton, and normally accounts for only about 5% of world exports and imports.⁵⁵ Chinese cotton purchases in world markets in 1994 and 1995 are thought to have driven up world prices, however.

Table III.49. Cotton: cultivated area, production and yields

	1978	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Cultivated Area ('000 hectares)	4867	5141	4306	4844	5535	5203	5588	6538	6835	4985	5528
Output ('000 tonnes)	2167	4147	3540	4245	4149	3788	4508	5675	4508	3739	4341
Yield (kg per hectare)	450	810	825	870	750	735	810	870	660	750	785

Source: China Statistical Yearbook, 1995

Cotton yields increased significantly as a result of the agricultural reforms of the late 1970s and early 1980s, under which the land effectively was decollectivised and allocated to peasant households under the production responsibility system; also, government procurement prices were raised. The target for cotton output which was to have been achieved by 1985 under the Sixth Five Year Plan (1981-5) was actually achieved by 1981. A peak output of 6.25 million tonnes was reached in 1984, with crop yields almost double those of 1978. This surge in output generated problems for the government, which was unable to buy or fully dispose of the available supplies of cotton. Although cotton exports were increased during the mid-1980s, there were limits on export expansion as a means of disposing of excess supplies since Chinese cotton is perceived on world markets as being of low quality. Measures were taken to reduce supply, including the lowering of procurement prices, and farmers as a result found it difficult to sell their production. These measures were later regarded by the government as excessive, as excess demand for cotton appeared in 1987.⁵⁶ Cotton, as a labour-intensive crop, faced competition for labour with the growth in China of non-farm employment, and came to be regarded by peasants as a high-investment, low profit crop. There was a reduction in cultivated area by over a third between 1984 and 1987.

Serious shortfalls in cotton production emerged in the early 1990s as a result of crop pests, and continuingly inadequate government procurement prices in the face of domestic inflation, with the consequent loss of cotton land to other crops. In 1994 cotton production rose 16% over 1993's exceptionally low crop of 3.7 million tonnes, and the government brought the cotton market under tighter control in an attempt to curb price rises.

Silk: China is the largest world producer and exporter of silk. Silk is produced in both coastal regions and the interior. The main producing provinces are Sichuan, Jiangsu, Zhejiang and Guangdong. The centre of silk production is the city of Suzhou, which accounts for 19% of China's silk exports.⁵⁷ Silk comprises 30% of China's exports of textile fibres (SITC 26), and 5% of China's exports of textile yarns and fabrics (SITC 65).⁵⁸ Silk output has increased consistently during the reform period, and by the early 1990s had more than tripled compared to 1978 (Table III.50.). 90% of China's silk is exported.⁵⁹ There were problems in production for export markets in 1987-8, with some shortages and prices rises resulting from the dismantling of central control over silk buying within China.⁶⁰ Central control was reestablished in the early 1990s, though subsequently relaxed. Recent reports suggest that there are continuing problems, since processing capacity for silk has risen faster than raw silk production, and actual purchasing prices paid by factories in 1995 were running some 25% higher than state-fixed prices.⁶¹

Synthetic fibres and yarns: synthetics production started to develop in the late 1950s, and its subsequent growth, prior to the 1978 reforms, was stimulated by cotton shortages and by the development of China's oil industry. In the 1970s many contracts were made with foreign firms, mainly Japanese, for the supply of equipment for artificial fibre production.⁶² Domestic capacity for synthetic fibres has been increased considerably since 1978, using the country's growing domestic resource base for petrochemicals. However, although there has been a tenfold increase in the production of chemical fibres since 1978, cotton products still provide the bulk of yarn and cloth output (see Table III.50.). About 45% of chemical fibre is made into garments and some 18% is used in the manufacture of decorative fabric.⁶³

Wool: China is the world's fourth largest producer of wool (after Australia, the former USSR and New Zealand). Only about 3% of the country's wool production is exported directly, and the export of woollen piece goods is also minimal. China has experienced some problems of low quality in its wool production, which has limited its export possibilities. In 1985 the Ministry for the Textile Industry set up fine wool production bases in an attempt to improve quality, and from 1987 established auctions where price was linked to quality grades.⁶⁴ Wool stockpiles developed in the late 1980s due to reduced government procurement resulting from financial shortages. Wool production makes up only 4% of the volume of China's fibre mill output, but nearly 16% of the value

of its textile production.⁵⁵

The production of cashmere is a particular speciality of China, which accounts for 60% of world supply of cashmere products. Cashmere, which is made from special goat hair, was exported as a raw material before the start of the Chinese economic reforms, but, partly with the introduction of Japanese investment and technology, exports of cashmere sweaters were developed in the 1980s. Inner Mongolia is the centre of China's cashmere production.

Recent trends

Textiles were the largest industry in pre-Communist China, and continue to be one of the country's largest industrial employers, with 10% of China's industrial workforce. Traditionally textiles have been China's largest manufacturing export. Although textile's share in exports has fallen in recent years, it still accounts for 10.7% of export earnings. The industry grew slowly in the 1970s as a result of the inability of the domestic economy to grow enough cotton, and available imports were insufficient to fill the gap. During the reform period there was a rapid growth in domestic production capacity, particularly in synthetics but also in cotton spinning and weaving.

Table III.50. Production of Textiles, 1985-94

	Chemical fibres	Yarn (of which: pure cotton yarn)	Cloth (of which: pure cotton cloth)	Knitting Wool	Silk
	('000 tonnes)	('000 tonnes)	(hundred million metres)	('000 tonnes)	('000 tonnes)
1985	948	3535	147	126	42
1986	1017	3798	165	149	47
1987	1175	4368	173	205	52
1988	1301	4657	188	225	51
1989	1481	4767	189	250	52
1990	1654	4626	189	238	57
1991	1910	4608	182	283	60
1992	2130	5018	191	351	74
1993	2374	5015 (3313)	203 (122)	344	94
1994	2803	4895 (2907)	211 (116)	440	106

Source: China Statistical Yearbook 1995

Township and village level collective enterprises (TVEs) are important in the textile industry. In 1993 there was a total of 32,778 enterprises in the TVE textile sector (including 1,248 in chemical fibre production), employing 3.5 million workers, and producing 203 billion yuan of output. In China's national textile industry statistics there were listed 25,701 enterprises (including 1,088 in chemical fibre production), employing 9.5 million workers, producing 418 billion yuan of output. The two

sets of figures are not strictly comparable, since the national figures for China's textile industry include some township enterprises,⁶⁶ but they do indicate a broad order of magnitude. The bulk of the rest being in state owned enterprises, but there has also been a growth of foreign investment in the sector (see below).

Some degree of central control was reasserted over TVEs in 1989 as part of the national measures to limit the overexpansion of the economy, and TVEs were required to obtain licences for the import of machinery and some raw materials,⁶⁷

There are problems of out of date equipment and excess capacity in cotton textiles in relation to likely domestic and overseas demand. Much of the spinning capacity is more than twenty years old, and three million of China's 41 million cotton textile spindles are over 45 years old. In weaving, there are over 25,000 enterprises, and China has over a third of the world's cotton weaving capacity, but much of the capacity is obsolete, with most looms being of the shuttle type.

The silk industry also has problems with outmoded operational methods and poor silk reeling technology, and there has been some export of substandard silk.⁶⁸ Silk production has been affected too by high raw material prices. 41% of silk enterprises in 22 main silk producing cities made losses in 1994, and 70% of silk processing enterprises in major silk producing provinces made losses in the first quarter of 1995. There have been significant changes in the structure of silk exports. In 1987 88% of silk exports were in the form of raw silk and silk products and 12% were in the form of garments, whereas by 1993 the share of garments rose to 73%.⁶⁹

The dyeing and finishing sector is relatively underdeveloped in China. Grey cloth is exported to Hong Kong and reimported by China in finished form. The knitting sector is traditionally based on cotton yarn, but now uses a wider range of materials. The knitting sector has attracted over 20% of total joint venture foreign investment in the textile and clothing sector combined.⁷⁰

China besides yarns and fabrics, and consumer textiles such as carpets, China also manufactures a range of industrial textiles.⁷¹ These include:

- engineering textiles, with an output of 40 million metres, for use in building and engineering construction. The China Textile Industry Council forecasts that demand for these items could rise to as high as 200 million metres by 2000 as a result of major construction projects like the Three Gorges.

- structural textiles, such as cord cloth for tyres and conveyor belts. According to a forecast issued in 1994, demand was set to rise to 150,000 tonnes by 1995 and 250,000 tonnes by 2000.

- farming and fishing textiles, with a 1994 consumption of 500 million metres.

- medical and health textiles, with 1994 consumption of 40,000 tonnes, which, according to the Textile Industry Council, could

reach 100,000 by 2000.

Many textile enterprises in the 1990s have been making losses and are heavily in debt. Demand for Chinese textile machinery has been affected by credit restrictions faced by state textile mills. Official policy for the textile industry, announced in 1994, has three main strands:⁷²

-to restructure and technically update the textile industry in order to improve world competitiveness. In 1993 up to \$3.6 billion was spent on importing equipment to replace outmoded plant.

-to improve and upgrade chemical fibre production so as to make it a 'pillar' of the industry

-to accelerate import substitution in textile machinery with the aim of upgrading traditional fibre-processing equipment

The chairman of the General Textile Association announced in 1994 that a quarter of backward capacity would be retired.⁷³ Restructuring also is taking the form of relocation of capacity to western regions of China where cotton growing is concentrated and where labour costs are lower than in the eastern cities. In 1994 Xinjiang, the most important cotton-growing province, produced 850,000 tonnes of cotton, of which 600,000 tonnes were transported out of the region.⁷⁴ Xinjiang's cotton spinning capacity is planned to double by the end of the century. Shanghai, the long-established centre of China's textile industry, has agreements with Xinjiang to transfer cotton spinning and weaving capacity.

Table III.51. Exports and Imports of Textiles, 1985-94

(mil. \$)	Textile fibres (SITC 26)		Textile yarns and fabrics (SITC 65)	
	EXPORTS	IMPORTS	EXPORTS	IMPORTS
1985	1077	1032	3051	1508
1986	1154	1062	4241	1630
1987	1509	1131	5798	1850
1988	1672	1946	6458	2388
1989	1546	2286	6994	2845
1990	1096	1840	7220	5426
1991	1126	2204	8014	6976
1992	900	1953	8681	7750
1993	813	1361	8807	7790
1994	1093	2983	11819	9347

Sources: China's Customs Statistics Monthly, December 1994; UN International Trade Statistics Yearbooks, 1988, 1989, 1993

China is the world's third largest largest exporter of textiles and the fourth largest importer. It is the second largest exporter and third largest importer if Hong Kong's textile reexports and reimports are excluded from Hong Kong's export and import totals. The country's total imports of textiles (fibres, yarns and fabrics) and approximately balanced by its textile imports, with a small surplus for yarns and fabrics and a small deficit for fibres. In 1994 China imported \$880 million of cotton, \$794 million of wool, and \$1076 million of synthetic

fibres and yarns. Its exports of cotton cloth were larger than those of synthetic cloth and silk combined (see Table III.52).

Table III.52. Exports and Imports of Major Textile Items, 1985-1994
(million US dollars)

EXPORTS	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Cotton yarn	294	424	535	512	424	390	460	391	416	514
Cotton cloth	994	1270	1525	1488	1600	1602	1739	2057	2230	2679
Polyester and synthetic cotton cloth	356	464	632	620	685	676	798	668	537	660
Silks and satins	312	392	459	681	716	776	633	515	412	679
IMPORTS	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Cotton	0	0	13	59	709	711	631	430	16	880

Sources: UN/ESCAP, *Statistical Yearbook of Asia and the Pacific, 1994*; China's Customs Statistics Monthly, December 1994

China's major markets for textiles are Hong Kong, which took 37% of 1993 exports, Japan (12%), the EU (11%), and the US (8%). Many of China's exports to Hong Kong, however, are reexported. There are substantial reexports back to China from Hong Kong of finished cloth which was imported by Hong Kong as grey cloth.

Silk export volumes have been adversely affected by the imposition of export quotas for the first time in 1994 by the EU and the USA. Quotas were introduced in the US in response to the growing competitive power of silk garments and fabrics in relation to clothing made of other fabrics. In the EU, the opening of the single market in 1993 had removed the protection previously enjoyed by the French and Italian silk industries, and led to the imposition of quotas as an alternative form of protection. Silk prices, however, stand to rise as a result of the quotas, especially in the US where China has 90% of the market, although silk quotas are to be abolished under the GATT/World Trade Organization agreement following Uruguay Round.⁷⁵

The severe cotton shortages which emerged in 1993 have had an adverse effect on textile output and many mills in China have cut back on production.⁷⁶ In 1993 the government had to release inventory to prevent cotton shortages, partly caused by farmers withholding cotton in the expectation of higher procurement prices. Procurement prices were raised in September 1994, but farmers were said still to consider them too low. The crop in 1993 suffered from infestation of pests (boilworms), as well as land lost to food crops. The 1994 cotton harvest recovered, but only to 4.25 tons. Estimates suggest that up to October 1995 some

500,000 tonnes of raw cotton had been imported.⁷⁷

China's textile exports have suffered not only from the recent domestic shortages of cotton, but from the adverse world market conditions which have prevailed since the early 1990s. China's textile exports grew only 1% during 1993.⁷⁸ While many other major exporters also experienced slow export growth, in 1993 the textile exports China's major competitors Korea and Taiwan(China), which are based more on synthetics, grew and 9% and 8% respectively.⁷⁹ These market difficulties have affected not only cotton and synthetic textile exports, but also silk, for which demand was dropping in the early 1990s in the US, EU and Japan.⁸⁰ However, in 1994, China's textile export growth rose sharply to 36%.

Since the start of the reform period, the textiles industry has used over \$3 billion of foreign capital to establish over 3,000 enterprises, which now produce some 30% of the industry's output.⁸¹

Constraints and prospects

In the face of rising prices for cotton, and intensifying world market competition, the textile industry in China has been sustaining losses for several years. The structural weaknesses in the industry are now being addressed, with technological upgrading and relocation of textile production to cotton growing areas. The government's imposition of controls on the cotton market in 1994 have helped to check price rises, and increases in the procurement price for cotton give farmers more incentive to produce, though cotton production remains less profitable and more risky than the growing of some alternative crops.⁸²

Synthetic materials are becoming more important in the production of textiles in China. The chemical fibre capacity will remain in the central and coastal provinces, near the country's petrochemical plants, and will continue to grow rapidly. With regard to inputs for synthetic materials, polyester chip production was expected to reach 1.4 million tonnes in 1995, and PTA production 700,000 tonnes, which still will be less than demand by 300,000 tonnes and 360,000 tonnes, respectively.⁸³ The Ministry of Textile Industry has the strategic goals that by the year 2000 textile fibre processing capacity should rise to 9.5 million tonnes, compared to a 1994 figure of 7.4 million; that chemical fibre production should account for 45% of total processed fibre output, compared to its 1994 share of about 30% of output, and meet 85% of domestic demand with a total output of 3.5 million tonnes. Chemical fibres share of industrial and decorative articles is planned to rise from 40% to 70% by 2000.⁸⁴

Reorganization of the industry eventually will become even more pressing with the gradual phasing out of the Multifibre Arrangement, following the successful completion of the Uruguay

Round negotiations. Markets in the US and EC are likely to become even more competitive in the way that non-quota markets such as those in the Middle East already are, with a consequent reduction in export unit values. However, as the section on garments discusses in more detail, the gradual expansion of quotas under the phase-out will be very slow. China cannot benefit from this quota expansion until it joins the World Trade Organization. Even then, the expansion of its quotas will be based on a 'growth-on-growth' formula, under which quotas will expand as a percentage of the existing agreed quota growth rates. Since China's quota growth rates, agreed for the period 1 January 1994 to 31 December 1996, are only 1% for most items, any percentage increase will have minimal effect.

GARMENTS

The resource base

The domestic textile industry is the main supplier of raw materials for China's production of garments. Within the domestic market for textiles, 62% of cloth sold in 1993-4 was for the manufacture of garments, 20% was for bedding and 18% was decorative cloth (for bedding, table cloths, furniture covering, etc).⁶⁵

The development of China's garment exports has been greatly helped by the proximity of Hong Kong, which has provided expertise in marketing, design and quality control. Hong Kong has also provided substantial inflows of direct foreign investment, although the relocation of Hong Kong factories to China has not been as extensive in garments as in some other products, because of strict enforcement of rules of origin for export markets. Of the foreign investment of \$4.75bil which China has attracted in textiles and garments, with 4250 joint ventures, 39% is in garments, 21% in knitting establishments, and the remainder in other textile production.⁶⁶

Foreign investment in garment manufacture in China has been made profitable by the country's abundant labour supply and relatively low labour costs. Garment production in the world economy has remained highly labour-intensive, and low wages generate more of a competitive advantage to Chinese garment production than in the case of the textile industry. Wage statistics for the summer of 1993 show that textile industry wages in China on average were US\$0.36 per hour, compared to \$11.61 in the USA. Even compared to its Asian rivals Chinese wages were low: \$0.43 in Indonesia, \$0.56 in India and \$1.18 in Malaysia. Of China's main potential competitors, only Bangladesh had lower wages (\$0.23).⁶⁷

Recent trends

In China before the 1978 economic reforms, consumers would buy cloth to make their own clothes, and the market for ready made garments was relatively small. During the reform period the domestic market for ready-made garments has grown rapidly at the expense of demand for textile fabrics, and the production of clothing has been promoted by the government as a key consumer good industry. Consumers have become fashion conscious, buying a wider of colours and styles, particularly Western styles. A survey by a group of Chinese department stores showed that materials for garments made up only 24%, and ready made garments 76%, of consumer clothing purchases.⁶⁸ Output has risen from 673 million items of clothing in 1978, to 1.27 billion in 1985 and 6.37 billion in 1993 (see Table III.53.).

Table III.53. Production of Clothing, 1985-94

	(billion items)
1985	1.27
1986	2.70
1987	2.30
1988	2.91
1989	3.00
1990	3.17
1991	3.63
1992	4.27
1993	6.37
1994	na

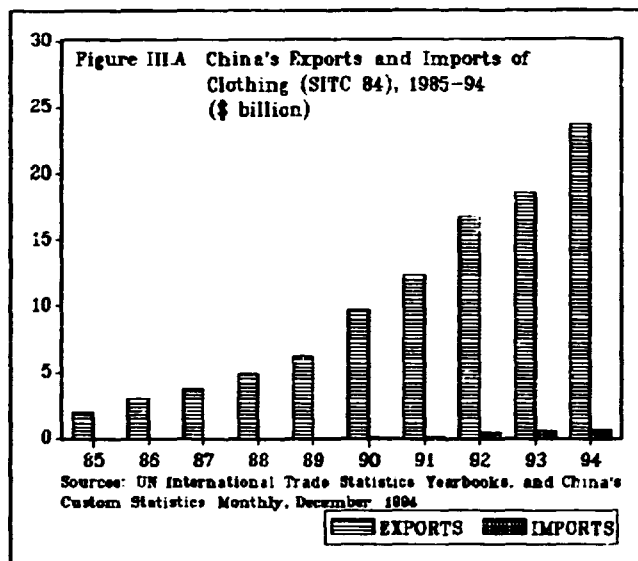
Source: China Industrial Economic Statistics Yearbook, 1994

China is the world's largest exporter of garments. The share of garments in China's merchandise exports has grown from under 9% in 1980 to 20% in 1994. Its share of the world garment market in 1994 was 17%. Also, China's garment exports are understated by its own export figures. According to the World Bank, China's 1991 clothing exports as reported by importing countries were 46% more than those reported in China's own statistics.⁸⁹

China has had problems in making its exporters adhere to quotas, and there is also transshipment of garments through third countries in an attempt to conceal their origin. Under a new textile agreement signed by China and the US in January 1994, there are severe penalties for transshipment.⁹⁰ China claims to have introduced a stricter system to supervise the issue of textile licences to prevent illegal exports.⁹¹

China's main markets for clothing in 1993 were Hong Kong (29%), Japan (24%), USA (15%) and the EU (11%).⁹² Those to Hong Kong, however, were principally for reexport to third countries.

Township and village enterprises (TVEs) are active in garment production. There were 23,254 TVEs in garment production in 1993 employing 1.6 million workers, producing 59.4 billion yuan of output. In the national garments industry statistics for China in 1993 there were 17,921 enterprises listed, employing 2.6 million workers, and producing 97.8 billion yuan of output. As



in the case of textiles, the latter statistics include some township enterprises, so a precise share of TVE production in the total cannot be derived from them, but the importance of TVEs' production is clear.⁹³ One source suggests that township enterprises generate 60% of China's garment exports.⁹⁴ The importance of township and village enterprises in production and exports reflects widespread new entry into the industry and an intensification of domestic competition.

Constraints and prospects

Despite increased competition in the world market for garments, China's garment exports have continued to grow rapidly. Even in 1993, when world demand was slack, China's garment exports grew by 10% (compared to 36% in 1992). By 1994 the growth rate of garment exports had risen again to 29%.

In the longer term, rapid economic growth in China, particularly in the booming south of the country, eventually may push up real wages and erode China's competitive advantage, though migration to the south exerts a countervailing pressure on wages.

World competition will further intensify as quotas are progressively phased out in major markets with the ending of the Multifibre Arrangement, and this will give China an opportunity to gain market share from less efficient competitors. However, this trade liberalization, which will be undertaken over ten years under the new Textiles and Clothing Agreement (TCA) of the GATT Uruguay round, will be slow. For example, it has been estimated that in the US market some 89% of the apparel subject to US quotas in early 1995 will remain subject to quotas until 2005. China has yet to join the World Trade Organization, and cannot therefore participate in the increases to be applied to existing quotas under the TCA. In any case, the existing agreement on textile and clothing quotas between the US and China (which runs from beginning-1994 to end-1996) has reduced China's quota growth for most items to only 1% per annum. Under the TCA, any additional quota growth is applied as a percentage increase on this base percentage, so the actual increases will be minimal. Chinese garment sales should benefit, though, from the removal of quotas on silk in the early stages of the liberalization. However, recent uncoordinated growth in silk processing - with about three quarters of silk now exported by China in the form of garments - has led to price cutting and to losses.⁹⁵

Recent changes in rules of origin for textile products introduced by the US may affect China adversely. Now, the place of assembly rather than the country where the material was cut will determine the country of origin. This means that material cut in Hong Kong or Taiwan but assembled in China will count as Chinese. Even after Hong Kong's reintegration into China in 1997, Hong Kong and Chinese quotas will be administered separately, so China will not be able to take over part of Hong Kong's quota.⁹⁶

One constraint on the growth of Chinese garment production and exports is the poor quality of domestic textiles. This constraint has been eased in practice by the importation of higher quality fabrics for processing. The contribution of Hong Kong in dyeing and finishing Chinese grey cloth for reimport by China will continue to be important.⁹⁷ Problems in domestic cotton supply are likely to accelerate the increased use of synthetics.

Within the domestic market, rapid growth in consumer incomes is increasing the demand for garments and will make foreign investment in garments for domestic sale attractive. By the year 2000 it is estimated by the China Textiles Economic Research Centre that the proportion of ready made garments will rise from around 50% at present to 80%.⁹⁸

CARPETS AND TAPESTRY⁹⁹

The resource base

China, as one of the most important world producers of textile products, produces wool, synthetic fibre and other textile items required for carpet and tapestry production.

Recent trends

The rapid growth of carpet exports is shown in Table III.54, which indicates that carpet exports (in terms of current prices) rose almost 60% between 1990 and 1994.¹⁰⁰ China in 1993 was the second largest exporter of 'carpets, etc, knotted' (SITC 6592), after Iran, with 18.2% of the world market. China was the third largest exporter of 'carpets of wool or fine hair' (SITC 65921), with a 15.7% world market share. It was much less important as an exporter of 'man made textile carpets nes' (SITC 6595), with a world market share of less than half a percent.

Carpets were approximately 5% of China's 1994 total textile export earnings, and special woven fabrics such as tapestries were 3% of 1994 textile export earnings.

China produced 25 million woolen carpets in 1992.¹⁰¹

Table III.54. Production and Exports of Carpets, 1990-94

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Production (million square metres)	5.8	5.8	13.3	16.1	na	56.7	46.5	56.1	70.8	na
Exports (\$ million)	201.7	na	285.1	389.8	431.3	390.2	428.0	517.9	519.5	617.0

Sources: Production statistics are from China Industrial Economic Statistical Yearbook, 1994. The 1989 production figure is misprinted and it is unclear what should be the correct version. It is also possible that the figures for 1990-93 are misprinted, since they appear exceptionally large; no other sources have been found which contain Carpet production statistics. Export statistics from China Statistical Yearbooks, 1989, 1992, 1994, 1995. Note that the definition of 'carpets' used in this source is slightly wider than that used for the relevant SITC category (SITC 6592) in UN, International Trade Statistics Yearbook. For example, the 1993 exports of SITC 6592 were \$445.6 million. The UN statistics do not give figures for Chinese carpet exports for the 1980s.

Constraints and prospects

China's exports of carpets have shown rapid growth in the 1990s, and continued growth is likely to depend on the availability and quality of local textile inputs, and access to imported inputs where required.

C. LEATHER AND FOOTWEAR

The resource base

In the past decade, China has become a major exporter of footwear. Nearly two thirds of these exports are leather shoes, and just under one third are of plastic or rubber construction, the remainder being traditional Chinese cloth shoes. China still has substantial production of cloth shoes, made from domestic cotton. Leather production (Table III.55.) has not kept pace with the rapid expansion in shoe output and exports, and increasing quantities of leather have been imported. Leather imports in 1993 were equivalent to 45% of the value of leather shoe exports (although not all imported leather is used for shoes). Footwear made of synthetic materials can draw on domestic rubber and plastics production.

The footwear industry in China has been transformed by the migration overseas of the bulk of Taiwanese footwear production, driven by rising labour costs in Taiwan and the appreciation of the Taiwanese currency. China has been the major beneficiary of this relocation,¹⁰² and has been able to offer low labour costs and a culturally familiar environment to Taiwanese investors. Relocation of Hong Kong footwear production to China in search of lower labour costs also has helped to develop the Chinese shoe industry.

Recent trends

The growth in Chinese production and exports of footwear is shown in Tables III.55 and III.56 and Figure III.B. Production of traditional cloth shoes has doubled over the past decade, while that of leather shoes has increased five fold. Exports have grown from negligible figures in the mid 1980s to over \$6 billion in 1994. They doubled (in terms of current prices) between 1989 and 1990, and tripled between 1990 and 1994.

The world shoe market is highly diversified, and an exporter's share of the world market is likely to vary considerably among different product types. For example, in 1989, sales from China accounted for 50% of world imports of rubber/fabric shoes, 30% of juvenile vinyl/plastic footwear and 24% of women's vinyl/plastic footwear. China had 14% of world exports of men's leather shoes and 10% of women's leather shoes.¹⁰³

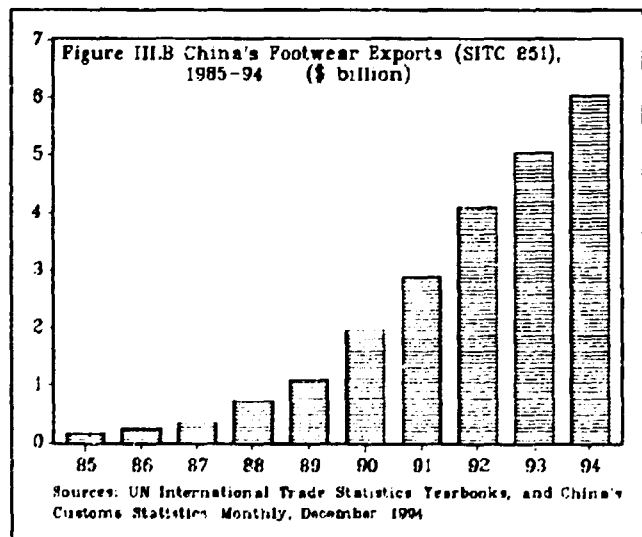


Table III.55. Production of Footwear and Leather, and Imports of Leather, 1985-94

	Cloth shoes (million pairs)	Leather shoes (million pairs)	Leather (million pieces)
1985	499	232	42
1986	534	264	51
1987	na	309	57
1988	708	347	52
1989	750	354	52
1990	765	438	53
1991	793	536	57
1992	842	771	58
1993	1085	1151	68
1994	na	na	na

Source: China Industrial Economic Statistical Yearbook, 1994

Table III.56. Exports of Footwear and Leather Goods, 1985-94

(\$mil.)	Exports of Rubber and Plastic Footwear (SITC 85101)	Exports of Leather Footwear (SITC 85102)	Exports of Leather Clothes and Accessories (SITC 8481)
1985	na	137	na
1986	na	203	na
1987	na	304	na
1988	na	465	na
1989	na	698	325
1990	706	1203	399
1991	1080	1721	455
1992	1194	2685	948
1993	1562	3268	1156
1994	na	na	na

Sources: United Nations, *International Trade Statistics Yearbooks*, 1988, 1989, 1993; *China's Customs Statistics Monthly*, December 1994.

Notes: Imports of footwear were minimal in comparison to exports: 1994 imports were \$325 million. 1994 total footwear exports were \$6.0 billion, but *China's Customs Statistics Monthly* does not disaggregate this total.

Table III.57 Imports of Leather, 1985-94

(S mil.)	Imports of Leather, Leather Manufactures not elsewhere specified, Dressed Fur, etc (SITC 61)	Imports of Leather (SITC 611)
1985	136	na
1986	138	na
1987	184	na
1988	na	na
1989	280	na
1990	374	188
1991	642	360
1992	1538	1082
1993	1932	1465
1994	1902	na

Source: United Nations, *International Trade Statistics Yearbooks*, 1988, 1989, 1993; *China's Customs Statistics Monthly*, December 1994.

One important contributor to the growth in China's footwear exports has been the sourcing of sports shoes by major brand name companies such as Nike and Reebok, who have worked with Taiwanese and Hong Kong firms to develop production in China. Shoe manufacture is a highly labour intensive operation which takes advantage of China's low wages. Reebok, which started full-scale production in China in 1990, was sourcing 25% of its total supply from China by 1992.¹⁰⁴ Other well-known brands of footwear which have been produced in China for the export market include Timberland and Hush Puppy.

The bulk of Taiwanese and Hong Kong investment has gone to the south of China. 80% of Hong Kong shoe factories have located in Guangdong and Fujian provinces. In the southern province of Guangdong alone, which offers good transport connections through Hong Kong, there are at least 3-5,000 shoe factories, of which at least 800 are operated by foreign investors.

Taiwanese investment has also been important in developing the production of leather fashion shoes. By 1992 China was supplying 49% of the US market purchases of non-rubber footwear, and almost half of China's shoe exports were going to the US. China also has attracted Italian direct foreign investment, which is important source of design and marketing expertise, Italy being the world's

leader in upmarket fashion footwear. Italian foreign investors in shoes have been supported by Italian investment in at least three tanneries in China, which produced high quality kidskin for women's shoes. Supply of blemish-free calfskin in China is difficult to secure.

One interesting development is the agreement signed in 1993 with foreign investment from Thailand to set up an International Leather Industrial Park at Nanchang in Jiangxi. The park, which should be completed by 1997, will include tanneries, shoe-making, chemicals, research and trade, and joint ventures are expected from a wide variety of well-known international companies in the footwear and leather business. It is expected to be employing 150,000 workers.¹⁰⁵

State owned enterprises remain important in the shoe industry, but mainly in low-end segment of the domestic market.

China has long been self-sufficient in footwear, and the domestic market is protected.¹⁰⁶ Total footwear imports in 1994 were only equivalent to 5% of the value of exports. The domestic market has been expanding in the 1990s with the rapid rise in consumer incomes, and some production originally designed for export has been shifted towards the domestic market. Chinese department stores provide outlets for upmarket shoe sales. The move towards the domestic market was accentuated by a slackening of international demand in the early 1990s and by imposition of EC quotas.

Production of leather items such as leather clothing and handbags has increased along with the exports of leather footwear, and Italian shoe investors,¹⁰⁷ for example, have diversified into these items. Exports tripled during the 1990s.

Constraints and prospects

The relocation of Taiwanese and Hong Kong footwear factories to China is now largely complete and the phenomenal growth in footwear production and exports is unlikely to continue at the same rate. There is some evidence that foreign investors are diversifying from shoes to other leather products, and this provides scope for further export expansion. International buying groups prefer a choice sourcing locations from which to subcontract production, in order to minimize risk, and despite China's low labour costs, it is unlikely to attract investment away from other important locations such as Indonesia. China already has large market shares in product segments in the US and EU, and EU and EC protective measures will limit growth. There is already something of a glut of shoe factories in China, but the domestic market increasingly is providing an outlet for some of the cheaper ranges of footwear which previously mainly were exported.

D. WOOD AND WOOD PRODUCTS

The Resource Base

Intensive forestation efforts, strict management and rational utilisation have resulted in sustained growth of forest resources in the 1990s¹⁰⁸. However mature timber resources are almost exhausted, with only 1.96 million cubic metres left. The fourth survey of national forest resources carried out between 1989 to 1993 revealed that forest acreage had risen from 125.7 million hectares with a 9.6 billion cubic metres of timber resources in 1988 to 133.7 million hectares with 11.7 billion cubic metres of timber resources. Over 2.78 million hectares of trees were planted during that period, accounting for over 31 % of increased forestland¹⁰⁹. Artificial forests cover an area of 33.78 million hectares. In the five years since 1988, however, 2.19 million hectares of forest area were destroyed or used for other purposes. As a percentage of total agricultural production forestry has fallen from 5.0 % in 1985 to 4.2 % in 1991¹¹⁰.

Recent Trends

Timber output has remained steady over the decade of 1985-1994 (see Table III.58.). The bulk of this is young or immature timber. Heilongjiang is the lead producer of timber, accounting for over 12.2 million cubic metres of timber in 1993, almost 20 % of total output. There are 1,100 enterprises engaged in the logging and transport of timber and bamboo and 12,410 involved in timber processing, bamboo, cane, palm fibre and straw products. In addition there are 392 township-run enterprises and 4,751 village-run enterprises transporting and logging timber and 7,479 township-run and 20,792 village-run enterprises processing timber and other wood products.

Table. III.58. Output of Timber (million cu.m.), 1985-1994)

1985	63.23
1986	65.02
1987	64.08
1988	62.18
1989	58.02
1990	55.71
1991	58.07
1992	61.74
1993	63.90
1994	66.15

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 413.

China is not a leading producer of sawnwood, accounting in 1990 for only 4 % of total world production (see Table III.59.). Moreover its imports of sawnwood exceed output, in 1993 by almost

four times.

Table III.59. Total Output, Exports and Imports of Sawwood^{b/}, 1985-1990, (1,000 cu.m.)

	Output	Exports	Imports
1985	27,021	94 ^{a/}	692
1986	26,325	110	867
1987	26,278	90	1,257
1988	26,216	147*	1,482*
1989	24,892	102*	1,199*
1990	22,971	95	1,069
1991	n.a.	131*	1,283*
1992	n.a.	962	2,171
1993	n.a.	653	2,521

Source: UN, *Industrial Statistics Yearbook 1990, Volume 2, Commodity Production Statistics, 1981-1990*, UN, New York, 1992, p. 329, 332; a/ All export and import figures from FAO, *FAO Yearbook, Forestry Products, 1982-1993* FAO, Rome, 1995, p. 112; * FAO estimate; b/ sawwood includes sleepers, planks, joists, boards and rafters.

Production of railway sleepers has remained static, with output standing at 66,000 cu. m. per year between 1985 and 1990¹¹¹.

Furniture

Over 340,000 persons were engaged in furniture-making in 1993, representing a 15 % drop compared with the previous year. Altogether there are 8,014 enterprises making furniture, of which 467 are state-run. In addition 3,374 township-run enterprises and 12,086 village-run enterprise produce furniture. The value of furniture exports rose from US\$ 487.2 million in 1992 to US\$ 603 million in 1993¹¹².

Table III. Output of Furniture, 1985-1994, (million units)

1985	116.4
1986	120.0
1987	144.8
1988	165.8
1989	166.6
1990	163.7
1991	214.3
1992	216.5
1993	308.6
1994	n.a.

Source: *China Industrial Economic Statistical Yearbook*, China

Statistical Publishing House, 1995, p. 34.

OTHER WOOD PRODUCTS

China accounts for 11 % of world production of wood-based panels, which includes veneer sheets, plywood, particle board and fibreboard, both compressed and non-compressed (see Table III.60.). However it is a net importer of these products, with exports in 1993 forming only 10 % of imports.

Table III.60. Total Output, Exports and Imports of Wood-Based Panels, 1985-1994, (1,000 cu. m.)

	Output	Exports	Imports
1985	2,553	564	550
1986	2,835	513	589
1987	3,397	560	1,278
1988	3,821	515	1,336
1989	5,576	350	1,788
1990	4,690	261	2,296
1991	7,952	212	2,522
1992	12,786	303	3,834
1993	14,719	344	3,491
1994	n.a.	n.a.	n.a.

Source: FAO, *FAO Yearbook, Forestry Products, 1982-1993* FAO, Rome, 1995, pp 146, 148.

Whilst market demand for plywood stands at about 4 million cu. m. annually, 1 million of this has to be imported. Demand for plywood has increased in the 1990s following the start of construction of the Three Gorges Project, the development of the Pudong area in Shanghai, the vogue of wooden furniture and the completion of various construction and real estate projects.

E. PULP AND PAPER

The Resource Base

Recent Trends

Woodpulp is made up of mechanical, semi-chemical, chemical and dissolving woodpulp. China mainly produces mechanical and chemical woodpulp. Mechanical woodpulp is processed by grinding or milling whilst chemical woodpulp involves treatment with sulphate, soda or sulphite.

Domestic output of wood pulp has increased 37.5 % since 1985. As this has not been able to match demand, there has been a concomitant rise in imports (see Table III.61.). In 1993 the volume of imports was 38 % higher than in 1985. Whilst in 1985

the volume of imports constituted 48 % of domestic output, by 1993 this had risen to 55 %.

Table III.61. Total Output, Exports and Imports of Wood Pulp (1985-1993), (1,000 tons)

	Output	Exports	Imports
1985	1,773	56	858
1986	1,924	79	949
1987	1,956	65	1,099
1988	2,037	90	1,307
1989	2,077	76	1,049
1990	2,057	76	861
1991	2,102	74	1,340
1992	2,208	134	1,213
1993	2,439	95	1,186

Sources: FAO, *FAO Yearbook, Forest Products, 1982-1993*, FAO Forestry Series, no. 28, FAO Statistical Series, no. 122, FAO, Rome, 1995, pp 223, 225, 227, 229, 231

Mechanical wood pulp has fared similarly with output increasing 25 % between 1985 and 1993 but imports falling (see Table III.62.). In 1985 imports of mechanical wood pulp were equivalent to 24 % of domestic output but only 15 % by 1993. Exports of this product are negligible.

Table III.62. Output, Exports and Imports of Mechanical Wood Pulp, 1985-1993, (1,000 tons)

	Output	Imports	Exports
1985	401	96	n.a.
1986	402	124	n.a.
1987	384	68	n.a.
1988	402	112	n.a.
1989	406	65	n.a.
1990	417	54	n.a.
1991	410	93	n.a.
1992	435	76	n.a.
1993	500	75	1
1994	n.a.	n.a.	810 ^{a/}

Sources: FAO, *FAO Yearbook, Forest Products, 1982-1993*, FAO Forestry Series, no. 28, FAO Statistical Series, no. 122, FAO, Rome, 1995, pp 233-234; a/ from *China's Customs Statistics, 1994*, 12, p. 26

Chemical wood pulp production has risen by 36 % between 1985 and 1993 (see Table III.63.). Again China is a net importer of

chemical wood pulp, with imports exceeding exports in 1993 by seventy times.

Table III.63. Output, Exports and Imports of Chemical Wood Pulp, 1985-1993, (1,000 tons)

	Output	Exports	Imports
1985	1,200	56	700
1986	1,334	79	764
1987	1,329	65	973
1988	1,394	90	1,101
1989	1,417	76	829
1990	1,365	76	652
1991	1,389	74	1,064
1992	1,469	52	927
1993	1,635	13	910

Source: FAO, *FAO Yearbook, Forest Products, 1982-1993*, FAO Forestry Series, no. 28, FAO Statistical Series, no. 122, FAO, Rome, 1995, pp 246-7, 251.

PAPER AND CARDBOARD

Recent Trends

There are over 5,000 mills involved in paper and paperboard manufacture. Most of these are small-scale and geared toward local supply. The production of machine-made paper and paperboards has more than doubled in the decade since 1985 (see Table III.64.). This has been matched by a 50 % increase in the number of persons engaged in papermaking and paper products. About 90 % of paper and paper board production is of packaging products.

Table III.64. Output, Exports and Imports of Machine-made Paper and Paperboards, 1985-1994, (1,000 tons)

	Output	Exports ^{b/}	Imports
1985	9,110	304	941
1986	9,990	386	1,354
1987	11,410	440	1,580
1988	12,700	485	1,169
1989	13,330	475	1,240
1990	13,720	777	1,433
1991	14,790	924	1,861
1992	17,250	949	2,821

1993	19,140	984	3,056
1994 ^{a/}	21,380	n.a.	3,180 ^{b/}

Sources: 1994 *Statistical Yearbook of China*, China Statistical Publishing House, p. 405; a/ 1995 *Statistical Yearbook of China*, China Statistical Publishing House, p. 409; b/ Export and import figures from FAO, *FAO Yearbook, Forest Products, 1982-1993*, FAO Forestry Series, no. 28, FAO Statistical Series, no. 122, FAO, Rome, 1995, pp 288, 293. FAO figures refer to 'paper and paperboard'; b/ from *China's Customs Statistics, 1994*, 12, p. 26

In 1993 1.2 million persons in 11,940 enterprises were employed in this sector. Only 1,662 enterprises are state-run. In the rural areas there are 5,520 township-run enterprises and 14,045 village-run enterprises, engaged in this sector. The key provinces producing paper and paperboards are Shandong, Henan and Guangdong. China is not self-sufficient in paper and paperboard, with imports trebling between 1985 and 1993. In addition imports far outweigh exports. In 1993 there was a net trade deficit of 2 million tons for this product.

China produces and trades in a range of different paper types, including newsprint, printing and writing paper and other types such as construction paper, household sanitary paper, wrapping and packaging paper (see Table III.65). It is a net importer of newsprint and since 1990 has become increasingly a net importer of printing and writing paper. Output of newsprint has increased 57 % between 1985 and 1993 whilst output of printing and writing paper doubled. Whilst exports of printing and writing paper quadrupled between 1985 and 1993, imports rose almost seven times.

Table III. 65. Output, Exports and Imports of Different Paper Types, 1989-1993, (1,000 tons)

	Newsprint			Printing and Writing Paper		
	Output	Exports	Imports	Output	Exports	Imports
1985	452	n.a.	332	3,076	55	78
1986	456	n.a.	190	3,455	65	73
1987	439	3	219	4,069	128	126
1988	443	4	220	4,462	123	145
1989	454	1	270	4,699	123	110
1990	475	1	243	4,984	93	168
1991	486	3	235	5,199	189	300
1992	590	5	243	5,531	196	525
1993	711	5	372	6,688	217	531

Source: FAO, *FAO Yearbook, Forest Products, 1982-1993*, FAO Forestry Series, no. 28, FAO Statistical Series, no. 122, FAO, Rome, 1995, pp 308, 311, 316.

Output of other forms of paper, such as packaging and wrapping

paper is more impressive than that of newsprint of printing and writing paper (see Table III.66.). Output has doubled between 1985 and 1994.

Table III.66. Total Output of Other Paper and Paperboard, 1985-1994, (1,000 tons)

1985	7,669
1986	8,690
1987	9,723
1988	10,795
1989	11,334
1990	11,869
1991	12,840
1992	13,808
1993	16,417*
1994	

*Source: FAO, FAO Yearbook, Forest Products, 1982-1993, FAO Forestry Series, no. 28, FAO Statistical Series, no. 122, FAO, Rome, 1995, p. 321; * = FAO estimate.*

Constraints and Prospects

Of the 210 major capital construction and technical renovation projects planned between 1993 and 2,000 are three forestry projects. The project in Inner Mongolia aims to create an annual processing capacity of particle boards of 45,000 cubic metres. The second undertaking in Sichuan seeks to develop an annual processing capacity of 30,000 cubic metres of MDF. The third project in Guangdong province has as its goal the production of 50,000 tons of pulp per year and high grade art paper¹¹³.

The demand for timber is likely to continue to exceed supply over the next decade, requiring imports to meet construction needs. As with agricultural land timberland is also endangered by the rapid pace of industrialisation. Since 1995 all enterprises and units have been required to seek permission before using timberland for non-forestry purposes. According to the Ministry of Forestry around 440,000 hectares of timberland have been used for non-forestry purposes each year¹¹⁴.

F. PETROLEUM REFINING¹¹⁵

The resource base

China is estimated to have 80 billion tonnes of oil reserves and 51,000 billion cubic metres of natural gas reserves.¹¹⁶ China's oil industry first started to develop in the late 1950s and early 1960s with the discovery in northeastern China of the Daqing oilfield in Heilongjiang, and subsequently the oilfields of Shengli in Shandong and Liaohe in Shenyang. Oil output rose from 5.2 million tonnes in 1960 to over 30 million tonnes in 1970, and 105 million tonnes in 1980; more than 90% of this oil came from the northeastern oilfields. Increases in oil output began to slacken from these major oilfields in the 1980s and production costs started to rise. The northeastern oilfields remain important. Daqing produced 38% of China's oil output in 1994, 21% of oil was from Shengli, and 10% from Liaohe. One region of particular promise is the Tarim basin in Xinjiang, where the China National Petroleum Corporation (CNPC) has been exploring since 1985. Tarim is hoped to be producing 10 million tonnes of oil a year by 2000. The third round of bidding for oil exploration in this area was being conducted in 1995.¹¹⁷

Table III.67. Production and Trade in Petroleum Products, 1985-94

	Production of crude oil (million tonnes)	Production of natural gas (million cubic metres)	Exports of petroleum and products (SITC 33) (\$mil)	Imports of petroleum and products (SITC 33) (\$mil)
1985	124.9	12,930	6,301	46
1986	130.7	13,760	3,176	373
1987	134.1	13,890	4,008	397
1988	137.0	14,260	3,372	638
1989	137.6	15,049	3,581	1,465
1990	138.3	15,298	4,472	1,054
1991	141.0	16,073	3,908	1,846
1992	142.1	15,788	3,843	3,198
1993	145.2	16,765	3,226	5,413
1994	146.1	17,559	2,789	3,595

Sources: China Statistical Yearbook 1995 for oil and gas production statistics; UN International Trade Statistics Yearbook 1988, 1989, 1995 for import and export statistics

The growth in oil production has failed to meet growth in demand. China has been an oil exporter since the 1960s but became a net oil importer for the first time in 1993 (see table), and had become a net importer of refined products in 1992. China invited foreign participation in offshore oil exploration in the 1980s in an attempt to increase oil supplies. Offshore oil (and gas) deposits have been found in the South China Sea, and oil has also been found in the Bohai Gulf (just east of Tianjin). In 1993 offshore petroleum production was about 4.6 million tonnes, 5% of China's total oil output, and was expected to peak in 1997 at 12 million tonnes (and 4 billion cubic metres of natural gas).

At present, domestic crude oil makes up 90% of refinery feedstocks. Chinese crude is paraffin based with a low/medium sulphur content.¹¹⁸

CRUDE OIL

Recent trends

The slow growth of oil production during the past decade is clear from Table III.67. 1994 crude oil output was only 17% higher than 1985. State-determined domestic oil prices have been set below world levels, encouraging excessive consumption and discouraging investment, and there has been some reluctance to allow foreign investment into promising onshore areas.

Import restrictions were imposed on oil in 1994, on a temporary basis. The industry was placed under greater central control and domestic prices were raised. Domestic oil prices vary with location and according to whether the endused works under the state plan.

The China National Petroleum Corporation is China's major producer of crude oil, with 97% of China's output of crude in 1992. A total of 1.17 million people were employed in petroleum and natural gas extraction in 1994.

Foreign participation in the industry was initially limited to offshore areas. Foreign firms were required to cooperate with the China National Offshore Oil Corporation (CNOOC). During the period 1982-93 foreign firms spent \$3 billion on offshore exploration and \$1 billion on offshore development. Offshore oil fields are operated in the South China Sea by Agip, Chevron and Texaco, and CNOOC has wells of its own in the Bohai Gulf.

Onshore oil exploration by foreign companies is now permitted. Amoco in 1992 became the first foreign company to win the right to produce onshore, with a contract for the Fuyang field in Anhui province. 11 provinces and regions were opened up to foreign exploration in the south of China in 1985, and in 1993 CNPC opened another ten regions, including the Tarim basin in Xinjiang. Foreign companies working with CNPC are expected to bear all exploration costs, while any finds are jointly developed and their proceeds shared. The gains to foreign oil companies onshore, appear have been modest. Natural gas investment appears to have been more profitable for foreign companies, and a joint venture between Arco, the China National Oil Corporation, and the Kuwait Foreign Petroleum Exploration Company was in trial production by Hainan island off the coast of Guangdong in 1995.¹¹⁹ Liquid natural gas has widely displaced kerosene as a household fuel in cities in the south.

Constraints and prospects

China's demand for oil is likely to continue to run ahead of domestic production. Imports of crude oil are likely to rise, and exports fall. Domestic production costs have been rising and there is considerable excess labour in the state-run oil industry. Production is likely to continue to be mainly from onshore deposits. The government has expanded the number of areas in which foreigners can explore, and foreign participation will be important both as a source of investment for exploration and development and as a source of technology to reduce production costs. The climate for foreign investment in oil exploration and development is closely linked with opportunities for investment in downstream activities in refining and distribution within the domestic market. In 1995 China cut the royalty rates on onshore oil in order to encourage foreign involvement in oil exploration in remote regions such as Xinjiang.¹²⁰

PETROLEUM PRODUCTS

Recent trends

Some \$7.5 billion were invested in refining in the five years to 1994, but the increases in refining capacity have not kept up with demand, which in 1993 alone rose by 14%.¹²¹ China is a substantial net importer of refined petroleum: imports were \$1,956 million in 1994 compared to exports of \$621 million.

The China National Petrochemical Corporation (SINOPEC), set up in 1983, is the dominant organization in refining as well as petrochemicals. In 1993 SINOPEC accounted for 88% of China's refined oil production. SINOPEC's refineries are located near China's main oilfields in the northeast, and are set up to process Chinese domestic crude, which is high in paraffin and low in sulphur.¹²²

Since domestic crude oil production has increased little in the past decade, China needs to import increasing quantities of crude. The most likely source of imports is the middle east, and Chinese refineries will need adaptation to handle the middle east's higher sulphur crudes. Growth in the consumption of petroleum has been greatest in the south of China, furthest from the country's refining capacity, which has put strains on the country's transport system and generated shortages. Until the government imposed controls in May 1994, traders were buying both crude and refined products at low state prices and diverting them to the free market.

About three quarters of planned increased refinery capacity in the mid-1990s is to be located in the south, near both to main growth areas of demand and to crude supplies from the middle east.

Foreign investment has been allowed in petroleum refining since 1991. China's first foreign refinery project was at Dalian in

Liaoning province, a joint venture involving the Total company of France. SINOPEC was reported to have negotiated 63 joint venture agreements in refining (and petrochemicals) involving a total of \$200 million utilized by the end of 1993.¹²³

While fuel oil and diesel distribution has been tightly controlled, natural gas distribution has been an area where foreign participation has been given easier access. Aviation fuel is also an area where demand growth is outstripping supply, and in 1994 foreign firms were invited to upgrade China's aviation fuel distribution system.

Constraints and prospects

Like crude oil production, China's refining capacity has not been able to match the country's growth in demand. Increased capacity is planned, but rapid economic growth and the expansion of motor vehicle usage in China means that substantial imports of crude and refined products are likely to continue. Foreign investment will be important in providing both capital and technology to increase refining capacity. While much interest has been shown by foreign companies, their experience has been frustrating, particularly with regard to domestic market sales, despite buoyant domestic demand. Refinery prices have been tightly controlled since the 1994 clampdown, and access to downstream domestic marketing of petroleum products is strictly limited. Elf Aquitaine in October 1995 pulled out of a \$2.5 billion project to build a refinery in Shanghai, apparently because it would not see how or when the refinery could become profitable.¹²⁴ Shell's \$6 billion project to build a refinery in Guangdong was, in 1995, still awaiting State Council approval. The agreement for the Total refinery at Dalian involved the foreign partner accepting a largely export-oriented marketing deal.

G. PETROCHEMICALS¹²⁵

The resource base

The production of petrochemicals depends vitally on the supplies of crude oil for feedstocks and on natural gas. China has been producing its own crude oil since the 1960s, and until 1993 was a net exporter of petroleum products. China was still a net exporter of crude in 1994, but crude production has grown only slowly since the early 1980s.

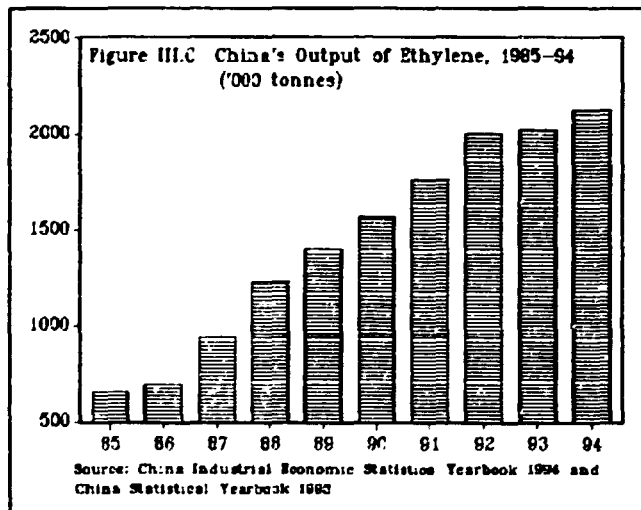
Recent trends

China's petrochemical industry developed during the 1960s and 1970s, following the discovery of oil at Daqing in northeastern China in 1959. China's first petrochemical plant started operation in Lanzhou in 1962, and other plants were built using domestic technology in the 1960s. The industry initially developed in isolation, using domestic technology and feedstocks.

The introduction of overseas technology in the 1970s saw further expansions in capacity, with the importation of plant to produce ethylene, synthetic fibre, synthetic ammonia and urea.

The China Petrochemical Corporation (SINOPEC), which is responsible for the development of the industry, including petroleum refining, was formed in 1983. Over the past decade SINOPEC has installed four 300,000 tonnes ethylene plants, three chemical fertilizer and two chemical fibre facilities, and has opened large refineries at Luoyang, Shijiazhuang and Fujian. SINOPEC in 1994 had 865,000 employees, making it one of the world's largest corporations.

One indication of the development of a country's petrochemical industry is its output of ethylene, a major raw material for the production of plastics. Ethylene output rose three-fold from 1985 to 1992, reaching 2 million tonnes a year, and 2.13 million tonnes in 1994. This made China the 10th largest producer of ethylene in the world economy, though this represented only 3% of world output. The largest producers are the US and Japan. This relatively small share of world ethylene capacity is mirrored by a low share in the world capacity of plastics (3%), synthetic fibres (8.6%) and synthetic rubber (3.6%).¹²⁶



SINOPEC accounts for about 90% of the manufacture and sale of

petroleum and petrochemicals in China, and in 1993 it had 93% of China's ethylene capacity. In addition to its ethylene facilities, SINOPEC operated:¹²⁷

- four chemical fibre production plants at Shanghai, Liaoning, Tianjin and Sichuan, which produced 1.1 million tonnes of synthetic fibre monomers, 570,000 tonnes of polymers for synthetic fibre and 450,000 tonnes of synthetic fibre.
- synthetic rubber plants at Shandong, Beijing, and Lanzhou, accounting for most of SINOPEC's output of 300,000 tonnes, which was 77% of the 1993 national total.
- organic chemical production facilities producing 3 million tons of chemicals in 1993.
- chemical fertilizer plants producing 3.2 tonnes of synthetic ammonia and 4.79 tonnes of urea.

In the Seventh and Eighth Five Year Plans (1986-90 and 1991-95), rapid growth of petrochemical capacity was planned. In the Seventh Plan, output growth of 7.5% a year was planned in chemicals, with particular stress on petrochemicals. Additional ethylene capacity of 1.28 million tonnes was completed. During the Eighth Plan seven new ethylene plants were authorized; originally the total was fifteen but a number of smaller projects were frozen as part of austerity measures in the early 1990s. The plan envisaged construction of new petrochemical complexes, to provide inputs for industries such as fertilizer, agricultural chemicals, and plastics. In 1993 petrochemicals were designated a key industry comparable with machinery, electronics and automobiles. In 1994 most large petrochemical enterprises achieved sales growth of around 40%.

China's new industrial policy, announced in outline in March 1994, the aim of which was to improve international industrial competitiveness, included goals for increases in capacity for crude oil refining of 5 million tonnes a year, 70-100,000 tonnes a year for polypropylene, and 100,000 tonnes a year for ethylene.

Under the Ninth Five Year Plan (1996-2000), the Minister of the Chemical Industry has announced plans for seven large projects, including petrochemical complexes. The year 2000's targets included the establishment of 100 export-orientated chemical groups, again including petrochemicals. SINOPEC itself announced plans in September 1994 to increase annual processing capacity of crude oil to 200 million tonnes by 2000 and 300 million by 2010. SINOPEC itself planned to increase ethylene capacity to 5 million and then 8 million tonnes over the same period.

Table III.68 Production and Trade in Petrochemicals, 1994

('000 tonnes)	Production	Imports	Exports	Apparent Demand
Ethylene	2,190	-	-	2,190
Benzene	860	-	-	860
Butonal	70	-	-	70

Octonal	140	-	-	140
Ethylene glycol	450	130	-	580
Acetic acid	390	-	-	390
Polyethylene	1,190	1,340	-	2,530
Polypropylene	860	810	-	1,670
Polyvinl chloride	1,150	490	110	1,530
Polystyrene	180	1,080	-	1,260
Acrylonitrile butadiene styrene	70	700	-	770
Synthetic rubber	430	250	-	680

Source: adapted from M. Takeda, 'China's Petrochemical Industry', *JETRO China Newsletter*, July-August, 1995, p.18

Economic reform in the petroleum industry has affected the profitability of petrochemical production, and has put pressure on SINOPEC to improve efficiency. Prices of petroleum, which used to be set below world prices, were raised to near the international level in 1994, and tariffs on petrochemical imports are gradually being lowered as part of China's preparation for World Trade Organization membership.

Foreign investment in petrochemicals increased rapidly in the early 1990s. Although many companies have started with relatively small operations, such as investments petrochemical-using industries such as pharmaceuticals and agrochemicals, larger scale investments are now also taking place. The German companies Hoechst and Bayer, Rhone-Poulenc from France and the American firm Du Pont all signed agreement in 1992 and 1993 to lay the groundwork for investment. For example, Hoechst has a comprehensive cooperation agreement with the Ministry of Chemical Industry relating to the production of acetic acid, engineering plastics, herbicides, polyester fibre and other products. Hoechst also has joint ventures including polyester nonwoven fabric and in pharmaceuticals in Shanghai. ICI from the UK has joint ventures including polyester fibre production in Yizheng and polyurethane blends in Shanghai. Other companies with joint ventures in petrochemicals include Total (in connection with its Dalian oil refinery project), Shell (in connection with its proposed Huizhou refinery in Guangdong), Elf Aquitaine, Dow Chemicals from the US, and Du Pont¹²⁸. Du Pont in June 1995 signed a letter of intent to establish \$100 million plant to produce polyformaldehyde, a synthetically engineered plastic resistant to abrasion, which is used in industries such as machinery manufacture, motor vehicle production.¹²⁹

Constraints and prospects

China is still a small producer of petrochemical products by world standards. The country's industrial growth in the 1990s will require increasing quantities of petrochemicals. These will

be required to produce plastics for major export industries such as toys and shoes. Synthetic fibres will be needed by the textile and garment industries, particularly if domestic cotton production stagnates. Expansion of the automotive industry will require many plastics, and synthetic rubber, and there will be a continuing demand by agriculture for chemical fertilizer. China is making vigorous plans to develop petrochemical production and encourage inward foreign investment. At present, China's petrochemical industry, long shielded from foreign competition by import tariffs and artificially low petroleum prices, faces pressure to become more efficient, and there is a substantial influx of foreign capital and technology. However, despite plans for expansion in the petrochemical sector, if the economy continues to grow by nearly 10% a year, it is likely that domestic demand growth will outstrip supply, leading to growing imports, including imports of crude oil.

H. FERTILIZERS

Recent Trends

The development of the fertiliser industry is closely linked to the government's desire to rapidly increase agricultural output. During the readjustment years of 1963-65 the chemical fertiliser industry experienced rapid growth, with production in 1965 reaching nine times the level of 1957¹³⁰. In the early 1970s chemical fertiliser plants and equipment were imported to expand output, including 13 large urea plants from European, Japanese and US companies¹³¹. By 1979 the application of fertilisers had increased substantially, with kilo per *mu* inputs rising from 1.0 in 1957 to 35.2 in 1979. Between 1979 and 1983 output of chemical fertiliser increased 13.6 % annually in efforts to raise crop yields.

In 1994, there were 1,565 factories producing chemical fertilisers, making China the largest producer in the world¹³². China accounts for 19 % of world production of natural phosphates but still has to import to satisfy most of its needs (see Table III.69.).

Table III.69. Total Output, Exports and Imports of Natural Phosphates, 1985-1994, (1,000 tons)

	Output	Exports	Imports
1985	6,970	0	595*
1986	9,790	9	583
1987	15,165	110	554
1988	18,237	158	563
1989	17,000*	194	602
1990	17,300*	345	624
1991	21,000*	534	703
1992	23,196*	319	1,046*
1993	23,500	574	807*
1994	n.a.	n.a.	n.a.

Source: FAO, *FAO Yearbook, Fertilizers, Vol. 44, 1994*, FAO, Rome, 1995, pp 11,13; * = FAO unofficial figure¹³³.

China cannot satisfy domestic demand for chemical fertilisers itself and has to rely on imports. In the first half of 1995, for example, supply fell short of demand by about 10 million tons according to the Ministry of Agriculture. However without an adequate supply of chemical fertilisers grain output increases are difficult to maintain. According to some estimates chemical fertilisers account for 40 % of grain output increases.

In order to encourage the production of chemical fertilisers the government has granted preferential policies to this sector. These include provision of US\$ 1.1 billion in working capital loans to support small urea and phosphate-ammonium production plants; continued exemption from added-value tax; low electricity

prices; guaranteed supplies of coal, phosphate and natural gas; a ceiling price for urea; and a special allocation of funds to create a reserve of chemical fertilisers¹³⁴.

Nitrogen and Phosphate

Recent Trends

Production of nitrogenous fertilisers has increased 33 % since 1985 whilst phosphate production has more than doubled over the past decade (see Table III.70.). Provinces producing over one million tons of nitrogenous fertilisers per year include Henan, Sichuan, Shandong, Hebei and Jiangsu. Leading manufacturers of phosphate fertilisers are Sichuan, Hubei, Yunnan and Jiangsu provinces.

Table III.70. Output of Chemical Fertilisers including Nitrogenous and Phosphate, (million tons) 1985-1994

	Chemical Fertilisers	of which nitrogenous	phosphate
1985	13.22	11.43	1.76
1986	13.59	11.59	2.34
1987	16.72	13.42	3.25
1988	17.40	13.65	3.69
1989	18.02	14.24	3.72
1990	18.79	14.63	4.11
1991	19.79	15.10	4.59
1992	20.47	15.70	4.62
1993	19.56	15.25	4.19
1994	22.72	17.36	5.04

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 414.

China is a net importer of nitrogenous fertilisers but a net exporter of phosphate fertilisers (see Table III.71.). In 1993 imports of nitrogenous fertilisers were equivalent to 21 % of domestic output.

Table III.71. Exports and Imports of Chemical Nitrogenous and Phosphate Fertilisers, (1985-1994), (1,000 tons)

	Nitrogenous Fertilisers		Phosphate Fertilisers	
	Exports	Imports ^{a/}	Exports	Imports
1985	2.0*	3,870	12.0*	6.3

1986	5.8*	3,010	14.8*	5.0
1987	9.8	5,610	32.0	2.5
1988	14.0	8,560	43.6	1.5
1989	5.3*	n.a.	14.0*	6.6
1990	18.0*	8,630	70.1*	7.7
1991	25.4	7,700	57.7*	7.4
1992	10.0*	8,440	40.0	9.1
1993	25.0	4,100	97.0*	9.1
1994	n.a.	n.a.	n.a.	n.a.

Sources: FAO, *FAO Yearbook, Fertilizers, Vol. 44, 1994*, FAO, Rome, 1995, pp 43, 71, 77; a/ Import figures for chemical nitrogenous fertilisers from UN, 1988, 1989, 1993, *International Trade Statistics Yearbook*, vol. 1, UN, New York, 1990, p. 173; 1991, p. 170; 1995, p. 184: * FAO unofficial figure.

Potash

Recent Trends

Potash production has more than doubled since 1985 (see Table III.72.). Shandong province is the main producer of potash, accounting for 20 % of total production in 1993. However supply cannot meet demand and according to some estimates about 95 % of consumption needs are met through imports. From Table III.72. we can see that despite increases in the production of potash, China has had increasingly to import potassic fertilisers to meet its needs. Moreover, between 400,000 and 600,000 tons of potassium sulphate are imported every year for potash fertiliser production. Wenzhou Chemical Factory in Zhejiang province has adopted new technology to produce potash fertiliser, becoming one of the few enterprises in the world to use alunite high-efficient purification technology to produce potassium sulphate¹³⁵.

Table III.72. Output of Potash and Imports of Chemical Potassic Fertilisers, 1985-1994), (million tons),

	Potash	Potassic Fertilisers
1985	2.01	n.a.
1986	2.14	n.a.
1987	2.36	n.a.
1988	2.60	n.a.
1989	3.04	n.a.
1990	3.79	2.79 ^{a/}
1991	3.93	2.93
1992	4.55	2.96
1993	5.34	2.29
1994	5.81	n.a.

Sources: 1995 *Statistical Yearbook of China*, China Statistical Publishing House, p. 413'; a/ figures for imports of potassic fertilisers from UN, 1993, *International Trade Statistics*

Yearbook, vol. 1, UN, New York, 1995, p. 182. 1985-1989 figures as well as export figures for this product are not cited in this series.

Constraints and Prospects

Domestic production of chemical fertilisers can only meet 85 % of current demand. The gap is being filled by imports, particularly of high-quality chemical fertilisers. In order to boost production the government has included two phosphate-producing fertilizer factories in Hebei and Guizhou provinces in the 210 major capital construction and technical renovation projects for 1993-2000.

Some of the key obstacles facing the development of chemical fertiliser production are shortages of raw materials, irrational management structures and a poor distribution system¹³⁶. As nitrogen-based fertilisers in China are mainly dependent on coal and oil feedstocks, the development of these products will in turn be limited by the performance of the coal and oil sectors. Technological upgrading is needed to take full advantage of China's phosphate reserves.

I. PHARMACEUTICALS

The Resource Base

There are 4,198 enterprises engaged in making medical and pharmaceutical products, of which 1,846 are state-run. There are also 938 township-run and 912 village-run enterprises in this sector. Pharmaceuticals account for 50 % of all current and planned health-care expenditures and make up the largest single share of medical spending. Since 1980 more than 1,000 pharmaceutical joint ventures have been set up throughout China, with total foreign investment of US\$ 1 billion¹³⁷.

Recent Trends

China is self-sufficient in most pharmaceuticals, including antibiotics, analgesics, cardiovascular and other medicines. However the technological production level in this industry is about ten years behind the latest Western developments. China thus has to rely on imports for drugs which rely on biotechnology, such as some anti-cancer drugs, or the most recent research techniques. Foreign companies have also begun to enter this field but government restrictions on the production and imports of drugs, except for new, high-tech drugs, has limited development.

Over the last decade the industry has been developing rapidly and pharmaceutical companies have been able to compete in the world market. In order to foster the development of this industry the government introduced a three-step plan at the end of the 1970s. By 1988 China had already achieved the quadrupling

of output value which was targeted for 1990. The goals set for the end of the century focus on upgrading product quality, developing new varieties of medicines and equipment and gradually meeting international standards. In the first half of the next decade China plans to develop a modern pharmaceutical industrial base using the latest technology.

Bulk drugs

Of the 210 major capital construction and technical renovation projects planned between 1993 and 2000 the government has earmarked seven pharmaceutical factories to expand production of penicillin, aspirins and amino acid infusion¹³⁸.

Vitamin C production has been dominated by domestic producers because of governmental restrictions on foreign investment in this subsector. In 1993 China produced 12,000 tons of vitamin C, of which five sixths was sold abroad. China took 17 % of the world market that year. There are 16 companies producing vitamin C. These will merge over the next five years into five or six groups, each carrying out production, research and distribution¹³⁹.

Antibiotics account for 15 %, the largest share, of total pharmaceutical production in China. Whilst there may be temporary shortages of some antibiotics, China is basically self-sufficient. This has been achieved through the expansion of antibiotics production facilities during the 7th Five Year Plan. During that period factories such as the Shanghai No. 3 Factory, were expanded and upgraded. With regard to the latest drugs such as third and fourth-generation cephalosporins and new forms of penicillin, China is reliant on imports.

Imports of all pharmaceutical products are limited by central government control over import licences. The Medical and Health Products Import/Export Corporation has a virtual monopoly over imports and approved imports carry a 30 % duty¹⁴⁰. Approval depends on whether there are sufficient domestic alternatives and whether the drug is to be used for a priority disease.

Formulations

The potential for over-the-counter drugs in China is enormous. According to a survey carried out by Medical China in the summer of 1993, 90 % of urban consumers interviewed said they had used medication for colds over the previous six months and half said they had taken pain-killers¹⁴¹. Although all drugs, apart from herbal preparations, require a doctor's prescription, unofficially there has been an expanding over-the-counter market. Decentralisation has weakened the ability of the State Pharmaceutical Administration to control and monitor distribution of drugs. As the over-the-counter sector is unofficial, no figures exist pointing to its relative size or importance. Whilst imports are also severely limited, illegal imports from Hong Kong are in evidence in hospitals and drugstores.

Joint venture activity in pharmaceuticals is restricted by government requirements that any production or importing in this area should only be in the field of new, high-tech drugs. China is self-sufficient in low-cost and well-established drugs such as over-the-counter formulations and the government clearly wishes to limit foreign activity in this area. However, some foreign companies have managed to steer their way into the market by promises of future high-tech products and won government approval for the production and import of over-the-counter products¹⁴².

According to a survey of three cities in the summer of 1993 carried out by a Hong Kong-based consultancy company, joint venture products account for up to 20 % of gastrointestinal and cough and cold remedy sales in value terms, and about 5 % of painkiller sales. For some formulations only or two joint ventures dominate the foreign drugs market in China. For example SmithKline's Beecham's cold medicine, Contac, which is produced in the Tianjin joint venture, is the only foreign cough and cold remedy. Similarly Bristol-Myers Squibb's lead the multi-vitamin market with their joint venture product Theragran. The Xian-Janssen Pharmaceuticals joint venture gained repute throughout China with its deworming agent. Other foreign pharmaceutical companies with joint ventures in China include Abbott International Ltd. producing diagnostic reagents in Shanghai and Ningbo; Capsugel, producing hard gelatin capsules in Suzhou; ICN Pharmaceuticals Inc. producing ribavirin, an anti-hepatitis drug; Pfizer International Inc., producing antibiotics in Tianjin and Squibb Pharmaceuticals, producing antibiotics, vitamins and dermatological medicines in Shanghai.

INDIGENOUS MEDICINAL PRODUCTS

Recent Trends

The production of Chinese medicines has more than doubled since 1985 (see Table III.73.). Sichuan and Guangdong are lead producers in this field, accounting together for 35 % of total production in 1994. There are currently over 1,000 traditional Chinese medicine producers¹⁴³. Medicinal materials as well as medicinal and pharmaceutical products are exported. Between 1992 and 1993 the amount of medicinal materials exported rose from 111,233 tons to 121,674, an increase of 9%. Whilst figures on the volume of Chinese medicines exported are not available, in 1993 they accounted for 13 % of the value of total medicinal and pharmaceutical products exported¹⁴⁴.

Table III.73. Output of Chinese Medicines (tons), 1985-1994

1985	17.5
1986	20.7
1987	24.2
1988	27.5
1989	22.6

1990	22.6
1991	26.9
1992	32.2
1993	36.2
1994	37.9

Sources: *1995 Statistical Yearbook of China*, China Statistical Publishing House, p. 411.

In order to expand its exports of traditional medicines the State Administration of Traditional Chinese Medicine is encouraging overseas producers to invest in the sector. Particularly sought after is advanced technology for the production of injections, the decoction of herbs, capsules and pills. However foreign companies are not permitted to produce medicines from rare species of wild materials or to form joint ventures with Chinese partners with confidential prescriptions. Although the Administration is encouraging joint ventures, wholly-owned foreign enterprises are still not welcome in this sector.

Constraints and Prospects

The complicated distribution system as well as unfamiliarity with foreign brand names are important constraints on the entry of foreign producers into this market. Due to differing sales strategies and the distribution system pharmaceutical products are often used in the locality of production. As a result some products are known in the south but not in the north or in some major cities and not others. In order to cultivate demand for their products foreign drug companies advertise on Chinese television and in newspapers, visit hospitals and sponsor health campaigns. As foreign products are perceived to be of higher quality and efficacy, the potential market for foreign pharmaceutical manufacturers is great, despite the higher price.

The technical level of the domestic pharmaceutical industry lags behind that of developed countries and few domestically researched drugs have been granted patents abroad. Further progress in this sector will require greater government investment and technology transfer from overseas. Similarly if the traditional Chinese medicines market is to take off, technological upgrading, market research and the expansion of marketing channels are all required.

J. NON-METALLIC MINERAL PRODUCTS¹⁴⁵

ASBESTOS

The resource base

Reserves figures are not available for any major producer except Canada, but the US Bureau of Mines estimates that China's reserves of asbestos are 'large'. China in 1994 accounted for nearly 9% of world mine production of asbestos. Asbestos is found in Liaoning, Qinghai and Sichuan provinces.

Recent trends

China's output of asbestos in 1994 was approximately 240,000 tonnes, a rise from the 160,000 tonnes production recorded in the late 1980s (see Table III.74), although these production figures are highly approximate and do not necessarily indicate the magnitude of the production increase. Exports in the 1980s were a minimal proportion of output. China's exports in 1993 of crude asbestos (SITC 2784) were a mere 0.02% of the world total.

Table III.74. Production of Asbestos, 1985-94 (thousand tonnes)

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
150	150	150	na	160	160	na	na	240	240

Sources: British Geological Survey, *World Mineral Production, 1983-7*, Nottingham, 1987 for 1984-7; 1990-91 from P. Crowson, *Minerals Handbook, 1992-3*, London, 1992; 1993-4 are US Bureau of Mines estimates.

Constraints and prospects

Any prospects of significant sales of asbestos in the world market have been damaged by worries about the health risks of asbestos's use as a building material, although there are some prospects for the material as a constituent of high strength asphalt paving material and in lightweight plastics as a reinforcing agent.¹⁴⁶

CEMENT

The resource base

China has the non-metallic minerals such as limestone and gypsum required for the production of cement.

Recent trends

In 1994 China produced over 20% of world cement output¹⁴⁷, and has been the world's largest producer for a decade. Cement output has risen six-fold since the start of the 1978 economic reforms, and doubled between 1990 and 1994. Only about 1% of 1994 output was exported, the low figure presumably resulting from high

transport costs. These exports represented a world market share for China of 3.3% (1993 figure).

Table III.75. Production of Cement, 1985-94 (million tonnes)

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
145.9	166.1	186.2	210.1	210.3	209.7	252.6	308.2	367.9	421.2

Source: China Statistical Yearbook, 1995

China has a total 7,700 cement plants, most of which are of the vertical kiln type. These have low investment costs but also are less efficient and produce poor quality output compared to rotary kilns. There are 195 medium cement plants (with 220,000 tonnes annual production) and 65 large cement plants (with annual production in excess of 5,000 tonnes). Of the medium and large plants, about 100 employ rotary kiln technology. In 1991, state-owned enterprises produced 65% of China's output of cement, and collective enterprises produced 35%.¹⁴⁸

Loans from the World Bank, Asian Development Bank and other overseas sources have been used for investment in 20 cement industry projects, generating 17.7 million tonnes of extra capacity with \$1.2 billion of foreign capital. China has been purchasing modern cement-making equipment from the Germany, Japan, Denmark, France and the US, and has welcomed foreign investment into the industry. There were 190 Sino-foreign joint ventures in cement as of 1995, including Japanese and Korean companies in Dalian, Nanjing and Shandong.¹⁴⁹ Foreign investors also include New Zealand's largest cement manufacturer, Milburn, which has taken a share in one of China's largest cement plants, at Suzhou.¹⁵⁰

Constraints and prospects

The major constraints are transport problems and the uneven distribution of limestone. Apart from the coastal area of the Liaodong Peninsula, the coastal region from Qingdao in Shandong in the north to Guangxi in the south contains few limestone resources. Transportation of cement and raw materials for cement production is predominantly by rail and puts strain on the nation's transport. There are also some quality problems among the three quarters of China's cement output which is produced by small and medium enterprises. Such cement is generally not suitable for major projects such as expressways, dams and high-rise buildings.¹⁵¹ China's use of foreign investment and importation of equipment will raise the share of high-grade cement, however.

Exports currently represent only 1% of output, but attempts are being made to develop bulk export facilities in Dalian, Yinkou, Tangshan, Lianyungang, Nantong, Ningbo, Fangcheng, Xiamen and Guangzhou. Exports are expected to have reached 6.6 million tonnes in 1995.¹⁵²

Cement production has expanded enormously during the 1990s, and

will continue to be in heavy demand with the boom in residential and industrial construction, and China's major construction projects during the Ninth Five Year Plan to 2000. During 1996-2000 demand for cement is expected to grow at 8-10% annually in line with GDP growth, which is somewhat below the growth rate of the early 1990s. Annual production is expected to reach 650 million tonnes by the year 2010¹⁵³.

BRICKS¹⁵⁴

The resource base

China has adequate clay resources for brick-making. However, the energy requirements for brick production are high. In 1990 and 1991, the production of every 10,000 bricks required 0.7 tonnes of coal and 150-250 KWH of electrical power.

Recent trends

The brick industry has developed quickly in recent years. There are 120,000 enterprises making bricks (and tiles), mostly seasonally operated. The average cost of production per 10,000 bricks was 400-600 Yuan, and the selling price was ¥600-800

Total brick production in 1990 was 448.5 billion bricks, of which 31 billion were produced by state enterprises, 402 billion by collective enterprises, and 14 billion by other types of enterprises. By 1991 production had risen to 456 billion, of which 91% was produced by collectives. In 1991 China also produced 49.4 billion tiles, of which 94% were produced by collective enterprises.

Constraints and prospects

Brick production is to some extent constrained by its high energy requirements. Also, much farm land has been destroyed because of brick production. The government is trying to accelerate the development of alternative wall material, but bricks will be a major material for building for a long time to come.

GYP SUM

The resource base

China in 1994 was the world's largest producer after the United States. According to the US Bureau of Mines, data on gypsum reserves are not available for any major producers except the United States and Canada, although the Bureau estimates that reserves are 'large' for the main producing countries. The

provinces with the richest gypsum reserves are Hubei, Shandong, Jiangsu, Ningxia, Shanxi, Shaanxi, Hunan, Gansu, and Anhui. Tibet also has large gypsum reserves. The largest producing province is Hubei, with the best known mine at Yingcheng.¹⁵⁵

Recent trends

Gypsum output increased 2.5 fold from the early 1980s to the early 1990s,¹⁵⁶ with the growth in demand from the cement industry. Exports are minimal as a proportion of output.

Table III.76. Production of Gypsum, 1985-94 (million tonnes)

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
5.0	6.5	7.2	na	9.0	10.4	10.6	12.0	11.5 (10.6)	11.0

Source: British Geological Survey, *World Mineral Production, 1981-7 and 1989-91*, Nottingham, 1987 and 1995; 1994 figure is US Bureau of Mines estimate (and who estimate 1993 as 10.6).

Constraints and prospects

China is well-endowed with gypsum and demand is likely to continue as the construction industry expands to meet China's rapid economic growth during the Ninth Five Year Plan (1996-2000). Cement demand is expected to grow in the late 1990s at around 8-10% annually.

MAGNESITE

The resource base

China has reserves of magnesite of approximately 745 million tonnes, equivalent to about 30% of the world total. Magnesium compounds can also be recovered from seawater and from lake brines.¹⁵⁷ There are magnesite deposits in Liaoning, Gansu, and Shandong provinces.

Recent trends

In the late 1980s China production of magnesite represented some 16% of world magnesite output. About a quarter was exported.¹⁵⁸ In 1993 and 1994 the US Bureau of Mines also estimates that China produced approximately 4% of the world output of magnesium metal. As the table suggests, however, there are substantial differences in the estimates of China's magnesite output.

Table III.77. Production of Magnesite, 1985-94 (million tonnes)

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
2.00	2.62	2.63	2.61	2.60 (2.00)	2.60 (2.40)	1.65	1.51	1.5	na

Source: UN Economic and Social Commission for Asia and the Pacific, *Statistical Yearbook, 1994*, for 1985-1990, and British Geological Survey, *World Mineral Production, 1982-91*, Nottingham, 1995, for 1991-93 (with 1982 and 1990 shown in brackets, since they differ from the ESCAP figures).

A major centre for magnesite production is Haicheng in Liaoning province. Haicheng has 82 magnesite mines and 64 processing enterprises. It started production more than 80 years ago, and is currently seeking foreign investment to update its equipment.¹⁵⁹

Constraints and prospects

Magnesite is a widely available resource, and China is particularly well-endowed. Its use in the manufacture of aluminium based alloys and in die-cast magnesium components in the automotive trade suggest it will be in strong and continuing demand as China expands its output of motor vehicles and other industrial products.

BARITE

The resource base

China has 38 million tonnes of barite reserves, the world's largest, and approximately 22% of the world total. On a wider definition of reserves, China may have as much as a third of the world total.

Recent trends

In 1994 China was estimated by the US Bureau of Mines to be producing 39% of world barite output, by far the world's largest producer. Its output has risen from around a million tonnes in the mid-1980s to 1.9 million tonnes in 1994, although it should be noted that different estimates of production vary considerably. In 1994, 1.17 million tonnes were exported.

Table III.78. Production and Exports of Barite, 1985-94

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Production (million tonnes)	1.00	0.82	0.90	na	1.51	1.46	1.50	1.10	1.35 (1.9)	1.9
Exports (million tonnes)	.97	.53	.81	1.1	1.03	1.44	1.12	0.63	0.84	1.17
Exports (\$ million)	32.3	na	20.8	28.1	29.3	40.6	33.4	19.7	24.8	32.6

Sources: British Geological Survey, *World Mineral Production, 1981-7 and 1989-93*, Nottingham, 1987 and 1995, for production (and 1986 export volume); 1994 production figure is US Bureau of Mines estimate, but not that their estimate for 1993 (shown bracketed) is also 1.9 million tonnes; exports from *China Statistical Yearbooks*, 1989, 1992, 1994, 1995.

Barite is used as a weighing agent in drilling oil and gas well, and it is also used in producing glass, paint, rubber, and barium chemicals. Exports of barite peaked in 1990 (see Table III.78).

Constraints and prospects

Despite its other industrial uses, the demand for barite is heavily dependent on the oil and gas industry, and the growth of

barite production for the domestic market will be encouraged if current oil exploration expands.

K. IRON AND STEEL

The Resource Base

China's steel industry can be traced back to the first decade of this century. Of the 34 largest steel enterprises about 40 % were set up before World War II. These large plants accounted for 58 % of total steel output in 1992. The state considers the steel industry to be of strategic importance.

Key raw materials in the steel industry are coal, as a source of power, iron ore and scrap metal. Coal provides 75 % of the energy needs of the national economy. In 1992 China's proved coal reserves amounted to 983.3 billion tons¹⁶⁰. The main coal-producing province in China is Shanxi, which, with an output of over 300 million tons in 1993, accounted for 27 % of total production. In 1994 output of coal registered a 39 % increase over 1985 (see Table III.79.).

China's coal mines are predominantly state-run. Due to high levels of staffing and poor technology the coal industry has for decades been unprofitable¹⁶¹. In 1992 key state mines accounted for 40 % of total coal output whilst locally-owned mines, of which there are over 21,500, accounted for 60 %. Most significant in the latter category are the collectively-run mines which produced 37.5 % of total output that year¹⁶².

Table III.79. Output and Exports of Coal, 1985-94
(100 million tons)

	Output	Exports
1985	8.72	n.a.
1986	8.94	0.098
1987	9.28	0.135
1988	9.80	0.156
1989	10.54	0.153
1990	10.80	0.172
1991	10.87	0.020
1992	11.16	0.197
1993	11.50	0.198
1994	12.10 ^{a/}	n.a.

Sources: 1994 Statistical Yearbook of China, China Statistical Publishing House, p. 408, 516; export and import figures from UN, 1989, 1993 International Trade Statistics Yearbook, Vol. 1, UN, New York, 1991, 1995, pp. 172; p. 188; respectively; a/ 'Statistical Communique of the State Statistical Bureau of the PR China on 1994 National Economic and Social Development', 28.02.1995, p. III.

Small amounts of coal are exported. For example in 1993 exports made up 1.72 % of total output that year. Consistent series data on the volume of coal imports are not available but in 1994 1.21

million tons of coal were imported, suggesting that China is largely self-sufficient in coal¹⁵³.

Also important for the iron and steel industry is iron ore. Proven reserves of this mineral amounted to 48.9 billion tons in 1992¹⁵⁴. In 1994 China produced 85 % more iron ore than in 1985 whilst imports rose 3.7 times, reflecting both rising demand and a shortfall in domestic supply (see Table III.80.)¹⁵⁵. Of the total production of iron ore in 1994 70 % was steelmaking iron, 25 % foundry iron and 5 % V-containing pig iron¹⁵⁶.

The production of iron ore has proceeded at a slower rate than iron and steel production. Key constraints on this industry are shortages of iron ore and the fuel needed to increase iron production.

Table III.80. Output and Imports of Iron Ore, 1985-1994, (million tons)

	Output	Imports ^a
1985	137.35 ^{b/}	10.04
1986	149.45	13.71
1987	161.43	10.86
1988	167.70	10.54
1989	171.85	12.59
1990	179.34	14.34
1991	190.55	18.54
1992	209.76	25.22
1993	226.35	33.04
1994	253.67	37.34 ^{c/}

Sources: Exports and imports for 1985-1987, 1988-1989 and 1990-93 from UN, 1988, 1989, 1993, *International Trade Statistics Yearbook*, Vol. 1, UN, New York, 1990, 1991, 1995, pp 173 and 170; ; 184 respectively; export figures not shown indicating these are insignificant; b/ output figures from 1995 *China Yearbook of Iron and Steel Industry*, Beijing, pp. 86, 92; c/ from *China's Customs Statistics*, 1994, 12, p. 26

Scrap steel is an indispensable material for smelting raw steel. In 1994 China consumed more than 36 million tons of scrap steel, contributing toward the production of 92 million tons of crude steel. China recovers 52 % of its scrap steel from its metallurgical industries. During the 1980s the annual recovery of scrap steel averaged about 10 million tons. By the 1990s annual recovery came to an average of 18 million tons as China increased steel production. In 1995 annual recovery was forecast at 19 million tons.

However China, like other Asian countries, still needs to import scrap steel. As can be seen from Table III.81. the amount imported has risen steadily in the 1990s, reaching over 2 million tons in 1994. Compared to China South Korea is a much larger

importer of scrap steel, importing 7 million tons in 1994. China's exports of scrap steel are minimal, amounting to only 0.02 million tons in 1994.

Table III.81. Exports and Imports of Iron and Steel Scrap, 1990-1994^{a/}, (million tons)

	Exports	Imports
1990	n.a.	0.18
1991	n.a.	0.23
1992	n.a.	0.97
1993	n.a.	2.75
1994	0.02	2.20 ^{b/}

Sources: UN, 1993 *International Trade Statistics Yearbook*, Vol. 1, UN, New York, 1995, p. 184; a/ figures for 1985-1989 are not available; b/ export and import figure from 1995 *China Yearbook of Iron and Steel Industry*, Beijing, p. 108.

Pig iron

Recent trends

Pig iron output has more than doubled since 1985 (see Table III.82.). Shanxi, Liaoning and Hebei provinces produced over 1 million tons of pig iron each, accounting together for 37.5 % of total output in 1994. Pig iron is used extensively in the production of tractors, processing machinery and various other kinds of equipment. China is an important producer of pig iron, accounting in 1994 for 19.5 % of world production. Since 1992 China has increasingly produced more pig iron than Japan. Its output also exceeds that of the USA and Canada together. As steel plants have built electric furnaces, which consume scrap steel, the shortage of scrap is already causing an increase in demand for pig iron as a substitute¹⁶⁷.

Exports of pig iron are insignificant and domestic supply virtually satisfies demand, with only a small amount of imports required¹⁶⁸.

Table III.82. Output, Exports and Imports of Pig Iron, (million tons) 1985-1994

	Output	Exports	Imports
1985	43.84	n.a.	n.a.
1986	50.64	n.a.	n.a.
1987	55.03	n.a.	1.47
1988	57.04	n.a.	n.a.
1989	58.20	n.a.	0.69

1990	62.38	0.82	1.30
1991	67.65	1.25	0.37
1992	75.89	1.25	0.20
1993	67.39	1.21	n.a.
1994	97.41	1.55	0.40 ^{a/}

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 412; export and import figures 1985-1987, 1988-89 and 1990-93 from UN, 1988, 1989, 1993, International Trade Statistics Yearbook, Vol. 1, UN, New York, 1990, 1991, 1995, pp 170; 173; p. 189, 185 respectively; a/ import and export figures from China's Yearbook of Iron and Steel Industry, Beijing, p. 108.

Exports of pig iron are predominantly to developing countries.

2. Rolled steel

Recent trends

Due in part to its long history the steel industry has the burden of outdated equipment and technology. Although China is the world's second largest steel producer next to Japan, most of its output is of low quality. Products such as thin steel sheets and seamless steel tubes, which require higher technology for their production, cannot meet domestic demand.

In 1994 there were 1,669 iron and steel production enterprises, 351 more than in 1985. Of these 22 (1.3 %) had an annual steel output over one million tons, of which four produced more than 5 million tons. Most iron and steel enterprises produced less than 0.5 million tons of steel per year¹⁶⁹. Leading iron and steel producers include, for example, the renowned Baoshan Iron and Steel Complex in Shanghai, which exported 500,000 tons of rolled steel worth US\$ 120 million in the first quarter of 1995 and the Ma'anshan Iron and Steel Corporation, which earned US\$ 30 million from exports in the first quarter of 1995¹⁷⁰. The output and products of the top ten steel producers in 1994 are given below in Table III.83.

Company	Products	Crude Steel	Steel Product
Anshan	steel plates, section steel, heavy rails, seamless tubes	8.16	5.56
Baoshan	thin, medium gauge plates and seamless steel tubes	7.27	4.61
Shougang	medium and small section steel and wire rods	8.23	5.83

Wuhan	medium and thin gauge plates	5.29	4.59
Baotou	large section steel, heavy rails & seamless steel tubes	3.04	2.06
Benxi	thin and medium gauge plates and section steel	2.49	2.05
Panzhi-hua	Heavy rails and large steel section	2.35	1.38
Maanshan	medium and small section steel, wire rods	2.42	2.03
Taiyuan	section steel, medium and thin gauge plates	2.30	1.27
Tanshan	medium and small section steel and wire rods	1.73	1.49
	TOTAL OUTPUT	59.20	45.49
<i>Source: 1995 China Yearbook of Iron and Steel Industry, pp 123-6.</i>			

Crude steel output has virtually doubled between 1985 and 1994 (see Table III.84.). However domestic supply cannot meet rising demand so imports have risen rapidly in the 1990s. Imports of steel doubled between 1993 and 1994 from 10 million tons to 20 million tons, the bulk of these being of high-quality steel. However this also led to an oversupply of steel, causing prices to fall and domestic sales to become sluggish. Taiyuan Steel Works, for example, was forced to lower producers' prices nine times in 1994 alone. Stockpiling of steel in steel enterprises has become a problem and many enterprises are making only minimal profits, which inhibits further growth of the industry.

Table III.84. Crude Steel Output, 1985-1994, (1 million tons)

	Crude Steel ^{a/}	Of which continuous casting steel
1985	46.79	5.06 ^{b/}
1986	52.20	2.59 ^{c/}
1987	56.28	2.65
1988	59.43	2.71
1989	61.59	2.61
1990	66.35	14.80
1991	71.00	18.83
1992	80.94	24.28
1993	89.56	30.30
1994	92.61	36.54

Source: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 412; a/ crude steel output refers to ingots;

b/ 1985 and 1990-1994 figures from 1995 *China Yearbook of Iron and Steel Industry*, p. 85; c/ figures from UN, UN, *Industrial Statistics Yearbook, 1990, Vol. 2, Commodity Production Statistics, 1981-1990*, UN, New York, 1992, p.567. It should be noted that the latter source underestimates considerably the output of continuous casting steel compared with the iron and steel yearbook. For example the 1985 figure is 2.64 million tons and the 1990 figure 2.50 million. The sectoral yearbook figures are used here but these do not cover the years 1986-1989.

Steel products

Recent trends

China's iron and steel industry has experienced high growth rates since the 1980s. Rolled steel final products have more than doubled in output since 1985 (see Table III.85.). The lead provinces are Liaoning and Shanghai, which in 1995 netted 30 % of total output.

Table III.85. Output of Rolled Steel Final Products (million tons), 1985-1994

1985	36.93
1986	40.58
1987	43.86
1988	46.89
1989	48.59
1990	51.53
1991	56.38
1992	66.97
1993	77.16
1994	84.29

Source: 1995 *Statistical Yearbook of China*, China Statistical Publishing House, p. 412.

The final products can be broken down into a range of items such as heavy rails, ordinary and quality rolled steel, wire rod, steel plate, silicon steel sheet, strip steel, seamless steel pipe. The output of these products are given in Tables III.6. and III.7. below.

Table III.6. Output of Various Rolled Steel Products, 1985-1994 Heavy Rails, Ordinary and Quality Rolled Steel, (million tons)

Heavy Rails	Ordinary Steel, large	Rolled of which medium	Quality Rolled small Steel	Strip Steel	Seamless Steel Pipe

1985	1.12	0.84 ^{b/}	2.72	9.39	3.50	0.81	1.39
1986	1.10	0.79.	3.20	10.21	4.05	0.97	1.46
1987	1.20	0.86.	3.23	10.78	4.48.	1.21	1.62
1988	1.38	0.87	2.80	11.19	4.85	1.38	1.78
1989	1.25	0.90	2.63	11.38	4.80	1.50	1.94
1990	1.26	1.05	2.55	12.18	4.56	1.68	2.11
1991 ^{a/}	0.93	0.68	2.96	13.70	4.92	1.82	2.31
1992	0.92	0.87	3.59	17.62	5.29	2.44	2.65
1993	1.25	1.29	4.81	19.25	6.42	2.77	2.83
1994	1.37	1.03	3.79	23.30	n.a.	3.31	3.61

Sources: 1985-1990 from UN, *Industrial Statistics Yearbook, 1990, Vol. 2, Commodity Production Statistics, 1981-1990*, UN, New York, 1992, p. 572; 1991-1993, *1994 Statistical Yearbook of China*, China Statistical Publishing House, p. 414; 1994 figures from *1995, China Yearbook of Iron and Steel Industry*, Beijing, pp 101-2; b/ 1985-1990 figures for ordinary rolled steel, quality rolled steel, strip steel and seamless steel pipe from *1994 China Industrial Economic Statistical Yearbook*, China Statistical Publishing House, pp 43-44.

Table III.87. Output of Various Rolled Steel Products, 1985-1994
Wire Rod, Steel Plate, Silicon Steel Sheet, (million tons)

	Wire Rod	Steel Plate			Silicon Steel Sheet
		High Gauge	Medium Gauge	Low Gauge	
1985	5.98	n.a.	4.36 ^{a/}	3.75	0.48
1986	6.32	n.a.	4.93	3.90	0.55
1987	6.91	n.a.	5.68	3.93	0.67
1988	7.98	n.a.	5.89	5.15	0.60
1989	8.82	n.a.	6.40	5.24	0.64
1990	9.99	n.a.	6.74	5.52	0.67
1991	10.99	0.14	7.04	6.40	0.60
1992	12.57	0.33	8.20	7.50	0.68
1993	13.89	0.37	9.65	8.74	0.76
1994	13.89	0.33	9.91	n.a.	0.81

Sources: 1991-1993, *1994 Statistical Yearbook of China*, China Statistical Publishing House, p. 414; 1985-1990 from UN, *Industrial Statistics Yearbook, 1990, Vol. 2, Commodity Production Statistics, 1981-1990*, UN, New York, 1992, p. 572; a/ 1985-1990 figures for medium and low gauge steel plate and silicon steel sheet from *1994 China Industrial Economic Statistical Yearbook*, China Statistical Publishing House, p. 44.

In 1994 ordinary small rolled steel accounted for 28 % of total finished steel products, wire rods for 18.6 %, medium steel plate for 12 % and heavy rails for only 1.63 %.

The 1990s have witnessed a surge in imports of steel products. Between 1992 and 1993 the volume of imports rose five times (see

Table III.88.). However, in 1994 imports dropped to 22.82 million tons but were still double the original figure planned and exceeded the amount needed to fill the shortfall in domestic production.

Table III.88. Exports and Imports of Steel Products, 1985-1994, (million tons)

	Exports	Imports
1985	n.a.	19.63
1986	n.a.	n.a.
1987	n.a.	n.a.
1988	n.a.	n.a.
1989	n.a.	n.a.
1990	n.a.	3.68
1991	n.a.	3.32
1992	1.9	6.17
1993	0.9	30.26
1994	1.7	22.82

Sources: 1995 China Yearbook of Iron and Steel Industry, Beijing, 1995, p. 84.

The bulk of imports are of high quality steel products such as cold-rolled plates. Due to inadequate domestic production capacity wide, thick steel plates, cold rolled thin steel plates and pipes have to be imported, accounting in 1992 for around 88 % of imports¹⁷¹. China can only supply 20 % of its annual needs for oil-transport pipe and 25 % of demand for steel pipe in power plants. Moreover, China is not able to produce large diameter, extra-long high-pressure boiler pipe with internal threads. There is a particularly severe shortage of 40 mm steel plate used for shipbuilding, making high-pressure boilers and oil derricks. Annual domestic demand for cold rolled silicon steel chips is 800,000 tons but in 1992 the Wuhan Iron and Steel Company only produced 135,000 tons, requiring the deficit to be imported¹⁷². Thus China has a very limited capacity to produce high-tech steel products and steel products such as steel sheets, pipes, alloy steel, strips and quality shaped steel. In order to increase the supply of plate steel Shougang steel mill is constructing a strip rolling mill. However more substantial investment in this subsector will be required to significantly reduce imports.

From Table III.89. we can observe that imports of wire rods, sheet and plate formed the bulk of imported steel products in 1994, accounting for 54 % of the total.

III.89. Exports and Imports of Finished Steel Products in 1994, (million tons)

	Exports	Imports
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TOTAL	1.74	22.80
of which		
Steel products for railways	-	0.28
Ordinary rolled steel	0.21	1.57
Quality rolled steel	-	0.01
Steel plate	0.39 ^a	2.02
Sheet		6.01
Silicon sheet	-	0.01
Seamless pipe	0.01	0.99
Welded pipe	0.04	0.36
Wire rods	0.29	4.38
Strip	-	0.62

Sources: 1995 China Yearbook of Iron and Steel Industry, Beijing, p. 108; a/ export figure is for both plate and sheet.

According to some analysts about half the imports such as wire rods and steel sections are unnecessary as there is already excess supply in the domestic market.

The government is trying to reduce imports and increase exports as overimporting in 1992 and 1993, coupled with tight credit arrangements in mid-1993, resulted in stockpiling. However in 1994 stockpiles of unused steel products were still 50 % higher than in 1993¹⁷³. In order to control imports the State Council issued new regulations in October 1994 stipulating that rolled steel imported by foreign-financed firms for their own construction use could not be sold on the open market in China, and that rolled steel imported for export production or construction work in the Special Economic Zones could not be sold domestically. Furthermore tariffs would be imposed on steel imported through barter trade, border trade and donations¹⁷⁴.

Some local governments are also encouraging the formation of joint ventures to deal with shortages of supply. In Guangdong province, for example, there is a 6 million tons shortfall of steel each year, with locally produced steel meeting only 30 % of demand¹⁷⁵. The Zhanjiang Steel Corporation has set up a joint venture to expand production of sheet steel to 3 million tons per year by the year 2,000, using imported technology and ore. Once the second phase of operation begins in 1998 this joint venture will become the first manufacturer of medium plate and thick steel in China.

Constraints and Prospects

The long-term strategy of the steel-making industry is to expand exports. The goal for 1995, for example, was to increase exports to 5 million tons and restrict imports to 10 million tons so as to ease the stockpiles of steel.

However imports of certain high-quality categories like tin plate, special plates, petroleum pipes and silicon steel are

likely to continue. Given that wire rod is not produced in large quantities by developed countries, China will have to rely on its own production to meet expanding demand for this product. Domestic producers are being urged to produce more high-quality products to reduce imports. In order to raise the amount of steel products produced in the continuous casting process from its current 40 %, the Ministry of Iron and Steel has set a target of 70 % to be attained by the end of the century¹⁷⁶. Raising the quality of domestically produced rolled steel will prove essential for the development of the auto, energy and transportation sectors. Hence the Ministry of Iron and Steel will prioritise the development of cold-rolled steel plate, zinc-plated steel and other steel for auto use. Although exact figures are not available, it appears the Ministry is planning to invest further in the technical renovation of existing plants in order to achieve these goals.

The further development of China's iron and steel industry hinges greatly on securing a steady supply of cheap raw materials such as coal, pig iron and scrap steel. In the first part of the 1990s considerable efforts were made to improve the efficiency of the coal industry. These included not only technical renovation and mechanisation but also the transfer of 500,000 workers from mining into profitable businesses. In order to boost coal production the Ninth Five Year Plan (1996-2000) envisages a greater role for foreign capital in the industry. Four strategic projects planned for the future are the transportation of coal through pipelines, exploitation of coalbed methane gas, pit-head power plants and the development of "clean coal" technology. In an attempt to reduce production costs further, another 500,000 workers are to be transferred according to the Ninth Five Year Plan.

In order to achieve these goals the government has been looking increasingly towards foreign investment. In the first half of 1995 the Ministry signed US\$ 5.2 billion worth of contracts, agreements and letters of cooperation with foreign companies. Inspired by this initial response from foreign investors the Ministry of Coal Industry gave a clear signal to foreign companies in the autumn of 1995 that further assistance in 300 projects was welcomed¹⁷⁷. Foreign investment projects so far include an agreement between the Australian firm, BHP, and the Zhunger Coal Industrial Company to jointly establish an open mine and two pithead power plants; two joint venture power plants between the CNCIEC Construction and Development Company and the German ERNO Company to produce 200,000 kilowatts a year; and a US\$ 10 million joint venture agreement with the US firm, Amoco, to tap coalbed methane¹⁷⁸. In order to attract foreign investors the Ministry of Coal Industry has permitted them to hold shares in coal enterprises they invest in and granted lower levels of government greater autonomy in the approval of joint ventures¹⁷⁹. Given the rising demand for coal in Asia, China will play an important role in meeting this expansion, which in turn should encourage foreign investors to invest in China's coal mines¹⁸⁰.

US restraints on exports of scrap steel in the face of rising domestic demand and higher Japanese purchases in the wake of the Kobe earthquake will affect China's ability to satisfy its increasing demand for this product. Any resulting price rises will increase production costs for China's steel industry. Policy-makers are already preparing countermeasures such as setting up overseas scrap steel processing bases and investing in scrap metal factories in the USA. Indeed one steelworks has already planned to operate a car dismantling and processing plant in the USA with an annual output of 300,000 - 500,000 tons of scrap steel.

As well as raw material constraints the iron and steel industry also has been plagued by cashflow problems. For example in December 1994 Anshan Iron and Steel Corporation had to close two blast furnaces because it did not have sufficient cash to pay for coal. In early 1995 lack of funds forced Shougang Iron and Steel Corporation to suspend or cancel ten or so projects involving US\$ 1.19 billion¹⁸¹. The cancelled projects included the construction of a steel plant in Qilu, eastern Shandong, a new office building, a cement plant and coal development. These cashflow difficulties are in part related to the problem of debt collection and in part to excess imports which have led to domestic stockpiling, subsequent price falls and lower profits.

Other constraints on the development of the iron and steel industry are the lack of advanced technology, low technical standards and rising production costs. Most of China's exports are processed steel products made with imported raw materials. In the past production costs were kept low because of low raw material and fuel prices, low rate of depreciation and cheap labour¹⁸². As domestic prices of raw materials and fuels increasingly approximate world market levels and wage rises outpace productivity increases, the prospects for domestic steel makers look increasingly bleak.

L. NON-FERROUS METALS¹⁸³

ALUMINIUM

The resource base

China has relatively small reserves of bauxite, less than 1% of the world's total¹⁸⁴, although recent discoveries are claimed to have raised its world reserve share to 5%¹⁸⁵. In the early 1990s China was the fifth largest producer of aluminium in the world, but the country's production, which was 5% of the world total, was small in relation to that of the US and Canada (with over 30% of world production between them).

1994 mine output came mainly from the provinces of Gansu (271,659 tonnes), Guizhou (147,603 tonnes), Henan (122,842 tonnes), Qinghai (114,376 tonnes), and Liaoning (98,519 tonnes).

Recent trends

As is the case with other non-ferrous metals, China's consumption of aluminum is high by world standards. In relation to gross domestic product, China consumed about double the aluminium consumed in OECD countries. Along with copper among the major non-ferrous metals, aluminium is in the shortest supply in China relative to demand. The Economist Intelligence Unit 1992 study of non-ferrous metals quotes a 1990 estimate by the Hawaii-based East-West Centre that Chinese demand for aluminium would increase by 6.35% over the coming 20 years. There has been more than a doubling of domestic output of bauxite since 1985. CNNC, the China National Non-Ferrous Metals Corporation,

Table III.90. Production and Imports of Aluminium, 1985-94

	Production of Bauxite (Al content, '000 tonnes)	Production of Aluminium ('000 tonnes)	Imports of Aluminium (SITC 684) ('000 tonnes)	Imports of Aluminium ores and Alumina (SITC 2873) (\$mil)	Imports of Aluminium (SITC 684) (\$mil)
1985	526.0	524.7	487.7	na	533.1
1986	530.0	570.0	266.2	na	336.2
1987	550.0	640.0	148.1	na	230.6
1988	595.2	713.0	75.4	na	174.8
1989	629.0	750.0	246.3	na	630.6
1990	621.3	854.3	115.6	200.3	281.7
1991	1,007.0	962.0	108.7	165.3	282.3
1992	1,200.0	1,096.0	344.0	148.9	586.3
1993	na	1,254.5	290.6	184.0	492.5
1994	na	1,498.4	(166.8)	(259.1)	(189.1)

Sources: UNCTAD, *Commodities Yearbook 1994* for bauxite production, and aluminium production for 1986-9. 1990-94 aluminium production statistics are from *Yearbook of Non-Ferrous Metals Industry of China, 1995*; Trade statistics from *UN International Trade Statistics Yearbooks, 1988, 1989, 1993*; *China's Customs Statistics Monthly, December 1994* for 1994 import figures.

Notes: 1994 import value figures for 'aluminium ores and alumina' are only for alumina. In 1993 imports of alumina were 97% of imports under SITC 2873. 1994 import figures for aluminium volume and value are only for unwrought aluminium.

is trying to cut what it regards as excess domestic use of

aluminium for consumption goods such as window frames and drinks cans, although already the usage of aluminium in such products is lower than in western countries¹⁸⁶. The Ministry of Foreign Economic Relations and Trade in 1989 imposed an export ban on all aluminium metals and alloys.

In the late 1980s smelting capacity for aluminium expanded faster than refinery capacity for alumina. There were bottlenecks at refineries and bauxite was diverted to export, while alumina was imported to feed the smelters. The Eighth Five Year Plan (1991-5) gave priority to the development of the aluminium industry, and twenty of the large state projects under the plan were alumina refineries or aluminium smelters.

The Anshan smelter, Guizhou, is China's largest producer of aluminium ingot and has been expanding.

There has been considerable importation of foreign technology in aluminium processing according to the entries for large individual enterprises in the *Yearbook of Non-Ferrous Metals Industry of China*. Foreign investment in aluminium, as in other non-ferrous metals has been severely restricted. The Minister of Geology and Mining announced in September 1994 that there would be some relaxation. A number of joint venture projects have been agreed. These include US-based Huang International Holdings taking a stake in the Lanzhou Aluminium Factory in Gansu province to upgrade the plant's facilities. A CNNC delegation in 1994 signed an agreement with the Eisenberg Group in Israel to invest \$2 billion in projects including aluminium processing¹⁸⁷.

Although there were small volumes of export of bauxite, alumina and aluminium, China remains a net importer. In 1994 China imported \$189.1 million of unwrought aluminium, while its exports of aluminium products were \$80.4 million. However, in 1994 there were pressures to increase export. These pressures resulted from rises in world prices and also from the reform in exchange rates and taxation, which made importing more expensive. The changes had the effect of raising domestic prices for aluminium.¹⁸⁸

Constraints and prospects

The inadequacy of power supplies for the energy-intensive operation of smelting has held back current production and the growth of new capacity, and the cost of electricity has risen substantially in recent years.¹⁸⁹ Power supply is likely to remain a problem at least until the next century, even though in the long run it may be solved by state investment in the electricity supply industry.

A second constraint is the shortage of alumina. The China National Nonferrous Metals Corporation has constructed a number of new plants in the 1990s to increase alumina supply.¹⁹⁰

Transport problems make it costly to ship aluminium ingots produced in the northwest to Guangdong in the south where demand is booming.

China in 1995 is predicted to have produced 1.65 million tonnes of aluminium, which will maintain its position as the fifth largest producer in the world.¹⁹¹ Aluminium will be in great demand as Chinese economic growth continues, for example aluminium foil for expansions in airconditioner output, for the auto industry, for construction and for aluminium conductors for the power industry.¹⁹² According to Wang Jianxia of CNNC, annual demand for aluminium is predicted to rise by 60% by the turn of the century, to 2.5 million tonnes, while production is planned to rise to 2.9 million tonnes.¹⁹³

Little new mine development is planned, but this is unlikely to be a constraint on aluminium output. Foreign investment has started in the industry only recently, but will be an influence making for greater efficiency. Efficiency improvements are necessary in aluminium as also in many other branches of non-ferrous metal production; the China National Non-Ferrous Metals Corporation was making losses in the early 1990s.

COPPER

The resource base

China has less than 1% of world reserves of copper, and accounts for about 4% of world mine production. Most of China's ore is relatively low grade, so production costs are high. The most important copper mining area is Jiangxi province, with nearly a quarter of China's mine production and the country's largest copper mine at Dexing. The largest smelter and refinery in China, at Guixi, is also controlled by the Jiangxi Copper Corporation. The second most important copper mining province is Yunnan, with a refinery at Kunming, and the third is Anhui province with the Wuhu smelter¹⁹⁴.

Table III.91. Production and Imports of Copper, 1985-94

	Production of copper ore (metal content, '000 tonnes)	Imports of copper ore (metal content, '000 tonnes)	Imports of unrefined copper (metal content, '000 tonnes)	Imports of refined copper ('000 tonnes)	Imports of copper ore, refined and refined copper (\$bil)
1985	239.8	69.3	43.5	355.7	652.7
1986	253.8	74.8	23.6	171.5	365.3
1987	278.2	59.9	18.2	75.8	232.6
1988	281.9	51.9	5.9	78.5	311.5
1989	299.1	53.5	1.2	68.9	308.9
1990	295.9	72.7	1.9	38.4	235.8
1991	304.0	92.4	6.1	107.8	413.9
1992	334.3	102.0	113.2	265.7	992.7
1993	345.7	na	na	(162.4)	(695.5)
1994	395.6	na	na	(121.4)	(224.2)

SOURCES: UNCTAD, *Commodity Yearbooks 1997 and 1994 for Imports*, *Yearbook of Non-Ferrous Metal Industry of China*, 1995 for ore productions; *China Statistical Yearbook*, 1995 for import figures for 1993 and 1994 (copper and copper alloys).

Domestic demand is substantially in excess of mine production, and the difference is made up by imports of refined copper and also of copper concentrates and blister for domestic smelting and refining.

Recent trends

Copper consumption in China is approximately three times more intensive in relation to GDP than in OECD countries, and rapid consumption growth has been forecast. The Economist Intelligence Unit non-ferrous metals study quotes the Hawaii-based East-West Centre's estimate of 3.26% annual consumption growth over the 20 years to 2010, but regards it as possibly being too low. The Chinese government has been trying to encourage substitution of other materials for copper in items such as power transmissions, and in consumer goods such as kitchen utensils. Under the Eighth Five Year Plan (1991-5) copper production was targeted to rise by 2.5% per year, with a focus on improving production conditions such as increasing smelter capacity utilization. The major domestic consumers are power generation, vehicle and machinery manufacture and the production of household goods.

The Eighth Five Year Plan looked to an expansion of smelting and refining capacity more than to an increase in mine production, and Dexing in Jiangxi is likely to continue to be the main source of ore.

Deregulation of foreign trade in China in the 1980s led to many problems. Producers had an incentive to export their copper despite domestic shortages, since plan prices were lower than world prices, and this led to a ban on exports of refined copper and copper alloys in 1989. China is an important player on the world copper market. For example, world copper prices dropped sharply in 1993 when China reduced its purchases, the country's buying of copper previously having supported the market¹⁹⁵. In 1995 China was reported to be planning to sell stocks of copper worth about \$560 million to pay for food imports. It was also reported to be buying copper scrap in preference to buying refined metal¹⁹⁶. A well-publicised dispute between CITIC (the China International Trust and Investment Corporation) and London Metal Exchange copper dealers was eventually settled after Shanghai-based dealers had lost a reported \$30-40 million in allegedly unauthorized copper trading.¹⁹⁷

Constraints and prospects

Copper is in relatively short supply in China, and production of refined copper is likely to increase less rapidly than consumption, with the gap being filled by imports. Rises in price in the world market in 1994-5 caused substantial rises in the domestic price¹⁹⁸.

China has been looking for inward direct foreign investment in

copper refining, and to outward direct foreign investment of its own to source copper ore overseas. Domestic smelting and refining are likely to continue to be in excess of domestic mine production, with the consequent reliance on imported concentrates and to some extent of imported blister copper.

TIN¹⁹⁹

The resource base

China has the world's largest reserve of tin - almost a quarter (1.6 million tonnes) of the estimated world reserves of 7 million tonnes, compared to 1.2 million tonnes each for Brazil²⁰⁰ and Malaysia. Tin in China is found in the south, particularly the south-west province of Yunnan, and in Guangxi, which together have half of China's tin reserves. There are also deposits in Guangdong, Hainan, Hunan, and Jiangxi provinces. China's tin deposits are part of the Asian tin belt, which runs from Yunnan through Burma, Laos, Thailand, Malaysia and Indonesia.

The largest mining and smelting complex is Gejiu in Yunnan, with 10,000 tonnes annual capacity.

Table III.92. Production and Exports of Tin, 1985-94

	Production of tin ore (metal content, '000 tonnes)	Exports of tin ore (metal content, '000 tonnes)	Exports of tin metal ('000 tonnes)	Exports of tin metal and tin ore (\$ mil.)
1985	29.8	2.5	13.7	176.8
1986	25.0	4.5	7.7	67.7
1987	28.0	10.4	17.6	132.1
1988	30.0	14.8	10.7	156.4
1989	44.0	21.8	9.9	172.2
1990	42.2	15.8	10.1	116.8
1991	47.1	10.5	15.7	118.1
1992	43.8	5.0	30.3	170.3
1993	49.1	na	(40.7)	183.1
1994	54.1	na	(44.4)	200.6

Sources and Notes: Production figures for 1985 and 1990-94 are from Yearbook of Non-Ferrous Metals Industry of China, 1995. 1986-89 production figures are from UNCTAD Commodity Yearbook 1992. Note that UNCTAD gives a 1985 production figure of 20,000 tonnes, so the fall between 1985 and 1986, and indications of changes in later years in the early 1980s may be unreliable. Tin export figures for 1993 and 1994 are from China Statistical Yearbook 1995 and refer to tin and tin alloys 'tin and tin alloys' - the volume figures are bracketed since they may not be compatible with earlier years. Export figures for 1984-92 are from UNCTAD, Commodity Yearbooks.

Recent trends

Figures for China's tin production are rather unreliable, and vary considerably among different sources. Nevertheless, it is clear that China's recorded production of tin ore rose sharply in the 1980s, probably from around 16,000 tonnes of contained tin in 1980 to 42,000 tonnes in 1990, a very high figure by historical standards. Production has increased further in the 1990s.

The rise in production was associated with increased exports. Production since the early 1980s has been substantially in excess

of domestic consumption requirements, which averaged 10-15,000 tonnes annually in the late 1980s. Consumption rose to 21,100 tonnes in 1993 and 26,100 in 1994²⁰¹, but this is still far less than the 54,000 tonnes of contained tin estimated to have been produced in 1994.

The rise in Chinese exports in the 1980s, coupled with export increases from newly discovered tin deposits in Brazil, was a key factor in causing the collapse of the International Tin Agreement (ITA) in 1985, which plunged real tin prices down to levels not seen since the 1930s. While the Association of Tin Producing Countries (ATPC) attempted to support the tin price by means of a supply rationalization scheme after the ITA's collapse, China (like Brazil) remained outside the ATPC and continued to export high volumes. China joined the ATPC in 1994, and accepted a quota of 20,000 tonnes for 1995 to limit exports. An official of the China Non-Ferrous Metals Import and Export Corporation was reported in late 1995 as wanting an increase in China's quota, but strongly supported the continuance of the supply rationalization scheme. There were fears within the ATPC that smuggling would mean additional tin from China entering the world market illegally²⁰², but the general manager of China's largest tin producer, Yunnan Tin Import/Export Kunming Co, was on record as saying he thought high domestic tin prices within China would act as a break on excessive exports in relation to quota. Chinese domestic consumption currently is dominated by solders and alloys, but usage in tinplate and chemicals is expected to expand²⁰³.

China in the late 1980s was exporting between a third and a half of its tin output as unsmelted ore. These ore exports were not for reimport - China's imports of tin metal were minimal. Since the early 1990s, expansions in refined tin production, reported to have increased from 32,620 tonnes in 1992 to 67,767 tonnes in 1994, have led to China becoming a net importer of tin ore²⁰⁴.

Constraints and prospects

China's expansion of production in the 1980s and its emergence as a significant player in the world market for tin to some extent reflected a lack of control over exporters as the country's system of foreign trade was decentralized. In 1990 the state council said that the production of tin and some other metals would be limited and a greater degree of central control over tin production was reasserted in 1991²⁰⁵. This increased control was a necessary condition for China's being able to join the Association of Tin Producing Countries' supply rationalization scheme.

Tin prices have remained low in real terms, but the prospects for higher prices are somewhat better as a result of recovery in OECD countries and the decision of the ATPC to continue its supply rationalization scheme until at least 30 June 1996.

Foreign involvement in China's tin mining industry in the future

is likely to be minimal, despite the sector now being open to foreign investment. Most major mining multinationals have already exited the world tin industry as a result of the 1980s tin price collapse and are unlikely to return.

LEAD AND ZINC

The resource base

China has 7 million tonnes of lead reserves, equivalent to 11% of the world total, and accounted for 14% of world production in 1994. China's zinc reserves are 5 million tonnes, 4% of the world total, with 12% of world production in 1994. The main lead and zinc deposits are found in Gansu, Yunnan, Inner Mongolia, Guangdong and Qinghai. China's largest lead/zinc mine is Changba in Gansu province, and the second largest in Lanping in Yunnan, and Xicheng in Gansu the third.

Recent trends

Lead mine production doubled between 1985 and 1994 and mine production of zinc rose 2.5 times.

Controls on lead and zinc exports were imposed in 1989 after domestic shortages were created by exports of concentrates which peaked in the case of lead at nearly 80,000 tonnes in 1987 and nearly 58,000 tonnes for zinc in 1989. These exports had resulted from world prices rising above the internal prices set by the China National Non-Ferrous Metals Corporation. Exports of lead concentrates have since fallen to low levels, though zinc concentrate exports have continued. Imports of lead ore have been negligible (400 tonnes in 1992) and lead metal imports have been small. Similarly, imports of zinc ore and metal have been minor. In the early 1990s China remained a small net exporter of zinc, and was exporting the equivalent of a quarter of its output of lead metal. High prices in 1995 fed through onto the domestic market²⁰⁶.

Table III.93. Production and Trade in Lead, 1985-94

	Mine production of lead ore (contained metal, '000 tonnes)	Production of lead metal ('000 tonnes)	Exports of lead ore (contained metal, '000 tonnes)	Exports of lead metal ('000 tonnes)	Exports of lead ore and metal (\$mil)	Imports of lead metal ('000 tonnes)
1985	230.5	222.5	5.0	6.4	(2.7)	7.6
1986	226.8	211.2	5.1	7.4	(3.0)	4.5
1987	267.2	210.3	79.8	23.5	38.5	4.6
1988	311.6	206.0	58.8	11.9	29.4	4.6
1989	341.4	269.0	19.2	1.8	9.0	36.4
1990	363.9	296.5	0.1	38.0	30.5	1.7
1991	352.2	320.0	2.5	15.9	11.8	0.2
1992	330.2	366.0	7.4	89.9	55.8	1.7
1993	338.1	411.9	na	na	na	na
1994	461.9	467.9	na	na	na	na

Sources: UNCTAD Commodity Yearbook 1992 for lead production figures 1986-89 and Yearbook of Non-Ferrous Metals Industry of China, 1995 for 1985 and 1990-94. Other statistics from UNCTAD Commodity Yearbooks, 1992 and 1994.

Notes: 1985-6 export value statistics (bracketed) for lead ore and metal are for metal exports only.

Table III.94. Production and Trade in Zinc, 1984-95

	Mine production of zinc (contained metal, '000 tonnes)	Production of zinc metal ('000 tonnes)	Exports of zinc ore (contained metal, '000 tonnes)	Exports of zinc metal ('000 tonnes)	Exports of zinc ore and metal (\$'000)
1985	395.0	306.2	na	na	na
1986	395.7	336.2	na	na	na
1987	458.2	383.1	18.6	95.3	75.6
1988	527.3	425.4	54.1	13.8	54.5
1989	620.4	450.9	57.5	20.1	63.9
1990	763.1	526.9	38.1	16.7	45.9
1991	749.8	576.1	38.5	6.3	22.8
1992	758.1	648.3	32.7	84.9	105.8
1993	775.4	na	na	na	na
1994	990.3	na	na	na	na

Sources: Ore production statistics for 1985 and 1990-94 are from Yearbook of Non-Ferrous Metals Industry of China, 1995. Other figures are from UNCTAD Commodity Yearbook: 1994 (UNCTAD's Commodity Yearbook did not include zinc statistics prior to the 1994 issue).

Under the Eighth Five Year Plan (1991-95) lead output was planned to grow at 5.4% a year and zinc at 5% a year. Most reported projects have been for mines rather than smelters, including expansion plans for the three largest mines Changba, Lanping and Xicheng. Since the removal in 1994 of many of the restrictions on foreign investment in non-ferrous metals, projects have been announced including a joint venture the Hong Kong OrientMet Industry Company and China's largest zinc-smelting plant at Huludao in Liaoning. The Australian mining multinational, BHP, has been involved in prospecting for zinc in Sichuan²⁰⁷.

Constraints and prospects

The domestic supply of lead at present appears adequate for domestic needs, though there have been some reports of shortages,²⁰⁸ but that of zinc could move into deficit despite rapid past output growth. Like other non-ferrous metals in China, lead and zinc face will continue to face increasing domestic demand, and an expansion of output is planned to continue to at least 2000²⁰⁹, aided now by some foreign investment.

M. NON-ELECTRICAL AND ELECTRICAL MACHINERY

The resource base

Chinese development policy has laid great emphasis on the country's capital goods (or 'machine-building') industry.²¹⁰ According to the First Five Year Plan (1953-7), 'the machine building industry is the key to the technological transformation of our national economy'.²¹¹

In the early years of the Chinese communist regime, from 1949 until the Soviet withdrawal in 1960, crucial help was provided by the Soviet Union in fostering Chinese production of machinery. The necessary development of the resource base in the form of transfer of technology and the training of workers and managers was accomplished by the work of Soviet experts in China and by the training in the USSR of a large cohort of Chinese.

In the 1960s the Chinese made great efforts to develop design technology of their own, including raising educational standards in engineering and requiring research institutes to apply their skills to meet the needs of capital goods production. By the mid-1960s, China was capable of manufacturing over a thousand different types of machine tools, including numerically controlled machine tools.

The technology to produce heavy electrical equipment had been acquired from Soviet and Czech sources in the 1950s. Work towards self-reliance in this area in the 1960s and early 1970s included further development of thermal generating plant and the manufacture of hydroelectric generating equipment. However, the efficiency of production in these, and many other branches of machinery manufacture, was by no means generally up to world standards.

The quality of education and training, essential for a highly skill-intensive industry like machinery production, suffered during the disruptions caused by the Cultural Revolution (1966-76), particularly during its most intense period from 1966 to 1968.

In the late 1970s, after the end of the Cultural Revolution, there began the import of technology through licencing agreements and manufacturing contracts, though, unlike the case of fertilizers, petrochemicals and synthetic fibres, there was little importation of complete plants.²¹²

Besides technology and human resource development, the development of the machinery industry requires inputs of key raw materials. The steel industry is an important element in the resource base for machinery production, as also (and increasingly so) is electronics. By the 1970s the machinery industry was absorbing a quarter of China's steel output.

A problem for Chinese machine building has been the availability

of a range of special steels. In the early years of the industry's development, in the 1950s, the special steels for many machines were not available in China, and a third of the machinery industry's sheet steel was imported. Since then, there has been substantial growth in special steels production²¹³, although there are still serious quality problems.

Ancillary industry development is less important as part of the resource base for machinery production in China than in many countries, because Chinese machinery manufacture has developed in a highly vertically integrated fashion. This structure, however, loses the efficiency gains achieved in Western countries and Japan through inter-firm specialization within a vertically 'disintegrated' industrial framework.

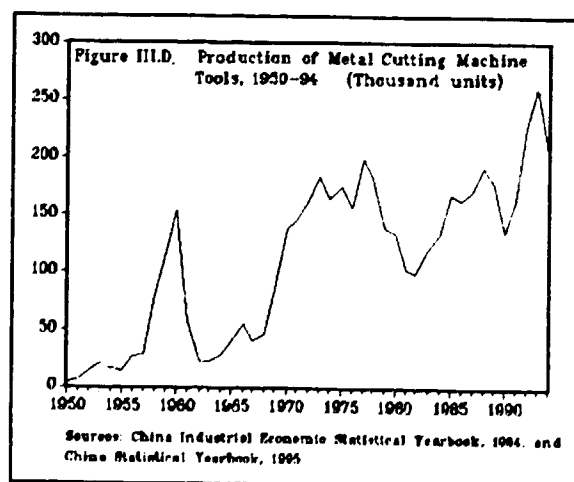
Machinery manufacture in China consists of about a hundred individual industrial branches such as textile machinery, mining machinery, construction machinery, petrochemical equipment, agricultural machinery, and so on. In 1994 the industries 'ordinary machinery manufacturing' and 'special purposes equipment manufacturing' employed 7.36 million workers, including some employment in township and village enterprises. This employment was larger even than the textile industry. Also, the official statistics record 3.64 million workers in these two machinery industries in township and village enterprises.²¹⁴

This branch profile concentrates on machine tools and electrical machinery.

MACHINE TOOLS

Recent trends

Figure III.D shows output of machine tools from 1950 to 1994, taking metal-cutting machine tools as representative of the sector. Output has fluctuated considerably over the years, particularly in the 1950s and 1960s. Machine tool production first grew rapidly in the 1950s. In the early 1960s, as the focus of the machine-building industry switched towards the support of agriculture, the growth of machine tool production slowed while that of agricultural machinery increased rapidly. Nevertheless, by the mid-1970s China was meeting 95% of its own requirements of machine tools.²¹⁵ Since then machine tool imports have risen and have been an important way of introducing new technology into the economy. These imports have been encouraged by a reduction in important



duties in January 1994. For example, the rate on numerically-controlled machine tools was cut from 15% to 9%.²¹⁶

After rising to 138,900 units a year in 1970, output reached a plateau of around 150,000 a year, until the late 1980s and 1990s saw some increase. Between 1993 and 1994 there was a fall, from 262,000 to 206,500²¹⁷, as a result of macroeconomic restrictions in the economy. A detailed breakdown of the different types of machine tool production in China for 1992 and 1993, the latest years for which statistics are available, is given in Table III.95.

China is the world's biggest importer of machine tools.²¹⁸ As Table III.96 shows, imports have quadrupled in current price terms during the 1990s, and are now 8.5 times the value of exports. Exports have fallen slightly during the 1990s.

Constraints and prospects

The industry at present suffers from fierce import competition, and the current *Yearbook of the Machinery Industry* (1994) mentions that many machinery enterprises are making losses, including machine tools. The Ministry of the Machine-Building Industry expects that machine tool output will have grown 8-9% in 1995, after the decline caused by an inrush of imports.²¹⁹

The Machinery Industry Ministry has announced a 15 year programme to make machinery production into a 'pillar of the economy' by 2010. These plans include objectives for machine tools. There will be a heavy stress on improving the quality of production of numerically controlled machine tools, which should take 70% of the domestic market in 2000 and 80% in 2010. The Minister of the Machinery Industry announced in December 1995 that in 1996 serious attempts would be made to increase the machinery industry's international competitiveness, by concentrating resources on the top 100 enterprises and setting up manufacturing research and technology development centres.²²⁰

It was announced in 1995 that machine-building enterprises would be given greater freedom by the Ministry of the Machine-Building Industry to approach prospective foreign investors.²²¹

Table III.95. Production of Machine Tools, 1992-3

(Thousand sets)	1992	1993
METAL CUTTING MACHINE TOOLS	228.7	262.0
<u>of which:</u>		
Numerically controlled machine tools	7.4	13.0
High precision machine tools	1.3	1.5
Large machine tools	4.0	4.8
<u>Of which:</u>		
Heavy machine tools	0.5	0.6
<u>Of which:</u>		
Lathes	123.0	142.5
Drilling machines	23.0	27.9
Boring machines	5.0	5.5
Grinding machines	19.8	19.4
Milling machines	20.1	23.8
Planing machines	7.5	7.3
Presses	91.4	105.2

Source: China Machinery Industry Yearbook, 1994

Table III.96. Imports and Exports of Machine Tools, 1985-94

	Imports of Metal Working Machine Tools (SITC 736) (\$ million)	Exports of Metal Working Machine Tools (SITC 736) (\$ million)	Imports of Metal Cutting Machine Tools (SITC 7361) (Thousand sets)	Imports of Metal Forming Machine Tools (SITC 7362) (Thousand sets)
1985	134.6	na	na	na
1986	369.4	35.6	na	na
1987	459.1	79.2	na	na
1988	519.0	131.8	na	na
1989	486.2	188.3	na	na
1990	543.9	250.3	21.1	11.9
1991	604.3	230.0	28.4	17.3
1992	1004.9	226.7	60.1	31.7
1993	2079.8 (1945.2)	242.4 (216.3)	72.8	41.3
1994	(2060.6)	(242.0)	na	na

Sources: UN, *International Trade Statistics Yearbooks*, 1988, 1989, 1993, and (for 1994) *China's Customs Statistics Monthly*, December 1994. The bracketed 1994 figures are for 'machine tools' and are shown to indicate the relative sizes of imports and exports. They are not fully comparable with SITC 736 figures for earlier years. For example, 1993 'machine tool' imports were \$1945.2 and exports \$216.3 (shown in brackets in the table)

ELECTRICAL MACHINERY

Recent trends

In 1994 there were 2.33 workers employed in the 'electric equipment and machinery' industry in China, and approximately a million workers in township and village enterprises.²²²

Table III.97 shows trends in the production of major items of electrical equipment. The production of power generating equipment rose three-fold between 1985 and 1994.

An important centre of the electrical machinery industry is Shanghai. Shanghai Electromechanical Holding Group, which is the most important enterprise, has established 129 joint ventures with foreign companies, bringing in \$400 million in foreign capital. Foreign partners include General Electric from the USA, Hitachi and Mitsubishi from Japan, and the German company Siemens.²²³

Constraints and prospects

There is a great shortage of electric power in China, and demand for power generating equipment, a major output of the electrical machinery sector, is likely to expand. The Machinery Industry Ministry has announced a 15 year programme to make machinery production into a 'pillar of the economy' by 2010. These plans include objectives for electrical machinery. Power generating equipment is to concentrate on large generating units, and hydro-electric generating equipment will develop units of 700,000kw capacity for the Three Gorges dam project.²²⁴

Table III.97. Production of Electrical Equipment, 1985-94

	Generating Equipment (Million kW)	Transformers (Million kV.A)	Alternating Motors (Million kW)
1985	5.6	80.4	34.5
1986	7.2	77.3	39.7
1987	9.4	93.0	41.7
1988	11.1	100.4	45.1
1989	11.7	99.3	41.0
1990	12.3	74.4	35.3
1991	11.6	77.5	38.2
1992	13.0	99.5	52.4
1993	14.7	174.3	54.5
1994	16.7	na	59.5

Sources: *China Machinery Industry Yearbook*, 1994; and 1994 from *China Statistical Yearbook*, 1995

N. TRANSPORT EQUIPMENT

The Resource Base²²⁵

The motor industry, and other branches of transport equipment manufacture, are served by China's extensive industrial base of steel production and machine building.

China's large pool of cheap labour also is an important resource for the transport equipment industry. In 1994 there was a total of 3.45 million workers employed in the manufacture of motor vehicles, components and other transport equipment, compared to 2.01 million in 1990

In 1950, when the Chinese government sought help from the USSR to set up China's first complete automotive factory, there was no proper feeder industry for the supply of components. Before the establishment of the communist regime in 1949, not only was there was no significant production of complete vehicles in China, but the automotive industry was limited to a few truck and bus chassis plants and some shops making bodies. The automotive industry was built up initially using Soviet-made components and Soviet technology. For example, the first truck produced, the 'Liberation' model, used over 80% Russian parts when production started in the mid-1950s, but by the mid-1960s after the political break with the USSR the components were entirely Chinese-made. China now produces a wide range of automotive components, although there are efficiency problems caused by the fragmented, small scale nature of production.

MOTOR VEHICLES AND AUTOMOTIVE COMPONENTS

Recent trends

The automotive industry developed in China in the 1950s with Soviet assistance. The industry originally was oriented towards the production of commercial and military vehicles, and of tractors to aid agricultural development. Passenger car production did not start until 1958, and by 1960 China was producing less than a hundred cars annually. Imports of cars also were minimal, and passenger car use was confined to a handful of high officials. Passenger car production did not increase significantly until the late 1980s, when a substantial demand for cars had appeared, for example for taxis for the tourist trade in the booming southern provinces. This demand initially was met by imports.

**Table III.98. Production of Motor Vehicles and Tractors, 1985-94
(thousand units)**

	Total production of motor vehicles	Production of trucks	Production of tractors
1985	437.2	269.0	867.5
1986	369.8	229.1	803.1
1987	471.8	298.4	1143.1
1988	644.7	403.3	1382.9
1989	583.5	363.4	1157.9
1990	514.0	289.7	1140.8
1991	714.2	382.5	1400.5
1992	1066.7	476.7	1447.7
1993	1298.5	597.9	999.1
1994	1366.9	663.0	1401.8

Source: China Statistical Yearbook, 1995

In the early 1980s domestic passenger car production was around 5,000 vehicles per year, while car imports reached over 100,000 units in 1985. Given the high and growing domestic demand for cars in China, decisions were taken in the mid-1980s to develop domestic production. Import substitution in passenger cars was encouraged by import licencing and import duties of several hundred percent (varying with the type of vehicle), among the highest in the world. Joint venture foreign investment came to dominate the passenger car industry as foreign vehicle manufacturers, faced with saturated markets in Europe, North America and Japan, were attracted by the prospects of China's vast and growing market.

Tractor production, as Table III.98 shows, rose rapidly in the late 1980s, but stayed stable around 1.4 million a year except for 1993, when severe macroeconomic restriction was in force.

Table III.99. Exports of Road Vehicles and Parts, 1985-94

(\$mil.)	Total Road Vehicles and Parts (SITC 78)	Parts (SITC 784)	Cycles (motorised and not) (SITC 785)	Cycles (non-motorised) (SITC 7852)
1985	54.5	na	na	na
1986	104.8	na	na	na
1987	115.7	na	na	na
1988	na	na	na	na
1989	295.2	na	na	na
1990	3814.3	3432	214	145
1991	5085.7	4348	440	358
1992	1160.9	126	559	433
1993	1240.9	178	596	427
1994	1791.3	na	na	na

Sources: UN, *International Trade Statistics Yearbooks*, 1988, 1989, 1993; *China's Customs Statistics Monthly*, December 1994

Table III.100. Imports of Road Vehicles and Parts, 1985-94

(\$mil.)	Total Road Vehicles and Parts (SITC 78)	Parts (SITC 784)	Cycles (motorised and not) (SITC 785)	Motorcycles (SITC 7851)
1985	3063.8	328	na	na
1986	2135.7	321	na	na
1987	1311.2	349	na	na
1988	1491.0	391	na	na
1989	1436.0	na	na	na
1990	4283.6	3485	64	9
1991	5901.9	4686	164	4
1992	3518.5	909	169	9
1993	5285.8	1000	553	366
1994	4666.6	na	na	na

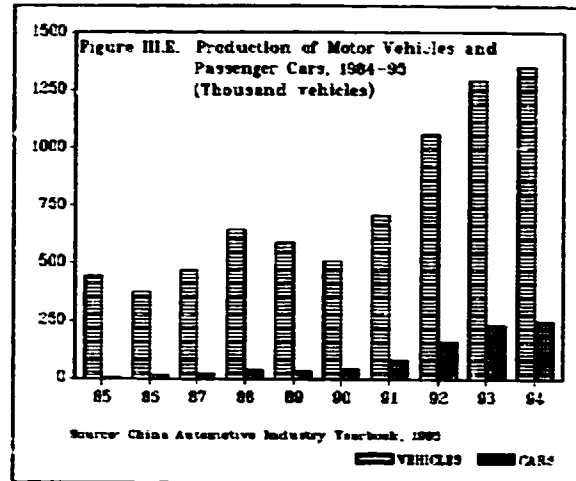
Sources: UN, *International Trade Statistics Yearbooks*, 1988, 1989, 1993; *China's Customs Statistics Monthly*, December 1994

By 1990 passenger car production was over 42,000²²⁶; it doubled

in 1991 and 1992, reaching over 250,000 in 1994. The output of trucks also has increased rapidly, more than doubling over the period 1985-94 (see Table III.98). Despite these increases, motor vehicle ownership in China remains very low by world standards, approximately seven vehicles per thousand people.

A legacy of the Chinese communist desire for local self-sufficiency is the large number of geographically dispersed plants in the motor industry. In the Maoist period plants were set up in the interior for greater safety from military attack. In 1964 there were 417 factories producing trucks, cars, motorcycles and automotive components; by 1974 nearly 2000. Nearly every province had its own automobile plant, often producing far below minimum efficient size²²⁷. In

the mid-1990s there are some 200 assemblers of motor vehicles, ranging from plants producing under 1,000 units a year to plants with annual production of over 100,000 units²²⁸. Nevertheless, in the passenger car industry a small number of large groups, all joint ventures, dominate production. The largest groups at present are:



Assembler	1993 Production (thousand vehicles)
Shanghai Volkswagen	100.0
Tianjin Auto (Daihatsu)	47.9
FAW Audi	18.3
Dongfeng (Citroen)	17.1
Guangzhou Peugeot	16.7
Changan (Suzuki)	15.0
First Auto Works (VW)	12.0
Hainan (Mazda)	
Guizhou (Fuji Heavy Industries)	1.2
Others	9.9
Total	240.0

Sources: adapted from Economist Intelligence Unit, 'China's Automotive Business. Prospects to 2000', *International Motor Business*, 1st Quarter 1995, p.157

The overwhelming importance of joint venture foreign investment in passenger car production dates from the rapid expansion of car production in the late 1980s. The largest producer, Volkswagen, was set up in 1984, and most others in the late 1980s.

In commercial vehicle production was already well developed before the post-1978 economic reforms. Domestic state-owned enterprise dominate, though there are some important foreign investors. The largest commercial vehicle producers are:

Assembler	1994 estimated production (thousand vehicles)
Dongfeng Motors	150.0
First Auto Works	130.0
Beijing Jeep (Chrysler)	81.0
Nanjing Motor Works	75.0
Tianjin Autos	45.0
Total	850.0

Source: Economist Intelligence Unit, 'China's Automotive Business. Prospects to 2000', *International Motor Business*, 1st Quarter 1995

The automotive industry was designated as a 'pillar' industry of the Chinese economy under the Eighth Five Year Plan (1991-96), along with petrochemicals, electronics and machine building. In 1994 a new automotive industry policy was announced, which aimed to consolidate the industry and develop mass production by encouraging enterprises to merge and cooperate. By the year 2000 there would be six or seven conglomerates formed out of the existing 13 auto groups, each expected to make 300,000 cars a year; these seven would be reorganized into three or four in the early decades of the next century²²⁹. Domestic production of motor vehicles is planned to constitute 90% of domestic market demand by the year 2000. In 1993 total domestic vehicle production was already over 80% of domestic vehicle sales (nearly 70% in the case of passenger cars)²³⁰.

An additional and important objective of current policy is to develop the domestic automotive components industry. While no new vehicle assembly ventures were to be approved under the policy until 1996, joint venture investment in components was not only to be encouraged but made a condition of the granting of approval for subsequent assembly investment²³¹. The government also hopes that the growth of the motor industry will stimulate expansion in a wider range of related industries such as plastics and glass manufacture.

Local content requirements are imposed on joint venture vehicle

assemblers, who are expected to reach 40% local content within three years of starting production, and to reach 80% within eight years. One consequence of these requirements is that Chinese vehicle production suffers from quality problems, which inhibit exports.

At present China has 2-3000 automotive component suppliers making parts for over a million vehicles per year. Many lack the skills and technology to meet international standards of quality control. The components industry is highly dispersed and fragmented. The situation in component supply mirrors that in automobile production where there is an excessive number of manufacturers. Local governments have encouraged the growth of component production in their region so that local vehicle manufacturers can buy locally.

The standard of components production in China also is rapidly being changed by foreign investors in the automotive industry, driven by the local content requirements as well as by the economic advantages of sourcing from nearby suppliers. Foreign component manufacturers are setting up in China to service their customers, and in some cases foreign assemblers are entering component joint ventures in the expectation of establishing assembly plants in China at a later date. General Motors has a joint venture to produce wiring harnesses for FAW-Volkswagen and is also involved in spark plug, airconditioning and fuel injection projects. Ford plans to produce interior parts. The Korean company Daewoo is setting up a plant for engines, transmissions and components, and Hyundai will produce dashboards. Toyota component suppliers are setting up in Tianjin to service the production of Toyota's automotive joint venture. Mercedes-Benz was reported to be going to invest a \$100 million in component manufacturing ventures in China.²³²

Foreign investors are also beginning to use China as a regional base for the supply of components. For instance, a plant of Honda's to make forgings and coatings is reported to be planning to export to Thailand.²³³

According to the Automotive Department of the Ministry of Machinery Industry, the development and manufacture of auto parts will be a budgetary priority during the 1996-2000 period. 300 firms will receive government support, and the support will concentrate on the development of 23 key components which China has hitherto been unable to manufacture. The programme will include an electronic auto parts research and development venture²³⁴.

Constraints and prospects

There was a slump in domestic sales following austerity measures which led to a shortage of funds in state owned enterprise in 1993-4. Nevertheless, motor vehicle production is likely to expand considerably up to the turn of the century and beyond. Under the Ninth Five Year Plan (1996-2000) demand for

automobiles is expected to grow at over 9% annually, and by 8% annually from 2000 to 2010²³⁵. The Chinese government expects vehicle output will double to three million vehicles a year by 2000, and that most local vehicle requirements will be met by domestic production. Demand for vehicles will be stimulated by China's high rate of growth of GDP and very low vehicle ownership per head of population. Nevertheless private ownership of cars will remain small, given that consumer incomes are low and car prices are very high by world standards, despite some recent price reductions.²³⁶ Low income consumers are likely to see car ownership as a distant priority compared to other consumer durables. In both passenger cars and commercial vehicles production is likely to concentrate on a small number of efficient producers.

Rapid growth is likely in the automotive components sector as the domestic market for vehicles expands and as more joint ventures are established to serve the needs of foreign investors in vehicles. There will also be a growing demand for auto-electronics components such as fuel injections, computerized ignition systems and airconditioners; a senior official of the Automotive Department of the Ministry of the Machine-Building Industry estimated recently that the share of electronic equipment as a percentage of the value of a Chinese-made car would rise from the present 2.5% to around 25% by 2000.²³⁷ The Economist Intelligence Unit estimates that the sales of automotive parts could grow from a 1990 figure of \$1.5 billion to 45.5 billion in the year 2000. Smaller and less efficient component manufacturers are likely to be damaged by the increasing entry of internationally competitive foreign component suppliers, but some degree of inefficiency is likely to remain in the supply of parts for the domestic market as a result of the forces which make for local protectionism in the Chinese economy.

An efficient components industry serving the main assemblers is crucial for the development of internationally competitive vehicle production. At the beginning of 1996, car production was still protected against imports by tariffs of 110% and 150% of the basic price (varying with engine size),²³⁸ and China faces the threat of import competition when it eventually joins the World Trade Organization and such tariffs have to be reduced.

MOTORCYCLES AND BICYCLES

Recent trends

An increased production of bicycles has been a consequence of the decision of the government to allow mass consumption standards

to rise during the course of the post-1978 economic reforms. Annual production of bicycles, which was a little over a million a year in the early 1960s, rose to 13 million in 1980 and to 32 million in 1985. Production has since stabilized at around 40 million bicycles a year (see Table III.101).

China normally contributes about half of total world exports of bicycles. Exports rose from 2.45 million bicycles in 1989 to over 10 million in 1993²³⁹, and 13.4 in 1994. In 1994 exports were equivalent to 30% of China's bicycle production, generating \$503.1 million in export revenue.

Table III.101. Production of Motorcycles and Bicycles, 1985-94

(Thousand units)	Motorcycles	Bicycles
1985	1045	32277
1986	635	35683
1987	734	41167
1988	1171	41401
1989	1032	36768
1990	966	31416
1991	1317	36768
1992	1982	40836
1993	3536	41496
1994	5291	43649

Sources: *China Automotive Industry Yearbook*, 1995, for motor cycles, and *China Statistical Yearbook*, 1995, for bicycles

Bicycle manufacture is widely spread throughout China, with Shanghai and Guangdong province being the largest producers. There are approximately 800 enterprises engaged in bicycle manufacture, of which 200 assemble bicycles and the remainder make bicycle parts. Of these totals, about 200 are foreign-funded enterprises, of which 40 assemble bicycles and 160 make parts. Most of the foreign-funded enterprises are in Guangdong and Jiangsu provinces. However, domestic brands such as 'Forever', 'Phoenix' and 'Flying Pigeon' still dominate the market. The makers of 'Forever' and 'Phoenix' bicycles have over a quarter of the Chinese market.²⁴⁰

China's largest foreign invested bicycle venture, China Bicycle, by the early 1990s had become one of the largest international cycle manufacturers in the world, second only to Giant Manufacturing Corporation in Taiwan²⁴¹. Based in the Shenzhen Special Economic Zone in Guangdong province, China Bicycle has been making export models for sale under international brand names, as well as its own brands, and in 1992 sold 80% of its output overseas. Chinese bicycles traditionally have been low-

priced items, selling for a few hundred Renminbi, but rising consumer incomes have produced a demand for more expensive models, particularly mountain bikes, which will generate increased sales for joint venture investors in the Chinese domestic market. For standard bicycles, the domestic market is already mature, with demand growing at about 3% annually.²⁴²

Rising consumer incomes also have generated a rapidly growing demand for motorcycles. Motorcycles are now within the reach of more affluent consumers, whereas private passenger cars are not. Sales are expected to rise especially rapidly when personal incomes reach \$1000 per year, as they have in Guangdong²⁴³. As Table III.101 shows, motorcycle production in 1994 had risen fivefold compared to the late 1980s. Motorcycle production has risen from about a million a year in the late 1980s to 5.3 million in 1994. The largest selling item are motor cycles of 50-100cc.

Foreign technology has been important in developing Chinese motor cycle production. The leading producers are joint ventures with major Japanese motor cycle manufacturers:

-Jialing, in Chongqing, is linked with Honda

-Jianshe, also in Chongqing, is linked with Yamaha

In addition, Kawasaki and Suzuuki from Japan, and Sanyang from Taiwan, are among the foreign motorcycle companies with joint ventures in China.

There are 94 motorcycle manufacturers in China²⁴⁴. Jianling and Jianshe, together with the third largest manufacturer, Qingqi in Jinan, produce half of China's output. The Ministry of Machinery Industry has announced plans to consolidate China's motorcycle producers into ten large enterprises by the year 2000.

Until recently the Chinese government has limited the foreign partners in joint venture motorcycle projects to 50% of the total equity, and foreign investors such as Honda have been limited to supplying components and technology for motorcycles which would mainly be sold under the Chinese partners' brand name. A new foreign investor, Piaggio (the manufacturer of the pioneering Vespa model in Europe), has entered into a joint venture at Foshan in Guangdong. In this venture, whose production started in 1995, the foreign partner will have 75% equity and the right to sell under its own name.

Constraints and prospects

China already has mass ownership of bicycles, and output has stabilized. There is scope for expansion of more up-market items, particularly mountain bikes, as consumer real incomes continue to rise. China's bicycle exports are already substantial, but its export growth prospects suffered a blow in 1993 when the EC agreed to impose provisional anti-dumping duties against China's bicycle exporters²⁴⁵.

Incomes in China are fast rising to levels which will support

mass ownership of motorcycles, which are already used widely for working transport, especially in rural areas. China is forecast to have 45 million motorcycles by 2000, with an annual demand of over 11 million, making it the largest market for motorcycles in the world.²⁴⁶

Export prospects are limited by poor quality, though this is changing as foreign investors can a stronger position. The latest major foreign investor, Piaggio, has declared its intention of using China as a regional production base as well as selling to the domestic market.

SHIPBUILDING²⁴⁷

Recent trends

China is the world's third most important shipbuilding nation, after South Korea and Japan. China's main shipbuilding centres are Dalian, Shanghai and Guangzhou. The country has one dry dock with a manufacturing capacity of 100,000 tonnes, one shipyard with capacity of 200,000 tonnes, and a floating dock which can fabricate 100,000 tonne ships. China's output includes oil tankers, bulk cargo freighters, drive-on automobile carriers, aluminium alloy hydrofoils, chemical freighters and refrigerated ships, and the country also undertakes major repair and refurbishment operations.

The central organization of the Chinese shipbuilding industry is the China State Shipbuilding Corporation (CSSC), which has 80 enterprises, including 26 large shipyards, which produce both civilian and naval vessels²⁴⁸. In 1994 the 26 major shipyards run by CSSC outfitted ships totalling 1.64 million tonnes, 23% up on 1993.²⁴⁹ Over half of that 1.64 million tonnage was for export. Over the period 1979 to 1994 China has exported approximately half the tonnage it has built. China's total shipbuilding production was 3 million deadweight tons. The 1.36 million tons of non-CSSC output consisted of small and medium vessels. CSSC also has auxiliary factories producing diesel engines and items such as navigation instruments.

China's shipbuilding capacity increased greatly in the 1980s, and much foreign technology and equipment was imported. Technology agreements were signed with overseas companies including Mitsubishi, Mitsui and Sumitomo. These agreements were used to undertake a major programme of shipyard renovation²⁵⁰. In 1995 Kawasaki Heavy Industries was reported to be setting up a ship-engine manufacturing venture in Wuhan, the company's first overseas production centre for marine machinery.²⁵¹

Constraints and prospects

China still suffers from some lack of technical expertise in shipyard construction. The large dry dock facilities under

construction in the Dalian shipyard in 1995, in Liaoning province in north east China, were seriously behind schedule. This was the first dry dock of such size to be built by the Chinese without foreign cooperation, to accommodate super-large crude oil tankers. Another problem is that there is a shortage of domestic steel plate used for shipbuilding.

China aims to enlarge its share of the world market from its 1994 share of around 5% to 10% by the year 2000²⁵². CSSC itself already has increased its output by two and a half times since over the 600,000dwt it produced in 1989²⁵³, and expects to increase output to 2.2 million deadweight tons by 1997. As of summer 1995 CSSC had orders for more than 3 million tons.

O. ELECTRICAL APPLIANCES AND ELECTRONICS

Recent Trends

The development of the household appliances, TVs, computers, telecommunications and software industries depends crucially on the overall development of China's electronics industry. Since the early 1980s the government has sought to promote the expansion and technological renovation of this industry, pouring money into the modernisation of R&D and manufacturing of the key building-blocks of the industry, namely, semi-conductors and integrated circuits. The reformers have pursued a strategy of import-substitution since the early 1980s to foster domestic development. Currently China has around 3,300 electronics enterprises.

Foreign investment and technology imports have been key mechanisms for upgrading manufacturing capabilities and increasing local content. Structural reform has also contributed to higher efficiency. This has involved the creation of large industrial conglomerates such as the Great Wall Computer Group, linking R&D, production, marketing and sales. This process has been assisted by increased government investment in the technical renovation of this sector²⁵⁴.

These efforts to promote the electronics industry had by the late 1980s and early 1990s already begun to pay off. Computer production was particularly strong in 1991, with output rising 57 % over the previous year. Whilst in 1985 electronics accounted for only 6 % of total exports, by 1990 this had risen to 18 %, the bulk of exports being composed of consumer electronics. In 1990 computers accounted for 12 % of total electronics output whilst components made up 29.6 %.

However China still lags behind the rest of the world in electronics production. Inefficiency, duplicate production as a result of decentralisation, outdated and old equipment, low labour productivity and shortages of foreign exchange, parts and components are some of the most relevant factors underpinning this technological gap. Decentralisation had encouraged provinces to set up their own electronics factories, but often at the cost of efficiency. For example only one out of thirty factories producing integrated circuits in China can produce more than 10 million units per year, well below the capacity of enterprises in the West and Japan. Although imports have contributed to increased production, there has been little local adaptation of the technologies or technical innovations.

Domestic production of integrated circuits cannot meet demand. In 1989, for example, China consumed around 400 million integrated circuits yet domestic production amounted to only 114 million, requiring the remainder to be imported. There have been some advances in semiconductor production, with output increasing seven times between 1985 and 1993 (see Table III.102.). The output of integrated circuits trebled between 1985 and 1993. Although output fell % between 1989 and 1990, there were

nevertheless improvements in the proportion of units which could actually be used. Out-of-date technology as well as a failure to transfer technological advances made in the lab to the factory have meant not only that China's semiconductor industry lags about ten years behind leading world producers but also that China remains dependent on foreign-produced components in most areas.

Table III.102. Semiconductor and Integrated circuits output, 1985-1994, (million units)

	Semi-conductors	Integrated circuits
1985	1,479.0 ^a	63.8 ^a
1986	989.9	45.7
1987	1,379.8	76.7
1988	1,875.5	92.2
1989	2,395.2	114.0
1990	3,098.8	108.3
1991	5,469.0	170.4
1992	6,719.0	160.9
1993	9,506.0	201.0
1994	n.a.	n.a.

Source: Simon, D., 'Sparking the Electronics Industry' in *The China Business Review*, vol. 19, no. 1, Jan.-Feb. 1992, pp 24, 26; a/ figures for semiconductors and integrated circuits, 1985 and 1991-1993 from 1994 *China Industrial Economic Statistical Yearbook*, 1995, p. 52.

One of the goals of the 8th Five Year Plan was to develop twelve backbone enterprises for semiconductor production in Beijing and Jiangsu Provinces, with the aid of foreign investment. The plan also aimed at raising annual production of integrated circuits to about 600 million, but this would still not be sufficient to satisfy domestic demand, requiring imports for about two thirds of local needs.

In the 9th Five Year Plan the government gave priority to the development of new components and devices in the electronics industry, such as surface mounting components and devices, thick-film hybrid integrated circuits, sensors, optical-electronic devices, power-electronic devices and new types of batteries. By the end of the century the output value of these products is planned to increase between 15 and 20 %, matching the planned growth in the electronics industry of 20 %. In order to achieve these goals the Ministry of Electronics Industry has proposed manufacturing on a large scale. The Ministry will give particular support to two enterprises with a sales value of US\$ 600 million each, 10 to 20 enterprises which will rank amongst the world's largest producers for some items and 10 to 20 enterprises with exports of US\$ 10 million each²⁵⁵. Integrated circuits are also a key priority in the 9th Five Year Plan.

China's attempts to build up its domestic base for integrated circuit production are inhibited by COCOM restrictions which prevent China from obtaining the technology required to develop more complex integrated circuits. In order to bolster domestic capability China is actively seeking foreign partners. Motorola Inc. has set up an integrated circuit production factory in Tianjin, starting initially with assembly but moving eventually to full domestic production capacity. The Japanese NEC also set up a joint venture with Shoudu Iron and Steel Plant to produce an annual output of 50 million circuits which would supply a programme-controlled telephone exchanges joint venture, also belonging to NEC, in Tianjin. Other projects include a joint venture between Philips and Shanghai No. 7 Radio Factory to manufacture five-inch wafers for TV and audio use and a joint venture involving the French company, Air Liquid, to produce high-purity gases for integrated-circuit manufacturing. The Shenzhen Electronics Group has also planned to set up a sub-micron wafer fabrication plant in Hong Kong through a subsidiary holding intra-COCOM status, thus enabling it possibly to circumvent these international restrictions²⁵⁶. Smuggling of integrated circuits, spare parts and components into China continue to damage the growth of the domestic industry²⁵⁷.

For foreign investors and traders the priority given to the electronics sector in government policy as well as China's inability to innovate and satisfy demand imply that this will continue to be an important sector for investment and trade over the next decade. However, China's weak intellectual property protection legislation is likely to be an inhibiting factor upon some foreign companies, concerned about China as a potential future competitor.

HOUSEHOLD APPLIANCES

Recent trends

Following the rapid development of the household appliances industry over the last decade China has become one of the world's leading producers of refrigerators, washing machines and electric fans²⁵⁸. The industry has benefited from continuous technological innovation and imports of foreign technology and equipment. The annual production capacity of this sector currently extends to 15 million washing-machines, 8 million air-conditioners and 80 million electric fans²⁵⁹. In 1994 twenty-out of the top 500 enterprises in China were in the electrical sector. Twelve of these have their stocks listed on domestic and foreign stock exchanges.

Whilst the production of refrigerators and washing-machines reached a peak in 1988, output has fallen back in subsequent years. Only in 1994 were 1988 levels recovered (see Table III.103.).

Table III.103. Total Output of Selected Household Appliances, 1985-1994, (million units) (except as stated)

	Lightbulbs (100 million)	Refrige- rators	Electric Fans	Washing Machines	Radios
1985	15.33	1.44	31.74	8.87	16.00
1986	16.09	2.25	35.28	8.93	15.89
1987	16.83	4.01	36.60	9.90	17.63
1988	18.27	7.57	44.95	10.46	15.48
1989	20.80	6.70	49.91	8.25	18.34
1990	24.54	4.63	57.99	6.62	21.03
1991	28.00	4.69	62.19	6.87	19.69
1992	32.81	4.85	68.37	7.07	16.48
1993	39.32	5.96	73.87	8.95	17.54
1994	40.65	7.68	86.13	10.94	41.32

Sources: 1995 Statistical Yearbook of China, China State Statistical Publishing House, 1995, pp 409, 411

At the same time demand for imported refrigerators has been declining as several domestic producers are now able to offer quality products at lower prices and with better after-sales service. Given the excess production capacity for refrigerators and the stagnating demand, less profitable firms are likely to be driven out of the market. Currently only one third of refrigerator manufacturers are profitable. The 9th Five Year Plan envisages a greater role for conglomerates in light industry, which would offer one way of rescuing some of the ailing state-owned enterprises²⁶⁰.

Electric fan and recorder production has increased steadily during the decade (see Table III.104.). Perhaps the most dramatic increase in output has been in cameras which rose more than six times over the decade.

Table III.104. Total Output of Selected Household Appliances, 1985-1994, (million units)

	Recorders	Cameras	Electric Irons	Free- zers	Air Condi- tioners	Vacuum Cleaners	Elec- tric boilers
1985	13.93	1.78	11.91		0.12 ^{a/}	0.08	
1986	17.56	2.02	11.43		0.09	0.08	
1987	19.78	2.56	12.23		0.13	0.35	
1988	25.40	3.12	21.86		0.25	1.82	
1989	23.49	2.45	14.20		0.37	2.18	
1990	30.23	2.13	14.05		0.24	0.71	
1991	28.73	4.78	14.49		0.63	0.69	
1992	32.31	5.26	17.22		1.58	1.12	
1993	36.47	19.30	22.29		3.46	1.49	
1994	83.95	28.30	7.60 ^{b/}	3.83 ^{c/}	1.71 ^{c/}	16.46 ^{c/}	

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, 1995, pp 410; a/ 1985-1993 figures for electric irons, airconditioners and vacuum cleaners from 1994 China

Industrial Economic Statistical Yearbook, China Statistical Publishing House, 1995, p. 52; b/ Qiu Qi, 'Appliance industry registers gain in international market' in *China Daily*, 01.04.1995; c/ Wu Naitao, 'Development and Exports' in *Beijing Review*, vol. 38, no. 28, July 10-16, 1995, p. 9.

The leading provincial producers of lightbulbs were Shanghai, Jiangsu and Guangdong. Jiangsu and Guangdong lead production of electric fans, accounting for 85 % of total output in 1993. In fact Guangdong is the main home to household appliance production, taking first place for all products. There are 12 main producers of freezers who hold 85% of the market. Similarly the 12 main producers of washing-machines and air-conditioners account for 77 % and 62 % respectively of the domestic market²⁶¹. The twelve largest enterprises in the refrigerator sector already accounted for 87 % of total production in 1994.

With the rapid development of the industry exports have also begun to increase. In 1994 China exported 562,000 refrigerators, 25 % over 1993 (see Table III.105.). Exports of air-conditioners rose 11 % over 1993 to 227,000. China is the leading world exporter of electrical fans, accounting for 70% of the global market. The bulk of exports of household appliances go to the US market.

Table III.105. Exports of Selected Household Appliances, (10,000 units, except where stated), 1992-1993

	1992	1993	1994
Electric Fans	3,252	4,424	n.a.
Cameras (pieces)	2,923	3,882	n.a.
Torches	17,827	21,505	n.a.
Refrigerators	n.a.	449,600	562,000 ^{a/}
Air-conditioners	n.a.	157,600	227,000 ^{a/}

Sources: 1994 *Statistical Yearbook of China*, China Statistical Publishing House, p. 517; a/ Wu Naitao, 'Development and Exports' in *Beijing Review*, vol. 38, no. 28, July 10-16, 1995, p. 9.

Foreign companies such as General Electrical, Siemens and South Korea's Samsung have also begun to enter the China market. Japanese electrical firms currently enjoy the largest share in the China market²⁶². However due to imports of advanced foreign technology and production lines the quality and prices of domestically produced household electrical appliances match those of foreign imports.

Sound recorders and radio cassette recorders continue to be imported to meet domestic demand and the preference for foreign brand names. In 1994 imports of these products came to 4.6 million units.

Constraints and Prospects

Demand for consumer electronics products has remained stable in the 1990s. Sales of traditional home appliances in urban areas have reached saturation point according to some analysts and rural markets for these products have not yet opened to any significant degree²⁶³. However as per capita incomes continue to rise, demand for first-time purchases in rural areas is likely to increase.

By mid-1994 75 % and 11 % of urban and rural households, respectively, had refrigerators. Future demand is expected to come from newly-formed families, which amounts to about 10 million per year, and the replacement of old refrigerators. Demand for frost free, multi-door and larger capacity models is likely to increase. With supply falling short of demand, the prospects for manufacturers of these more sophisticated designs are good.

Similarly as about 90 % of urban households have washing-machines, demand will be driven by replacement and upgrading, mainly for fully-automatic and rotary-type models. Imports are not an immediate threat to domestic producers of washing-machines as they are about 50 - 100 % more expensive, even without import duty. As only 30 % of households in rural areas have washing-machines, semi-automatic models will continue to find markets. However the growth of the rural market is limited by the underdevelopment of basic running water infrastructure.

As only 15 % of households in large cities own air-conditioners, there is a large potential market waiting to be tapped. Foreign brands and split-type air-conditioners are becoming increasingly popular, despite their higher prices. The growing demand for air-conditioners is likely to lead to output increases.

Import tariffs have served to protect the domestic industry. However in preparation for entry into the WTO rates were cut in mid-1994. For example the tariff for refrigerators was reduced from 100 % to 50 %; for air-conditioners from 130 % to 90 % and for washing machines from 100 % to 90 %. The development of the household appliances sector may be adversely affected by further possible cuts in import tariffs if China enters the WTO.

TV SETS

Recent trends

Before the reforms began colour TV set production was virtually non-existent. In 1979 it produced less than 10,000 sets. The first imported colour-TV production line started operation in Tianjin in April 1980. Government investment in this sector has

enabled TV set production to almost double in the decade since 1985 (see Table III.106.). In 1993 13.07 million colour TV sets were produced and China became the third largest producer behind the USA and Korea. Currently China has an annual production capacity of 20 million colour TV sets. In 1993 the total output value of colour TV sets and related products accounted for over 21.5 % of the total output value of the electronics industry. Since then almost 1,000 production lines for colour TV components, including colour picture tubes, integrated circuits, electronic tuners, printed circuit boards, metres and instruments have been established²⁶⁴.

There are around 50 enterprises manufacturing colour TVs of which nine produce more than 500,000 sets annually and three over one million units. The top ten enterprises account for 61 % of the total output for the industry. The top three local brands are Great Wall, Konka and Panda. Decentralisation of the electronics sector, including colour TV production, in the mid-late 1980s has led to a proliferation of factories and excessive imports of foreign equipment. Many of the 113 imported colour TV lines cannot be used because China cannot produce or afford to import the necessary components and parts²⁶⁵. Similarly there are about 30 factories producing integrated circuits, but these operate well below the standard capacity of factories in Japan and the West. China depends on imports of colour TV tubes for production. Annual production capacity currently exceeds demand.

Domestic sales of black and white TVs have declined in the recent years whilst exports account for an increasing share of total output. Poor electricity infrastructure in the rural areas constrains the uptake of TVs.

Table III.106. Output of TV sets (million) and exports of colour TV sets

	Total output	of which colour TV	Exports of colour TV sets
1985	16.67	4.35	n.a.
1986	14.59	4.14	n.a.
1987	19.34	6.72	1.82 ^a
1988	25.05	10.37	n.a.
1989	27.66	9.40	1.73 ^a
1990	26.84	10.33	n.a.
1991	26.91	12.05	2.42 ^a
1992	28.67	13.33	n.a.
1993	30.32	14.35	4.60 ^a
1994	32.83	16.89	n.a.

Sources: 1995 Statistical Yearbook of China, China Statistical Publishing House, p. 411; a) 'Development of China's Colour TV Industry' in *Beijing Review*, vol. 38, no. 10, Mar.6-12 1995, p. 21 b) Guo Linhuan (ed.), 'Demand for colour TVs expected to go up 7 %' in *China Economic Digest*, Spring 1995, pp 17-18.

With the rise in living standards, the preference for foreign-made brands and desire to replace earlier TV purchases, imports of colour TVs continue to increase. For example between 1992 and 1993 the number of TV sets imported rose threefold from 230,000 to 770,000. Whilst TVs are in general replaced every five to seven years, in China the replacement period is eight to ten years. China also exports its colour TVs, exports amounting to 4.6 million sets in 1993 (see Table III.106.)²⁶⁶.

Constraints and Prospects

Currently 80 % of the 100 million colour TV sets in use across China are located in urban households. Whilst demand for black and white TVs and colour TVs in rural areas should remain strong in the near future, the prospects for the colour TV market in urban areas are less bright. However, large screen TVs are enjoying a burst of popularity which will benefit manufacturers capable of producing these models. Changing preferences will serve to sift out inefficient manufacturers.

In the Ninth Five Year Plan (1996-2000) the Ministry of Electronics Industry has set the goal of expanding colour TV production to 20 million sets. This will involve nurturing one or two large enterprises with an annual capacity of 4 million colour TV sets. Dependence on imported integrated circuits as well as various components and parts will continue to limit the growth of this sector.

Import tariffs have protected the fledgling colour TV industry. However in preparation for entry into the WTO China has cut tariffs for colour TVs from 100 % to between 50 % and 65 % depending on the size²⁶⁷. Further cuts may have an adverse effect on the development of this industry.

Information technology and computers

The Resource Base

In the pre-reform period modern computer technology was virtually non-existent. Domestically produced data processors used low-tech, outdated vacuum-tube technology. Computer technology was also imported from the Eastern bloc.

There are 36 major domestic personal computer manufacturers, of which only five are capable of large-scale production. The key producers are China Great Wall Computer Group, the largest non-governmental computer conglomerate, Legend Group established in 1984, Changjiang Computer Group, Langchao Information Industry Group and the Yunnan Electronic Equipment Corporation, which together accounted for 82 % of domestically manufactured personal computers sold in 1992. However, only five of these manufacturers are capable of large-scale production. The Beijing Legend Group has reached out into the global market by establishing joint

ventures with Hong Kong computer companies and setting up overseas branches in the USA, Germany, Canada, Australia and Singapore²⁶⁸. It currently holds a 2 % share of the global computer market.

Recent trends

In its efforts to rapidly modernise the government began in the early 1980s to nurture the development of the computer industry. Between 1981 and 1985 the government aimed to build up a domestic capacity through technology transfer and foreign investment so as to avoid dependency on the West. As foreign companies proved reluctant to readily transfer technology to this sector, the government had to rely more on direct sales. In this five year period China imported US\$ 3.78 million worth of computer equipment, especially high-end systems. Following the surge in computer imports after decentralisation in 1984 the government increased import duties and import licensing requirements linking computer purchases to key projects. By the late 1980s imports took only 65% of the market as compared to 75% earlier.

From 1986 the government altered its position on technology transfer and in this changed context the first Sino-Chinese computer joint venture was set up. The initial goal in building up the domestic capacity was to create facilities to manufacture personal computers and small-scale computer hardware. The "Torch Programme" was launched in 1988 to promote the development of high-tech industry, including computers. One of the success stories of this programme is the "Super" desktop-publishing system developed at Beijing University, the popularity of which has presented an obstacle to the entrance of Apple into the China market.

As a result of the 1988 austerity programme and the tightening export policies in the wake of Tiananmen computer imports began to fall from 1989. However domestic industry was unable to take advantage of this downturn. This prompted the government in 1991 to abandon any aspirations for self-reliance in computer production. It focused attention on the development of a domestic capacity in low-end products whilst continuing to import high-end equipment such as mainframes and mini-computers. In 1991 China's computer industry industry accounted for only 9 % of the electronics industry total output value.

China relies on imports for high-end computer products. In 1992 China imported over US\$ 1 billion worth of computer equipment, a 12.9 % increase over 1991 (see Table III.107.).

Table III.107. Computer Imports (\$ millions)

Product	1991	1992
Total	902	1,019
Parts and Peripherals	402	428

PCs	199	290
Multi-user systems	211	186
Workstations	90	115

Source: Hui, S. and McKown, H., 'China Computes' in *The China Business Review*, September-October 1993, p. 15

Although there is an official policy of source diversification for technology imports, the US holds about 70 % of the China computer market in terms of shipment value. IBM and Digital Equipment Company dominate the multi-user system market. IBM is the leading mainframe vendor, supplying most government ministries and large organisations. Digital is the largest small-scale supplier. Hewlett-Packard is the largest server supplier, accounting for 40% of the domestic market. It also accounts for 60 % of the ink-jet and laser printer markets. Both Hewlett-Packard and Silicon Graphics dominate the workstation market. Compaq leads the personal computer market, overtaking its rival AST in 1994. Taiwan vendors, Japanese and European companies such as NEC, Olivetti and Bull HN have also entered this fiercely competitive arena. In 1995 the US internetworking technology giant, Bay Networks, which focuses on internetworking products and services, launched a major initiative to expand its operations in China.

China has a rapidly expanding market for personal computers and printers. Large multinational companies such as Apple, IBM, DEC, Compaq, NEC, AST and Hewlett-Packard are investing or have promised to invest in China's computer industry. Hewlett-Packard, which was the first foreign company to form a joint venture in China in the high-tech field, plans to invest US\$ 20 million in China in 1996 to manufacture personal computers²⁶⁹. It has five joint ventures in China and manufacturing facilities in Shenzhen, Qingdao and Shanghai. Compaq's joint venture in Shenzhen was scheduled to start operation in 1995, with an annual output target of 100,000 PCs for both domestic sale and exports²⁷⁰. Whilst the Ministry of Electronics Industry welcomes foreign investment, it is not encouraging companies to set up several joint ventures producing the same product.

China's computer export market has also been developing rapidly. In 1987 China exported US\$ 45 million worth of products, mainly components such as power supplies, floppy diskettes, monitors, printer heads and cables to North America, Europe and the Middle East. By the late 1980s it began to export high-level products such as motherboards. The overall goal is to establish China as a low-end personal computer and component supplier rather than a high-end manufacturer in competition with foreign firms.

With regard to information technology, rising foreign direct investment coupled with the government's determination to encourage rapid economic development imply that demand for information and data networks will continue to increase. By building up its national grid of optical fibre cables and

expanding its satellite programme, China will create an important stimulus to the rapid expansion of its infant information technology industry. In 1994 there were only 800 acknowledged databases in China, mostly not on-line. However, only 300 of these were actually in operation and of these only 60 really served the public according to a China Daily report²⁷¹. Official estimates put the number of installed base of PCs at less than 1.5 million. However the State Information Centre under the State Planning Commission as well as many enterprises are exploring this area. Chinapac, a packet-switched data network, extends nation-wide.

Both central and local governments are already planning ahead to improve information technology. A feasibility study of a national highspeed broadband network is already underway. Guangzhou, Shanghai and Beijing are planning, or are in the process of installing, synchronous digital hierarchy highspeed data transmission networks. The US company, SCM/Brooks, is providing financial support for a joint venture in Guangdong with the PLA's Galaxy New Technology Company to build an asynchronous transfer mode broadband switching system with AT&T equipment. This network would provide services to hotel and exhibition and trade centres in Guangzhou²⁷².

Constraints and Prospects

With growing demand for computer equipment from public bodies such as ministries, banks and financial institutions, private enterprises and home users, we can expect rapid expansion of this market over the coming decade, with positive spin-off effects on the development of the software industry. In the coming five years sales are expected to continue to increase at an annual growth rate of 25 %. In order to meet this expanding demand the government will increase investment and continue preferential treatment to this sector through to the end of the century. In the Ninth Five Year Plan the Ministry of Electronics Industry plans to promote computer utilisation in other industries. For example the target has been set that 70 % of large and medium enterprises and major research institutes will adopt CAD-systems. Computer-control for power conservation as well as computer-assisted management systems will also be introduced²⁷³.

Although China has some domestic capacity, reliance on imports, especially for higher-end systems, peripherals, components and software, will continue over the next decade. The government is encouraging the development of the software industry. Government policy aims to make China a major supplier in domestic and global markets of low-end personal computers and peripherals, including printers, monitors, and circuit boards. Foreign exchange earnings from these products would then support imports of higher-end systems. In order to corner a larger share of the global export market, the Ministry of Electronics Industry plans to export one million personal computers by the end of the century. To achieve this high priority is being given to domestic microcomputer manufacturing.

One of the constraints on the development of the domestic computer industry are the out-dated and inefficient state-run factories. By separating enterprise management from government administration the government intends to make leading producers such as China Great Wall Computer Group, Langchao Electronic Information Industry Group and Changjiang Computer Group more efficient. China's Legend Group, for example, sought listing on the Hong Kong stock exchange as a way to raise more capital. Similarly the Beijing Stone Group, the largest non-governmental computer conglomerate, listed on the exchange in the summer of 1993.

China's continued dependence on the imported chip is perhaps the most pressing obstacle facing the development of the domestic computer industry. China has a very low integrated circuit production capability which is currently limited to ICs in consumer products. It is not yet able to mass produce chips at the 1-3 micron level which is necessary for the production of basic computers. Thus all ICs required in computer production are currently imported. Given COCOM restrictions on technology transfer at least two to three decades of R & D are required before China can attain current Western standards of semiconductor technology. Thus COCOM and US Department of Commerce regulations on the export of high-technology to China are also major obstacles both to foreign exporters and to the future development of the domestic computer industry. In order to develop its IC production capacity China has set up a joint venture with NEC Corporation in Beijing, planning to export 70 % of the output. Motorola Inc. has also set up an integrated circuit-manufacturing facility in Tianjin²⁷⁴.

The lack of intellectual property protection in China has also been a major inhibitor on increased sales of foreign software and services to China. Rife smuggling of computer products, which sell at a lower price than domestic products, is also a serious constraint on the development of the domestic computer industry. In 1994, for example, only 90,000 computers sold were officially imported, the remaining 530,000 being smuggled or illegally assembled²⁷⁵.

Telecommunications

The Resource Base

There are over 40 telecommunications equipment production enterprises in China funded jointly by enterprises attached to the Ministry of Posts and Telecommunication and overseas companies. Domestic production cannot meet the needs of a modern telecommunications network so foreign companies have been active in entering this field. Whilst initially foreign companies conducted mainly direct sales and or set up licensing arrangements, more are now moving towards joint ventures. Particularly lucrative has been the local production of digital switching equipment which yields higher margins and regular post-

sale revenues from upgrading software and system expansion. As switching software is vendor-specific, suppliers can be sure of software revenues for up to fifteen years after the sale of a digital switch. Alcatel, Siemens, NEC, AT&T and Northern Telecom have all set up joint venture digital switching equipment production companies in China. Switchboards were the leading item in electronics imports in 1995²⁷⁶. The Ministry is now discouraging new joint ventures intending to produce digital switching systems. As companies have still managed to export digital switching systems through foreign government loan arrangements, domestic companies, including joint ventures, are currently operating under capacity. In the second half of 1994 imports of switches through foreign government loans was brought to a halt but imports will continue in the near future as already signed contracts are fulfilled²⁷⁷.

China is at an early stage in the production process of telecom equipment. Its production of telecom equipment such as fibre optic transmission systems, multiplexer equipment, microwave radio systems and cellular handsets takes the form mainly of assembly of kits, either Complete Knock-Down or Semi Knock-Down, with key modules and subsystems already assembled. From the point of view of the foreign supplier this type of production has lower margins and lesser post-sale revenues than digital switching. However China is developing a research capacity in this field so as to encourage technological adaptation and innovation. There are at least 100 plants and research institutes engaged in the development and production of fibre optic cable and transmission systems and foreign companies have already begun to set up joint ventures. For example, Philips, Olex and Furukawa Electronic Co. Ltd. have invested in joint ventures in Wuhan, Xian, Shanghai, Guangzhou and Beijing²⁷⁸. Around 30 Chinese companies, however, dominate the production of other cable used in the telecom industry, such as coaxial, pair, trunk and loop cable, providing annually about 3.5 million km of cable for the Ministry's expansion plans. Chengdu Cable Factory, for example, has an annual production capacity of over 1.2 million km and rates as the largest cable producer in the country. Whilst the opportunities for foreign companies in fibre optic cable production are likely to lessen as domestic plants move into this area, radio-based technologies, particularly high-capacity digital microwave and TDMA systems, are likely to provide other avenues for investment.

China has 164,000 route-km of analogue open wire, 40,000 route-km of digital microwave and 2,000 backbone telephone telecommunications trunks use satellite facilities. Fibre has taken the place of analogue coaxial cable²⁷⁹.

Recent trends

For historical and political reasons China suffers from a chronic underdevelopment of its telecommunications networks. In 1978 China had only 3 million telephone exchange channels, with one phone for every 300 people and only two mainlines per 100 inhabitants. Aware of the importance of telecommunications to

economic growth and regional competitive advantage the reformers have embarked upon significant changes in policy to accelerate the development of this sector²⁸⁰.

The first major initiatives in the telecommunications sector came in 1984 when a Leading Group for the Revitalisation of the Electronics Industry was established to promote not only electronics but also the development of the telecommunications sector. Telecommunications is viewed as an instrument of industrial policy, which can stimulate domestic equipment and components manufacturing.

During the 7th Five Year Plan (1986-1990) the key focus of the Ministry of Posts and Telecommunications was on digitising and expanding trunk backbone facilities and installing more digital switching facilities in major urban networks. The key areas targeted were provincial and coastal cities. The 8th and 9th Five Year Plans envisaged a much faster expansion of this sector, with goals set to be attained previously in the year 2,000 brought forward to 1995. In 1992 alone 2.8 million lines were installed, a 44 % increase over 1990 and a 250 % increase over 1988²⁸¹. This rapid expansion is reflected in China's imports of US telecom equipment which amounted to US\$ 460 million between 1987 and 1991²⁸².

By 1994 China had a total of 49 million lines and 10.83 million new telephone subscribers²⁸³. Moreover, the number of international direct-dial telephone circuits had increased from only 78 in 1978 to 24,000. A similar rapid growth is seen for long-distance circuits which more than quadrupled between 1985 and 1991, attaining a figure in that latter year of 152,000²⁸⁴. However it is mainly the urban areas which have benefited from this rapid expansion. 26 % of China's townships have no telephone exchange and 57 % of villages do not have any telephone service²⁸⁵. In large cities there are between 8 and 20 telephones per 100 population compared to an average of only 17 to every 10,000 in the rural areas.

The 1990s have seen a continuation of rapid policy changes. These have included liberalisation measures to extend network capacity as well as efforts to develop digital exchangers and expand fibre optic cable use. In 1992 China had a total fixed-wire network capacity of 32 million lines, of which 19.26 million were for public use and 12.74 for private or specialised use. Whilst the Ministry of Posts and Telecommunications thus operated about 60 % of network capacity, the remaining 40 % were run by township and village enterprises, other ministries such as the Ministry of Energy and state-owned enterprises²⁸⁶.

Organisational reform is an important aspect of changes in the telecommunications sector. In 1994 the Ministry of Posts and Telecommunications became the national regulator funded directly by the state budget whilst the national network operator, the Directorate-General of Telecommunications, was separated off. Under the initiative of the Ministry of Electronics, two corporations, namely, Jitong and Liantong, were set up in 1993

and 1994 to provide alternative or supplementary networks. By constructing satellite, microwave and cable connections Jitong was to contribute towards three of the 'Golden Projects' aimed at providing an information resources network for private end-users. Liantong was given authority to build and operate fixed-line and radio-based local and trunk telecommunications networks. In 1993 the State Council liberalised radio paging, non-public cellular mobile telephone (450 MHz and 800 MHz), Vsats, subject to obtaining a licence, as well as telephone and computer messaging services, E-mail, EDI and videotex, subject to a declaration.

As part of a ten-year plan to raise technological levels and attract capital the State Planning Commission and Ministry of Foreign Trade and Economic Cooperation announced 210 major projects to be implemented by the end of the century, including the expansion of digital exchangers in nine provinces and cities, the construction of optical fibre cable lines between Beijing and Guangzhou, Beijing and Xian, Beijing and Lianzhou and Fuzhou and Chengd²⁸⁷. In 1994 the Ministry of Posts and Telecommunications commissioned the first public Digital Data Network which will link over 300 cities in the first stage of development²⁸⁸. Guangdong province has set up a highly advanced fibre-optic network, a 2.5G-bps line, linking the Pearl River Delta and Hong Kong. In 1994 seven long-distance optical fibre cables and 14 satellite ground stations were completed, increasing the number of long-distance telephone lines by 63 %²⁸⁹.

By the year 2,000 the government hopes to achieve targets double its 1995 goals. Plans are afoot to increase long-distance telephone service circuits to 2.4 million lines by completing an optical fibre cable trunk network which is complemented by satellite communications and digital micro-wave communications facilities²⁹⁰; to increase the number of office telephone exchanges to 114 million lines and mainline subscribers to 93 million; to increase urban ownership of telephones to 30-40 %; to provide 90 % urban coverage for public packet switching and digital data networks; to increase the number of cellular phone users to 10 million and pager users to 25 million²⁹¹. It is projected that a digital network will serve 60 % of the nine million mobile phone and telephone lines in urban and rural areas. In order to fulfil these plans the Chinese government is seeking foreign investment.

Concerned about the current domination of the digital exchange production by foreign companies in the autumn of 1995 the government announced a plan to merge eight state-owned enterprises into one large telephone exchange producer, the China Great Dragon Telecommunication (Group) Co, Ltd.. This new company will receive government credit and financial support for R&D with the long-term goal of taking over the telecom market. By 1997 the company intends to achieve an annual output reaching 6 million lines. Plans are also afoot to set up manufacturing ventures in the former Soviet Union and India²⁹².

Constraints and Prospects

Currently China is adding 11-12 million telephone lines annually to the telecom infrastructure. Cellular mobile phone use has risen rapidly in the reform period. In 1994 alone there were 5 million new pager users, bringing the total to 10 million, a remarkable increase compared with 1990 when there were less than 500,000 pager-users²⁹³. Thus the telecommunications sector is enjoying rapid development and government plans foresee even faster growth.

Financing of this sector does not appear to be a major constraint on its development. As local governments view telecommunications as an import asset in the stiff competition with other regions for foreign investment, provincial authorities often provide cables for the local loop free to their Posts and Telephones Bureaux and the local People's Liberation Army provides free labour for the construction of ducts²⁹⁴. Switches are manufactured in China at less than US\$ 80 per circuit. Network installation costs are recouped through high registration and connection charges. Mobile phones have been a particularly profitable area for the Posts and Telephone Administrations, with handset prices and registration fees as high as US\$ 3,000 or more. Thus the Post and Telephone Administrations have been able to recover their capital outlay within one or two years and pay foreign systems suppliers such as Ericsson and Motorola cash for turnkey networks.

Given the weakness of domestic telecommunication equipment production, however, China will continue to rely on imports of advanced technology, whilst endeavouring to bolster its own development and production capacity. The Ministry of Posts and Telecommunications favours investment contracts over technology transfer agreements and foreign firms are already beginning to convert their licensing arrangements into joint venture contracts so as to gain a stronger foothold in the China market. New guidelines on foreign investment issued in mid-1995 permit foreign companies to participate and jointly invest in telecommunications construction projects, but they are still not allowed to hold shares or engage directly in telecommunications business operations²⁹⁵. Moreover the Ministry has issued guidelines requiring joint ventures to source at least 60-70 % of their inputs locally²⁹⁶. As Chinese plants move into the production of fibre optic cable, the opportunities for foreign companies in this area are likely to narrow.

Software

The development of the software industry is closely related to the continuing demand for computers. Like the computer industry this is also a fiercely competitive sector, both between domestic producers and foreign companies and amongst overseas producers. The domestic industry is very much in its early stages. Although sales in 1994 were 20 % higher than in 1993, compared with the sales of hardware products, the pace of growth is relatively slow²⁹⁷. Software products only account for 12.3 % of total computer industry sales whilst hardware products take up 73.84 %. The Beijing Stone Group Corporation is an active player in the

software industry, developing in 1989 its own typesetting system for small publishers of books and magazines²⁹⁹. However it lost the market to a more advanced system developed by the Founders Group. In 1994 a Stone Group joint venture with a Hong Kong company created 'RichWIN', a Chinese language platform for Microsoft's Windows operating environment, which was adopted that year as the standard operating system by the State Statistical Bureau throughout China.

Eager to accelerate economic growth the government is keen to promote this sector. One step in this direction has been the planned construction of three software parks in 1993 in Beijing, Shanghai and Guangdong provinces. The Shanghai park, situated in Pudong New Area, will accommodate 40 software companies, including joint ventures. The Guangdong location is export-oriented. The Ministry of Electronics aims to focus on the development of application software products. Cooperation with foreign partners is welcomed but wholly-owned software ventures are still out of the question.

Foreign companies have already begun to set up software joint ventures. In 1990 IBM Corp. and Shenzhen University Software Development Corp. set up an International Software Development joint venture. Bull HN Information Systems Inc., a US/French joint venture, announced plans in 1991 to set up a joint venture to produce UNIX application software. The Dutch Word House also revealed its plans that year to set up a joint venture to develop computer software in Guangzhou. Information Global Service, a Japanese company, has joined up with an institute in Shanghai to manufacture computer software for export to Japan and the USA.

Microsoft currently dominates the software market in China. Since its entry into China in 1992 its sales have doubled each year. Anticipating an increase in an accelerating pace of office automation Microsoft focused on Microsoft Office for Windows during 1995. The company has developed Chinese versions for Word, Excel and Mail, thus homing successfully in on the specificities of the domestic market. By expanding its after-sales services Microsoft is hoping to also counter the rampant piracy in software products. Microsoft faces, however, fierce competition from other companies such as Novell, Oracle, Sybase and IBM from the USA and NEC from Japan.

Constraints and Prospects

Software piracy has been a thorn in the side of government attempts to obtain the latest technology from overseas producers. Whilst the software industry in China is at an early stage in its development, government prioritisation of this sector as well as foreign investors' interest in the potentially huge market will be positive factors in its rapid promotion.

P. OTHER INDUSTRIES

Toys

China has become the world's largest producer of toys. In 1991 total output value of the toy sector reached ¥5 billion. There are over 3,000 toy manufacturers in China with more than 300,000 employees³⁹⁹. Of these 242 enterprises fall within the light industrial administrative system, employing a total of 60,000 workers. Production is concentrated in big cities such as Beijing, Shanghai, Guangzhou and in the eastern coastal areas. Foreign investors dominate the successful export market. According to the China Association of Toys 80 % of toymakers in Guangdong and 50 % in Fujian are overseas-funded³⁰⁰.

Exports of toys have grown at an annual rate of 15 - 20 %. Between 1991 and 1994 the value of its exports quadrupled from US\$ 820 million to US\$ 3,063 million³⁰¹. The main export markets are North America, Western Europe and Japan. In 1992 Hong Kong exported HK\$ 53 billion worth of toys, of which half were made in China. China accounts for one third of imported play items in the US, 28.5 % in Germany, 30 % in Britain, 60 % in Italy and 20 % of the Japanese markets. China is a net exporter of toys with the value of imports in 1994 amounting to US\$ 118.6 million. As export volume figures for toys are not available, Table III.108. below gives some indication of the relative importance of certain toy categories as sources of foreign exchange.

Table III.108. Exports of Toys (value) (US\$ million)

	Toys ^{a/} , Sporting Goods	Toys, Indoor Game Equipment	Dolls
1985	82	74	n.a.
1986	163	153	n.a.
1987	292	280	n.a.
1988	n.a.	393	n.a.
1989	n.a.	508	n.a.
1990	1,970	1,830	16
1991	2,454	2,241	23
1992	3,487	3,131	370
1993	4,050	3,590	330
1994	n.a.	n.a.	n.a.

Sources: UN, 1988, 1989, 1993 *International Trade Statistics Yearbooks, Vol. 1*, UN, New York, 1990, 1991 and 1995, pp 176, 173, 190 respectively; a/ this first category includes items such as children's bikes.

The Guangdong Provincial Association of Toys and the Taibao Group have jointly invested in the Shenzhen International Toy World which will hold international toy fairs. It is due to be completed in October 1995³⁰².

Constraints and prospects

The lack of a toy designing body is a key constraint on the

development of the exporting capacity of domestic producers'. Toys tend to be of low quality and limited variety. Most of the toys are copied and few are new creations. Hence China is not able to keep apace with the changing requirements of the international market. Whilst Hong Kong manufacturers require only three months to develop a new toy product, Chinese enterprises require on average six months. Hong Kong produces over 100,000 different types of toys, the USA 150,000 types but China only 20,000 sorts³⁰³.

Low-level technology is a further constraint on the development of the industry which currently relies on technology from the 1960s and 1970s. The need to import some inputs such as stuffing materials because of the poor quality of domestic inputs raises production costs. However domestic demand can mop up those products which meet obstacles overseas because of a failure to match international standards. According to a national market survey the demand for toys will increase 20 % annually, reaching US\$ 24.6 billion by the year 2,000³⁰⁴.

Currently China is dependent on Hong Kong for its export channels, though this may be of less significance once reunification takes place in June 1997.

As with other industries the problem of loss-making state enterprises is an added burden. Moreover the number of these which fall under the Light Industrial Bureau has been increasing in the 1990s³⁰⁵.

Handicrafts

In 1993 there were 2,492 handicrafts and arts enterprises in the light industrial system, 125 less than in 1992. These employed 711,000 staff and workers, a drop of 12,200 compared with 1992³⁰⁶. Handicrafts and artworks have been a mainstay export product of rural enterprises but since 1987 their relative importance as an export from rural enterprises has been falling. Whilst in 1987 15.6% of exports of rural enterprises were handicrafts, by 1993 this had fallen to 9.8 %, its relative position being taken by exports of footwear, paper and paper products, furniture, toys and other light industrial manufacturers³⁰⁷.

Rural enterprises in Beijing, Shandong and Hebei are the prime source of exports of handicrafts and artworks (see Table III.109.).

Table III.109. Ratio of Exports of Handicrafts and Artworks from Rural Enterprises to Total Exports of Handicrafts and Artworks (%)

	1988	1989	1990	1991	1992
Handicrafts					

and Artworks	39.0	43.1	45.0	52.0	63.7
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Source: Yan Shanping, 'Export-Oriented Rural Enterprises' in *China Newsletter*, JETRO, no. 118, Sept.-Oct. 1995, p.9.

Constraints and Prospects

The further development of the handicrafts and arts industry will hinge on the sector's capacity to raise the quality of its products. The government has set this as a policy goal and in that spirit has supported exhibitions and national-level meetings. Further links with foreign buyers will push producers to raise standards and to respond more rapidly to changing market needs.

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127. *Beijing Review*, 31 October - 6 November 1994
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147. Details of the cement industry have been taken from 'Introduction to investment in the cement industry', *China Monitor*, 1, 1995.

148. *Almanac of China's Building Materials Industry, 1991-2*

149. *China Economic Digest*, winter 1995

150. *China Economic Report*, February 1995

151. *China Daily*, 16 December 1995

152. *China Daily*, 3 January 1996

153. *China Daily*, 16 December 1995

154. There is a shortage of information about brickmaking in China. Neither the *China Statistical Yearbook* nor the *China Industrial Economic Statistical Yearbook* gives any production statistics for bricks. Even the *Almanac of China's Building Materials Industry*, for which the latest obtainable version is 1991-2, gives only two years (1990 and 1991) production statistics, and less than a page of text on the industry; everything here is taken from this source.

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157. P. Crowson, *Minerals Handbook, 1992-3*, London, 1992, pp.145-153.

158. See British Geological Survey, *World Mineral Statistics, 1983-7*

159. *China Economic Digest*, winter 1995

160. Here we refer to the US billion which has nine ciphers. Figures from 1995 *China Yearbook of Iron and Steel Industry*, Beijing 1995, p. 79.

According to 'Foreign Funds Fire Coal Future' in *China Daily*, 27.09.1995, China has underground deposits of 2,600 billion tons but less than half of these have been verified.

161. Chang Weimin, 'Foreign funds fire coal future' in *China Daily*, 27.09.1995, p. 1.
162. *China Coal Industry Yearbook, 1994*, Coal Industry Publishing House, 1995, p. 23 (in Chinese).
163. 1994 figure taken from *China's Customs Statistics, 1994*, 12, p. 26
164. Here we refer to the US billion which has nine ciphers. Figures from *1995 China Yearbook of Iron and Steel Industry*, Beijing 1995, p. 79.
165. As the *International Trade Statistics Yearbook* does not provide figures for insignificant exports, we can assume that exports of iron ore are likewise of minimal significance.
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169. Only 16 enterprises produced between 0.5 and 0.99 million tons.
170. Commercial Department, British Embassy, Beijing, 'Steel Plant Plans Ahead' in *China-Britain Trade Review*, February 1994, Issue 352, p. 7.
171. 'China to increase steel imports' in *China Economic Digest*, Summer 1993, p. 30.
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177. Chang Weimin, 'Foreign funds fire coal future' in *China Daily*, 27.09.1995, p. 1.

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179. '300 coal projects in sight' in *China Daily*, 09.09.1995, p. 1.
180. 'Asia's demand for coal to grow' in *China Daily*, 02.06.1995, p. 6.
181. 'Chinese steelmaker forced to cut activity' in *The Financial Times*, 04.05.1995.
182. 'Domestic steel makers still facing harsh times' in *China Economic Digest*, Spring 1995, pp 18-19.
183. Useful background information on non-ferrous metals has been obtained from J.P. Dorian, *Minerals, Energy and Economic Development in China*, Oxford, 1994; and US Bureau of Mines, *Mineral Commodity Summaries*, 1995, which provides the figures used here on reserves of major minerals. Useful detailed information on individual non-ferrous metals has been derived from Economist Intelligence Unit, 'China's Metals and World Markets: Emerging Opportunities for Trade', Special Report no.2185, by Richard Vivian, October 1992, and the *Yearbook of Non-Ferrous Metals Industry of China*, 1995. Note that production statistics for non-ferrous metals are problematic; there are discrepancies between Chinese sources such as the *Yearbook of Non-Ferrous Metals Industry* and international sources such as UNCTAD's *Commodity Yearbook*. These discrepancies are small in some cases (such as aluminium) and large in others (such as tin). Discussion of such discrepancies is included where appropriate.
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186. *China Daily*, 14 October 1993
187. *China Trade Report*, November 1994
188. *China Economic News*, 11 July 1994
189. *China Economic Digest*, winter 1995
190. *China Economic Digest*, winter 1995
191. *China Economic Digest*, winter 1995
192. *China Economic News*, 11 July 1994
193. *China-Britain Trade Review*, December 1995
194. See *Yearbook of the Non-Ferrous Metals Industry of China*, 1995

195. *China Trade Report*, June 1993
196. *Financial Times*, 26 May 1995
197. *China Economic Report*, January 1995
198. *China Economic News*, 22 May 1995
199. Information on tin is derived from J.T. Thoburn, *Tin in the World Economy*, Edinburgh, 1994; J.T. Thoburn, 'The tin industry since the collapse of the International Tin Agreement', *Resources Policy*, June 1994
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201. See world tin statistics listed in *Malaysian Tin Bulletin*, September 1995.
202. *Malaysian Tin Bulletin*, September 1995
203. *Tin International*, vol.68, no.3, 1995
204. *Malaysian Tin Bulletin*, September 1995, p.3
205. See Economist Intelligence Unit, 'China's Metals and World Markets: Emerging Opportunities for Trade', Special Report no.2185, by Richard Vivian, October 1992, p.59.
206. *China Economic News*, 22 May 1995
207. *China Trade Report*, November 1994
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212. Chudnovsky et al (*op.cit.*) give a very detailed account of these technology transfers, pp.158-177

213. These details about steel come from C. Howe (*op.cit.*), pp.120-1.

214. *China Statistical Yearbook*, 1995. Since the first figure includes an unspecified proportion of township and village enterprises in its total, the two figures cannot be aggregated.

215. C. Howe (*op.cit.*), p.118-120.

216. *China Economic News*, 27 June 1994

217. See *China Statistical Yearbook*, 1995

218. *China Economic News*, 27 June 1994

219. *China-Britain Trade Report*, February 1995

220. *China Daily*, 27 December 1995

221. *China-Britain Trade Report*, April 1995

222. *China Statistical Yearbook*, 1995. Since the first figure includes an unspecified proportion of township and village enterprise in its total, the two figures cannot be aggregated.

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224. *China Economic News*, 20 March 1995

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233. See 'Sum of the parts', *China Economic Review*, January 1995
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237. *China Daily*, 17 October 1995
238. *China Daily*, 4 January 1996
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246. *China-Britain Trade Report*, December 1995
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248. See *China Economic Digest*, summer 1993 and summer 1993 issues.
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