

CHINA'S OUTWARD-ORIENTED INDUSTRIES: A SOURCE OF TECHNOLOGICAL DEPENDENCY OR A MEANS TO CATCH-UP?

China's rising importance in various world markets, including in technology-intensive products, should not hide the dualism which characterises its industry. Some of its industrial sectors are highly competitive, and strongly integrated in international trade networks in high-tech products. They are dominated by foreign companies specialised in assembly. At the same time, China's traditional export sectors, dominated by purely domestic firms, lag far behind. The capacity of the outward-oriented industries to spur industrial and technological development in Chinese companies appears weak for the time being. China's entry into the WTO should help reduce this dichotomy, which raises fundamental questions about China's real capacity for industrial catch-up.

Globalisation has renewed the conditions under which developing countries are integrating the world economy. The international fragmentation of production processes has allowed some countries to enter markets in which international demand and productivity is rising rapidly: such as electrical and electronic goods. These products are generally characterised by their intense use of technology and skilled labour. Developing countries are specialised in those parts of the production processes which are labour intensive and in which they have a comparative advantage. These are mainly assembly activities. The benefits associated with such vertical specialisation stem from the increased technological content of the goods traded. According to the UNCTAD, the share of exports from emerging countries in technology and skills intensive sectors¹ rose from 12% in 1980 to 31% in 1998. But this data may be misleading given that the technology content of such exports relies to a large extent on parts and components which are produced in industrialised countries, and so does not reflect the capacity to innovate of emerging countries. The specialisation of developing countries in the labour-intensive stages of production does not automatically lead to technological spill-overs that domestic industries require to progress.

China has seen its share of the world market quadruple in twenty years. It provides a good case to analyse the benefits and limits associated with greater trade openness based on vertical specialisation.

■ The Rise of Outward-oriented Industries

In twenty years, China has considerably increased and diversified its manufacturing exports². During the 1980s, these were driven by traditional industries (textiles and clothing), and during the 1990s by electrical and electronic products. Between 1990 and 2000, the share of textiles in total Chinese exports fell from 32% to 26%, whereas that of electrical and electronic goods rose from 11% to 33%. Graph 1 shows how China increased its world market share over the last decade.

Such rapid transformation has been made possible by China's participation in the international segmentation of production processes³. China does not control the entire production processes in those export sectors which are the most dynamic. Instead it is specialised in assembling imported parts and components. Thus in 1999, 85% of its exports of electrical machinery and 80% of its exports of precision instruments stemmed from international assembly operations. China has developed a vertical trade specialisation, based on its comparative advantages in the downstream stages of production and comparative disadvantages in the upstream stages. This dynamic development has profoundly modified China's sectoral specialisation when compared to countries like India or Turkey, though they were very similar as little as a decade ago⁴.

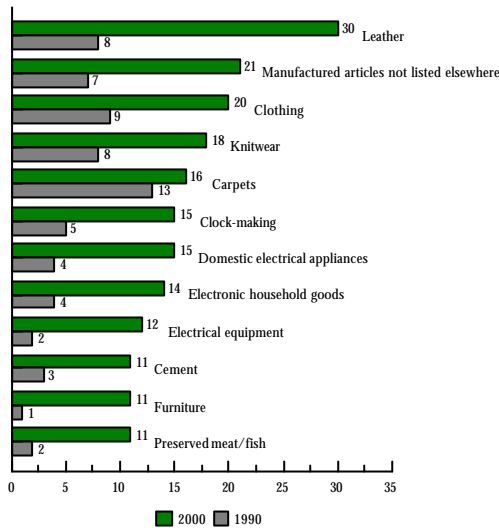
1. These sectors include: chemicals & pharmaceuticals, office machinery and computers, telecommunications equipment, aerospace, precision instruments, *Trade and Development Report 2002*, UNCTAD (2002).

2. The analysis relates to mainland China (excluding Hong Kong).

3. F. Lemoine & D. Ünal-Kesenci, "China in the International Segmentation of Production Processes", *CEPII Working Paper*, No 2002-02, March 2002, <www.cepii.fr>.

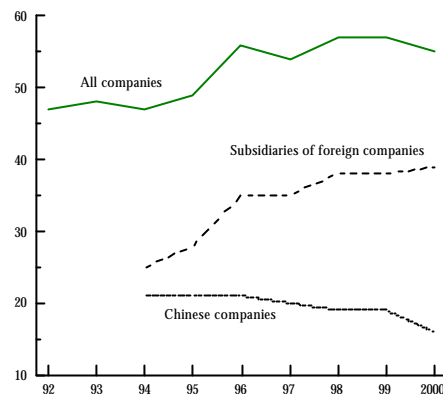
4. F. Lemoine & D. Ünal-Kesenci, "Insertion internationale et transferts de technologie : les cas comparés de la Turquie, de l'Inde et de la Chine", *CEPII Working Paper*, forthcoming.

Graph 1 — China's share of world exports (in %)



Note: The list includes products for which China's world market share is greater than 10%.
Source: CEPII, CHELEM database, authors' calculations.

Graph 2 — Assembly operations as a share of China's total exports (in %)



Source: F. Lemoine & D. Ünal-Kesenci, 2002.

Two factors have allowed China to attain this position in the international division of production processes (Graph 2).

- Its trade policy which has deliberately favoured international assembly activities. Intermediate products that are imported for re-export once they have been transformed are exempted from customs duties. This preferential treatment compared to "ordinary" imports, which are subject to the normal tariff regime, ensures a high level of effective protection for outward-oriented industries. These industries make up over half of China's exports.

- The strategies adopted by companies in Asia's industrialised countries which have relocated the labour-intensive stages of production to China, first in textiles and then in electrical and electronic goods. While American and European investors have aimed mainly at supplying China's domestic market, Asian investors have been attracted more by China's cost advantages. Japan and the four Asia "dragons" provide China with nearly 70% of its imports geared to re-export. Subsidiaries of foreign companies dominate such trade: in 1999, they accounted for two-thirds of China's assembly trade. As a result, a large share of China's foreign trade is intra-firm, with parent companies providing inputs for their subsidiaries based in China.

Intermediate Products: a Channel for Technology Transfer

The corollary of China's specialisation in the downstream stages of the production processes is that its imports are dominated by intermediate goods (69% of manufactured

imports in 1999). Parts and components make up a relatively large share of these, as in 1999 they accounted for a quarter of Chinese manufactured imports, a share significantly higher than in India (15%) or Turkey (17%), though similar to other East Asian countries⁵. Importing such intermediate goods is a source of efficiency for the producer, making it possible to choose from a greater variety of inputs. Upstream differentiation improves productive combinations⁶.

Importing parts and components also provides a way of acquiring high technology. In 1999, 59% of Chinese high-tech imports⁷ were in components (Table 1). Capital goods used to modernise productive capacity only make up one third of Chinese imports in high-technology. China's position in the international segmentation of production processes means that the average high-tech content of its imports (15%) is higher than for India (4%) or even Turkey (12%). As these components are incorporated in exports, the latter also have a higher technological content: 9% of Chinese exports are made up of high-tech products, a share similar to that of the EU, and far higher than in the case of India or Turkey (4%). Chinese exports and imports in high-technology occur in the same sectors, as its export industries absorb most of its high-tech imports. Thus, in office machinery and computers, 92% of imports and 90% of exports of parts and components are high-tech products (for radio and TV the levels are 60% and 47% respectively, see Table 2).

The division of labour which has arisen between China and the other Asian countries means that the latter have become China's main suppliers of high technology, as they account for nearly 60% of imports. The Asian countries export high technology to China mainly in the form of intermediate goods. Technology transfers from Europe, in contrast, follow the more traditional model of being incorporated in

5. In 1996, the share of components in manufactured imports stood at 28% for Thailand, 32% for Malaysia (Ng & Yeats, "Production Sharing in East Asia: Who does What, for Whom and Why?", *World Bank, Policy research Working Paper*, wps 2197, 1999).

6. L. Fontagné, M. Freudenberg & D. Ünal-Kesenci (1996), "Analyse statistique des échanges de produits intermédiaire de l'UE", 6D, *Eurostat*.

7. The list of high-tech products used here is constructed from a very detailed classification (based on work by the OECD and Eurostat), see L. Fontagné, M. Freudenberg & D. Ünal-Kesenci (1999), "Trade in Technology and Quality Ladders: Where do EU Countries Stand?", *International Journal of Development Planning Literature*, 14-4) and it differs from the list of labour-intensive and technology-intensive sectors defined by the UNCTAD.

Table 1 — The structure China's trade in high-tech goods, by production stage, in 1999

	Imports	Exports
Semi-finished products	5	16
Parts and component	59	44
Capital equipment goods	35	35
Consumer goods	1	5
Total	100	100

Source: F. Lemoine & D. Ünal-Kesenci, 2002.

Table 2 — The structure of China's trade in parts and components by sector and technology, in 1999

NACE		Imports			Exports		
		High-tech	Other Products	Total	High-tech	Other Products	Total
29	Machinery & equipment	0	18	19	1	12	13
30	Office machinery and computers	11	1	12	19	2	21
31	Electrical machinery	1	11	12	1	13	14
32	Radio and TV	26	17	43	17	19	36
	Other sectors	3	11	14	1	16	17
	Total	41	59	100	38	62	100

Source: F. Lemoine & D. Ünal-Kesenci, 2002.

capital goods. It may be noted that the technology intensity of Chinese imports from Europe and the United States is greater than that of imports from Asian countries: the share of high-tech goods stands at 21% of all China's imports from Europe and the United States compared to only 14% of its imports from Asia. Distance is therefore not always an obstacle to the transfer of technology.

■ The Dichotomy of Production Structures

The progress of China's foreign trade in the 1990s was thus assured by its outward-oriented industries, which are well-integrated into the production and trade networks of foreign companies. These industries make a positive contribution to China's trade balance as their surplus rose from \$8 billion in 1992 to \$45 billion in 2000, and stems mainly from trade with the United States and Europe. Foreign companies also play a positive role in expanding employment, training labour and raising wages. Though precise data about the weight of outward-oriented industries in the Chinese economy does not exist, it is possible to obtain some idea of their importance by examining the activity of companies set up in China by investors from Hong Kong and Taiwan, who focus mainly on such business. In 1999, they employed between 3 and 5% of urban wage-earners, accounting for 12% of the industrial output of the "organised" sector⁸, and 14% of its profits. They also owned 10% of fixed capital and paid 10% of VAT. Their labour and capital productivity is markedly higher

than that of local enterprises. This is due to their production and management techniques, as well as to the economies of scale associated with their access to international markets. Still, their performance is lower than that of industrialised-country subsidiaries, which are more capital-intensive and generally oriented to supplying local markets⁹.

Overall, Foreign Direct Investment (FDI) has contributed to the restructuring of Chinese manufacturing industry over the last twenty years. In 1999, companies with foreign capital accounted for about one quarter of China's industrial output. In the electronics and telecommunications sector, which leads their involvement, they represent 70% of Chinese output. Furthermore, China's industries with the largest foreign presence are also those in which labour productivity is closest to Western levels¹⁰. The positive impact of FDI on growth and productivity is hardly contested. But, apart from the statistical impact which the presence of high-performing foreign firms have, it is more difficult to identify their spill-over effects on Chinese producers.

Certain indications suggest that the spill-over effects of outward-oriented foreign companies on the industrial and technological capacities of wholly domestic firms have been limited. To be sure, the local content of assembled exports has greatly increased in recent years, as is borne out by the ratio of exports after assembly/imports for assembly, which rose from 1.2 in 1993 to 1.5 in 2000. This trend reflects the growing integration of production processes with the local economy. But the case of electrical goods also shows that such integration stems mainly from the rapid rise in transactions between foreign-owned subsidiaries present in China, rather than from increased supplies by Chinese producers¹¹. The dominance of foreign subsidiaries in assembly trade would tend to confirm that this is a general phenomenon. Foreign-owned subsidiaries accounted for three-quarters of China's assembly exports in 1999 (56% in 1993). Furthermore, the relative stability of the commodity structure of "ordinary" exports (i.e. excluding assembled goods), tends also to confirm the slow spread of the technology used by outward-looking industries to the rest of China's industrial fabric. Ordinary exports are dominated by traditional products (clothing, chemical products, agricultural products), while electrical-mechanical products only represented 15% of these exports in 1999. The dynamism of China's export sector is thus largely confined to foreign subsidiaries: Chinese-owned companies have lost market shares both in the sector of ordinary exports (in which they remain dominant) and in sector of assembled goods. On average, Chinese firms have seen their exports rise by only 6% per year since 1992, whereas companies

8. Excluding small-sized companies which make up 40% of industrial output.

9. F. Lemoine (2000), "FDI and the Opening Up of China's Economy", *CEPII Working Paper*, No 2000-11, June 2000, <www.cepii.fr>.

10. In 1995, labour productivity in China's manufacturing sector averaged 8% of Germany's, compared to 25% for the electrical and electronics sectors (Ren and Bai, "A Benchmark Comparison in Manufacturing between China and Germany by ICOP Approach", paper presented at the Chinese economy seminar held at the CEPII, 12 December 2001, Paris).

11. T. Maruya (2000), "The Electric Appliance and Electronic Industry Clusters in China: Present Status and Future Prospects", *China Newsletter*, No 144, JETRO.

with foreign shareholders have recorded a 25% per annum growth rate¹².

■ Towards a Less Dualistic Economy

Ordinary exports, produced largely by Chinese companies, have suffered discrimination relative to outward-oriented industries, as their competitiveness has been hampered by the fact that their imported inputs are subject to customs duties. China's trade policy has thus accentuated the technological dualism of Chinese industry: highly competitive sectors that are integrated into international production and trade networks in high-technology goods and that are dominated by foreign companies, coexist with traditional export sectors that are dominated by Chinese firms, and that are falling steadily behind.

China's entry into the WTO should help reduce such dualism. In fact, the cuts in tariff rates (from 16% to 9.5% for industrial products) should reduce distortions between the various tariff regimes and should stimulate imports for the domestic market. Chinese companies will thus have better access to imported technology, which has until now mainly flowed to the subsidiaries of foreign firms. The recent decision by the Chinese authorities to end tax concessions to foreign investment projects, which had existed hitherto, should also level the playing-field between wholly Chinese companies and others.

The technological dualism which presently characterises China explains the apparently contradictory judgements that are made of its capacity for catching up with the industrialised economies. On the one hand, experts stress the weak technological capacity of China as well as its insufficient efforts to spread and assimilate foreign technology¹³. On the other hand, Asia's most advanced countries fear a rapid technological catch-up by China, and

worry about the "hollowing-out" of their industries as their production relocates to China. Development in Asia has indeed been based on the move upmarket by the more advanced countries as successive generations of Newly Industrialised Countries have emerged. China's arrival on the scene imposes adjustments which are not, *a priori*, of a different nature to those that have occurred in the past. A major difference, however, does stem from its size, which allows China to benefit from its comparative advantage in labour-intensive industries while at the same time developing strengths in capital and technology-intensive industries. Foreign investors are attracted into these sectors due to the size of its domestic market and its huge reserves of cheap labour.

Chinese companies devote far more resources to importing foreign technology than to in-house research and development. Their purchases of foreign licences, which ensure a far greater dissemination of technology than do imports, remain limited (0.08% of GDP): this level is hardly more than India's (0.07%) and a lot less than South Korea's (0.66%). Overall, China's R&D effort slowed down in the mid-1990s, and only picked up again as of 1997. The share of R&D in China's GDP remains small (0.83% in 1999), compared to South Korea (2.47%) or Taiwan (2.05%). The present situation underlines the scale of the efforts China will have to make to diffuse and assimilate the technology it imports and to develop its own capacity to innovate, without which its dependency on foreign technology can only increase.

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12. It should nevertheless be noted that some of these foreign companies are actually financed by Chinese capital recycled through Hong Kong.

13. "China in the World Economy. The Domestic Policy Challenges", OECD, 2002; "China and the Knowledge Economy. Seizing the 21st Century", World Bank Institute, 2001.

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