CEPII
CENTRE
D'ÉTUDES PROSPECTIVES
ET D'INFORMATIONS
INTERNATIONALES

No 2005 – 09
June

China's Integration in East Asia: Production Sharing, FDI & High-Tech Trade

Guillaume Gaulier, Françoise Lemoine, Deniz Ünal-Kesenci

China's Integration in East Asia: Production Sharing, FDI & High-Tech Trade

Guillaume Gaulier, Françoise Lemoine, Deniz Ünal-Kesenci

No 2005 – 09
June

TABLE OF CONTENTS

CHINA'S INTEGRATION IN EAST ASIA:
PRODUCTION SHARING, FDI & HIGH-TECH TRADE

SUMMARY

The paper analyses China's involvement in the international division of labour and its consequences on the process of regional economic integration in East Asia.

The in-depth analysis of trade flows, based on China's customs statistics, shows that the engine of China's trade expansion has been international processing activities, based on inputs imported from Asian countries. Production sharing with advanced Asian economies has allowed for a rapid diversification of China's manufacturing export capacities. Firms in Asia have moved production facilities to China, enhancing China's integration in the regional economy and leading to the reorganisation of industry in East Asia. Foreign affiliates are responsible for a major and ever-growing part of China's trade, especially with Asian countries. China's imports of intermediate products from Asian industrialised countries have been an important channel of technology transfer and have helped China to rapidly improve the high-tech content of its foreign trade. However, up to now the technological upgrading of China's trade has remained quite circumscribed to foreign firm production and export bases. The question now is whether China will remain durably dependent on foreign technology or will be able to develop its own technological capacity in the coming years.

As a result of the reorganisation of production in Asia, a triangular trade pattern has emerged. In many sectors, China is used as an export base by the firms located in advanced Asian economies, which instead of exporting finished goods to the American and European markets, now export intermediate goods to their affiliates in China. China's exports to the EU and the US have skyrocketed and have displaced Japan's and NIEs' exports at accelerated pace.

The paper is organised as follows. A first section points out how globalisation provides new opportunities for latecomers to enter international trade through production sharing, a phenomena which has been especially widespread in East Asia. A second section investigates how China has taken advantage of this globalisation process and shows that it has become an assembly country for firms located in Asia which have reorganised their industrial capacities and extended to China their production and trade networks. A third section analyses how China's position in the segmentation of the production processes has fostered technology transfer, while inhibiting its diffusion to the rest of China's economy. A fourth section examines the impact of China's emergence on East Asia's intra-regional trade and trade with the rest of the world. The structural factors underlying the triangular trade pattern will remain strong in the coming years.

ABSTRACT

China has taken advantage of the globalisation process and has become a assembly country for firms in Asia which have extended to China their production and trade networks. China's position in the segmentation of the production processes has fostered its trade in high-technology products. However the rapid technological upgrading of China's trade is associated with an increasing dependence on foreign capital and technology. The emergence of China has led to the reorganisation of production in Asia and to a triangular trade pattern: firms in advanced Asian economies use China as an export base and instead of exporting finished goods to the US and Europe, now export intermediate goods to their affiliates in China.

Classification JEL: F13, F14, F15, O53.
Keywords: China, East Asia, Technology Transfer, Trade, Specialisation, FDI, International Production Sharing.

L'INTÉGRATION DE LA CHINE EN ASIE DE L'EST : DIVISION DU TRAVAIL, IDE ET ÉCHANGES DE HAUTE TECHNOLOGIE

RÉSUMÉ

Cette étude analyse l'insertion de la Chine dans la division internationale du travail et ses conséquences sur le processus d'intégration régionale en Asie de l'est.

L'analyse approfondie des statistiques douanières de la Chine montre que les activités d'assemblage basées sur des produits intermédiaires importés d'Asie ont été le moteur de l'expansion de ses échanges extérieurs. Le fractionnement des processus productifs entre la Chine et les économies avancées d'Asie a permis à la Chine de diversifier rapidement ses capacités d'exportation manufacturières. En Asie, les entreprises ont transféré en Chine leurs sites de production, ce qui a renforcé l'intégration de la Chine dans l'économie de la région et abouti à une réorganisation régionale des productions industrielles. Les filiales d'entreprises étrangères ont pris un rôle majeur et toujours croissant dans le commerce extérieur de la Chine, particulièrement avec les pays d'Asie. Les importations de produits intermédiaires en provenance d'Asie ont été un canal important de transferts de technologie et ont aidé la Chine à améliorer rapidement le niveau technologique de ses échanges extérieurs. Cependant, l'amélioration technologique des échanges est restée jusqu'ici étroitement circonscrite aux bases de production et d'exportation des entreprises étrangères. « La Chine restera-t-elle durablement dépendante des technologies étrangères ou sera-t-elle capable de développer ses propres capacités d'innovation dans les années qui viennent ? » est maintenant la question qui se pose.

La réorganisation des productions industrielles en Asie a fait émerger un réseau d'échanges triangulaire. Dans nombre de secteurs, la Chine sert de base d'exportation aux économies avancées d'Asie qui, au lieu d'exporter des produits finis sur les marchés américains et européens, exportent maintenant des produits intermédiaires à leurs filiales en Chine. Les exportations de la Chine vers les États-Unis et l'Europe sont montées en flèche et ont rapidement évincé les exportations du Japon et des nouvelles économies industrialisées.

L'étude est organisée ainsi : une première partie souligne comment la globalisation offre aux nouveaux venus l'opportunité de s'insérer dans le commerce international en prenant part à la segmentation internationale des processus productifs, un phénomène qui a été particulièrement répandu en Asie de l'Est. Une deuxième partie montre comment la Chine a participé à ce processus de globalisation et est devenue un pays d'assemblage pour les firmes situées en Asie, qui ont réorganisé leurs capacités industrielles en intégrant la Chine dans leurs réseaux de production et d'échanges. Une troisième partie montre comment la position de la Chine dans la chaîne de valeur ajoutée a stimulé les transferts de technologie, mais a inhibé leur diffusion à l'ensemble du tissu industriel chinois. Une

quatrième partie examine les conséquences de l'émergence de la Chine sur le commerce des pays d'Asie entre eux et avec le reste du monde et conclut que les facteurs structurels qui sous-tendent les échanges triangulaires resteront fortement présents dans les années à venir.

RÉSUMÉ COURT

La Chine a tiré parti de la globalisation et est devenue un pays d'assemblage pour les entreprises d'Asie qui ont étendu en Chine leurs réseaux de production et d'échanges. La position de la Chine dans la segmentation des processus productifs a stimulé ses échanges de produits de haute technologie. Cependant, l'amélioration du niveau technologique du commerce extérieur chinois est associée à une dépendance accrue à l'égard des technologies et des capitaux étrangers. L'émergence de la Chine a conduit à une réorganisation des productions en Asie et à un réseau d'échanges triangulaire : les entreprises des économies avancées d'Asie ont en Chine des bases de production et au lieu d'exporter des produits finis vers les États-Unis et l'Europe, exportent maintenant des produits intermédiaires vers la Chine.

Classement JEL : F13, F14, F15, O53.
Mots Clés : Chine, Asie de l'Est, transfert de technologies, specialisation, commerce, IDE, division internationale du travail.

CHINA'S INTEGRATION IN EAST ASIA: PRODUCTION SHARING, FDI & HIGH-TECH TRADE

Guillaume GAULIER, Françoise LEMOINE, Deniz ÜNAL-KESENCI [1]

INTRODUCTION[2]

Since 1980, China's economy has grown at the rate of 9% a year and its foreign trade has expanded at the pace of almost 15% a year. Its share in world trade rose from less than 1% to about 5% in 2002[3]. The emergence of China as a great economic and trade power is bringing far reaching changes in the world economy and in international economic relations. China's now holds large world market shares in traditional industries (accounting for about one third of world exports in leather and shoes, one fifth in clothing), but is also rapidly enlarging its shares in electrical and electronic exports, the fastest growing segments of world trade. In 2002 China recorded one fifth of world exports of consumer electronics and of domestic appliance. For East Asian countries, China has become a major partner, their first partner in the region. In 2003, for Japan, China was the second export market, behind the US, and its first supplier. For South-Korea, China was the first export market and its second supplier behind the US. In 2003 and 2004, the accelerated increase of China's import demand (+40% and 37% respectively) has been the engine of economic growth in East Asia. The aim of the paper is to help understand how China has achieved such outstanding trade performance and to bring to the fore the factors underlying China's competitiveness in world markets. It shows China's involvement in the international segmentation of production processes and its integration in Asian production networks are at the core of its rapid trade expansion.

The first section of the paper points out how globalisation provides new opportunities for latecomers to enter international trade through production sharing, a phenomena which has been especially widespread in East Asia. A second section provides an in depth analysis of China's trade flows. Based on the detailed data available from China's

[1] Guillaume Gaulier is economist, Françoise Lemoine is senior economist and Deniz Ünal-Kesenci is economist at CEPII (see www.cepii.fr).

[2] This study has benefited from the support of the International Trade Center (Geneva) which provided the databases of China customs statistics. The authors thank Friedrich Von Kirchbach and Christian Delachenal for their help. Previous versions of this paper were presented at the Conference "Resolving New Global and Regional Imbalances in an Era of Asian Integration", organised by the Research Institute of Economy, Trade and Industry (RIETI) in Tokyo – 17-18 June 2004 and at the International Workshop on "East Asia *de facto* Economic Integration", organised by the Institute for Developing Economies (IDE) in Tokyo, 19 January 2005. The authors express their thanks to the RIETI and the IDE for their support. The authors are very much indebted to Kyoji Fukao, Kazuhiko Yokota and Daisuke Hiratsuka for their careful comments and useful suggestions. However the authors are solely responsible for all remaining errors and shortcomings.

[3] Average of exports and imports (source, CEPII-CHELEM).

customs statistics, it assesses the role of international processing activities and of foreign affiliates[4] in China's foreign trade, the impact of production sharing with Asian countries on China's geographic and commodity trade patterns. A third section examines how assembly operations have been an important channel for technology transfers but have not favoured the diffusion of technology in the domestic industries. A fourth section focuses on the changes which have occurred over the last twenty years in East Asia countries' trade patterns both within the region and with rest of the world, as a result of China's emergence as a major trading partner.

1. ASIAN PRODUCTION NETWORKS

1.1. Production Sharing in East Asia

International production sharing is an especially widespread phenomenon in East Asia and has become an important factor determining trade patterns in the region (see *Hummels, Rapoport and Yi, 1998*). It has been driven by firms located in East Asia (Asian firms as well as affiliates of US or European Multinational companies), which have shifted from exports to international production and reorganised their business activities across different countries in order to reduce costs and improve their capacities to react to technological changes and market requirements. They have built-up cross-border production and trade networks which have underlain the progress of economic integration in East Asia. International production network can be defined as "the organisation, across national borders, of the relationships (intra and increasingly inter-firm) through which firms conduct research, development, product definition and design, procurement, manufacturing, distribution and support services" (*Borrus, 1996*).

Cross-border production and trade networks explain the rapid increase of both trade and FDI flows between Asian countries, and the far-reaching changes in countries' commodity trade pattern and specialisation. Empirical studies have shown that international production networks account for a significant share of trade flows of most countries of the region, are spread over a large number of countries and involve both intra-firm and arm's-length trade (*Ando and Kimura, 2003*).

Several factors have contributed to the expansion of Asian production networks: besides geographic proximity, the heterogeneity of the Asian economies has stimulated the international segmentation of production processes since the different countries had different comparative advantages (*Zysman et alii, 1996*). In the latter half of the 1980s, currency re-evaluations, which have affected the competitiveness of manufacturing industries in the most developed countries of the region, have played a catalytic role in accelerating the relocation of their labour intensive production in the low-wage countries of the region (*Naughton, 1997*). Finally the changes in the development strategies and

[4] Foreign affiliates include joint ventures and wholly-foreign-owned firms.

trade policies implemented from the mid-1980s in countries such as Thailand, Malaysia, Indonesia and the Philippines, have also decisively contributed to the expansion of international production networks, as these countries have facilitated inward FDI in export-oriented business (*Ando and Kimura, 2003*).

There is no comprehensive relevant statistics which allow for precisely measuring the role of international production and trade networks, however, indirect evidence can be drawn from the analysis of trade flows and of the strategies of firms.

Empirical studies of international trade flows have put forward the increasing vertical specialisation (the splitting up of the value added chain) and shown the growing importance of intermediate goods, and especially of "parts and components" in intra-Asian trade flows. As the possibility (and costs) of splitting up production processes into two or more steps depends on the technique of production, the forces driving to vertical specialisation have been stronger in some industries, such as machinery and electrical machinery (*Ando and Kimura, 2003; Ng and Yeats, 2003; Masuyama, 2004; Fukao et alii, 2003*).

Foreign direct investment (FDI) has been an important component in the development of international production networks in Asia (*Ando and Kimura, 2003; Masuyama, 2004; Fukao et alii, 2003*). Investigating the different motivations that drive foreign direct investment, *i.e.* market orientation versus export orientation, the studies generally find that Asian FDI in the region is more efficiency-seeking and export oriented than Asian FDI in other parts of the world. For instance, in China, Japanese FDI has been less market-seeking than American or European FDI.

Recent analysis of Japanese firms' strategies confirms that they follow a specific strategy in East Asia, compared both to the strategies of US firms in the region and to the strategies of Japanese firms in other parts of the world. Japanese investment is more oriented towards East Asia (and relatively more on ASEAN than on China) than American investment (*Ando and Kimura, 2003; Masuyama, 2004*). Japanese affiliates in East Asia are concentrated in manufacturing industries, and hence differ from Japanese affiliates in North America or Europe. Compared to Japanese firms investing in North America or in Europe, those investing in East Asia include a relatively large number of small and medium enterprises (SMEs), have less capital-intensive technology and less R&D expenditure. The analysis of the local content of sales by Japanese affiliates in the region indicates that those firms have shifted their source of supply as the local content has increased compared to Japanese inputs.

According to Ando and Kimura (2003), sales by Japanese affiliates located in East Asia are more export-oriented than those located in other parts of the world and concentrate their exports in the region (Japan and other Asian countries), while their sales to North America are small. This confirms the existence of strong intra-regional production networks, but contradicts the popular view that Japanese firms use export platforms in the region to export to the US.

The development of production networks has contributed to the rise of successive waves of "new industrialised economies" in East Asia and especially the emergence of the latest wave of new industrialised economies (Thailand, Malaysia, Philippines, then China and Vietnam). Since the mid eighties, firms in the most industrialised economies in the region (Japan, South Korea, Taiwan, Singapore, Hong-Kong) have gradually moved their production capacity in low-tech, labour intensive sectors to overseas export platforms located in low-wage countries, through foreign direct investment and out-processing operations. These relocations have helped South-East Asian countries and then China, to develop their comparative advantages in manufacturing industries and to progressively upgrade their industrial capacities and exports. Asian production networks have thus contributed to the "recycling comparative advantages" which has thus been at the core of East Asian industrialisation.

The evolution of the specialisation patterns of East Asian countries confirm the « flying geese model » developed by Akamatsu (1961). However, the changes in the global economy, together with the development in technology and production techniques have precluded homogeneous trajectories. Although late-comers may export similar products as the leaders did in earlier stages, their structures of production are quite different (*ESCAP, 1991; Bernard and Ravenhill, 1995; OECD, 1999; Guerrieri, 2000; UNCTAD, 1996*). In fact, while Japan has developed a strong indigenous innovative base, prior to the increase of its global economic presence in the 1950s, Taiwan and Korea have remained dependent on imported technology, components and equipment from industrialised economies (mainly Japan). The late-comers, South-East Asian countries, exhibit industrial structures which are characterised by the lack of a domestic manufacturing tradition, their high dependence on foreign controlled firms, a high import content of exports and limited backward linkages with local component suppliers.

The benefits that low-wage countries derive from their participation in international production sharing may be smaller than suggested by trade figures. The gains may be unequally spread between the firms involved in the value-added chain. Also, taking part in the labour-intensive stages of production does not automatically lead to the technological spillovers needed to move up the production chain and to ensure a sustainable trajectory of economic development (*UNCTAD, 1999 and 2002; Kaplinsky et alii, 2002; OECD, 1999*).

East Asian production networks have given rise to a "triangular trade pattern": Japan and NIEs export capital goods and sophisticated intermediate goods (especially parts and components) to the less developed countries of the region (ASEAN* and China) which process them for exports destined to the US and Europe[5].

[5] NIEs: Hong Kong, Singapore, South Korea and Taiwan.
ASEAN* = ASEAN countries excluding Singapore.

1.2. The Emergence of China

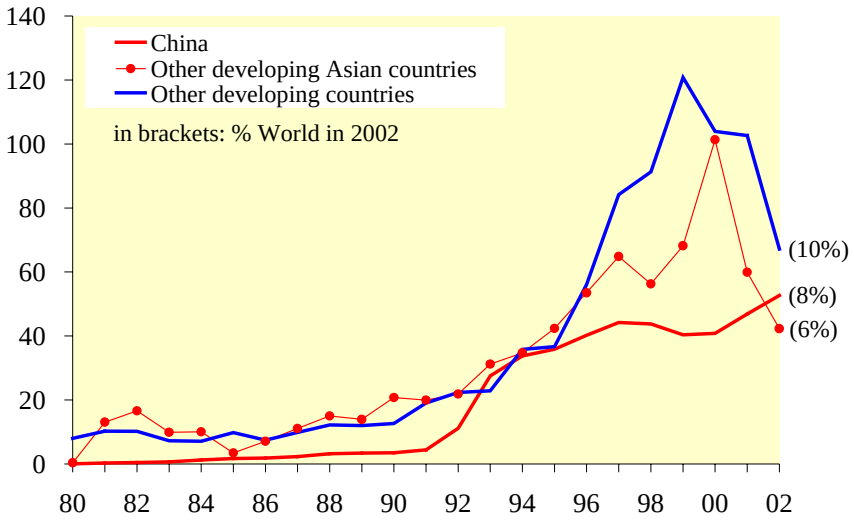
China appears as a latecomer in the international division of labour in Asia. China's case further illustrates how the splitting-up of the value-added chain between different locations (countries) and the development of firms' cross-border production networks are driving the process of industrial growth and integration in Asia (*UNCTAD, 1996 and 2002; Borrus et alii, 2000*). China's case also highlights how a latecomer can enter globalisation and carve out its place in the international division of labour. Since the mid eighties, China has been involved in international production sharing with Asian economies, as firms from Hong-Kong, Taiwan, Japan, South Korea, and other Asian countries have relocated their labour intensive industries in the mainland (*Naughton, 1996 and 1997*). Firms from the US and Europe operating in Asian NIEs have also moved their facilities in China. However, FDI flows to China show that the US and Europe have directed a relatively small part of their investment abroad to China, compared to Japan and Asian NIEs[6]. The rapid expansion of China's foreign trade has been closely associated with an on-going reorganisation of production in East Asia driven by export-oriented investment in the mainland (*Lemoine and Ünal-Kesenci, 2002a and 2004; Masuyama, 2004; Fukao et alii, 2003*).

FDI investment in China, which has reached huge amounts, is concentrated in manufacturing industries, as the service sectors were not opened to FDI up to China's entry into WTO. From 1990 to 2004, the cumulated amount of FDI in China reached almost US$ 500bn, according to China's statistics. In 2002, China received 8% of world FDI, that is more than the other Asian developing countries taken together (6%) (**Figure 1**). Indeed the figures computed by the Chinese authorities seem to overstate the real amount of FDI to China since the figures given by investing countries (mirror statistics) are much lower (**Table 1**). Several factors explain the difference: first, "roundtripping", *i.e.* capital flows coming from the Mainland and transiting through Hong Kong and other tax-haven to be invested in China with benefit of the preferential treatment applied to FDI; second, the different methods of computation (cumulated flows vs. stocks). However, in any set of data, most FDI is coming from East Asia, with Hong Kong and Taiwan accounting for an overwhelming share.

Recent studies indicate that market access and proximity to suppliers are the main factors explaining inward FDI flows in Chinese provinces (*Fontagné and Mayer, 2005*). However the motivations for investment in China differ according to the country of origin of parent firms (*Zhang, 1995; Tso, 1998; Masuyama, 2004*). Surveys have shown that Asian firms are motivated by cost considerations and tend to invest more than others in export-oriented activities. American and European investment is driven by market expansion strategies rather than by cost considerations. Their investment in China is more directed in capital-intensive sectors producing for the domestic market (*Wei and Liu, 2001*).

[6] According to OECD statistics on international investment flows, China accounted for less than one percent in the stock of investment abroad of the US and of most European countries; 5% in the case of Japan and 15% in the case of South Korea.

Figure 1 – FDI Inflows: China Compared to Other Developing Countries 1980-2002 (billion US$)



Source: UNCTAD FDI/TNC database, www.unctad.org/fdistatistics.

Table 1 – FDI in China According to Chinese and Partners' Declarations (billion of US$)

	Declarations	
	of China (A)	of partners (B)
USA	32	11
Japan	30	11
South Korea	13	4
Germany	7	5
France	5	2
United Kingdom	9	2
Hong Kong	177	122
Taiwan	34	29

Notes : (A) Cumulated flows in the period 1990-2002; (B) Stocks.
Sources: OECD, International Direct Investment Statistics Yearbook, 2002; China Statistical Yearbook, 2002; Hong Kong Annual Digest of Statistics, 2002; Banque de France: Balance des paiements, 2002.

Japanese FDI in China (like in ASEAN* countries) is cost reduction (*Fung et alii, 2003; Masuyama, 2004*). Japanese foreign affiliates in China export more than half of their production. The strategy of Japanese firms has evolved as their affiliates have strengthened their links with local firms and increased local procurements (vs. imports). However, Japanese firms tend to lag behind other foreign investors and to face strong competition both from other foreign affiliates and from the local producers in the domestic market.

For South Korean firms, China has overtaken the US as the first host country for FDI in 2001. In a first stage, South Korean investment in China has been driven by cost considerations and has been mostly export-oriented. However in the late nineties, a new wave of FDI has been driven by large corporations (Chaebols) aimed at China's domestic market. The recent rise of South Korean FDI in relatively capital and technology-intensive industries and in capital goods has raised the fear that the South Korean manufacturing industry may be facing the risk of hollowing out, as it has happened in Taiwan (*Lee and Kim, 2004*).

Taiwanese investment in China has been export oriented, concentrated in labour-intensive industries, and led by small and medium sized enterprises (SMEs). However recent trends show an evolution towards larger and more technology and capital intensive projects. In electronic industries, Taiwanese firms have extensively relocated their production in China. In 2002, almost half of Taiwan's information technology products are produced in the mainland (*Fung et alii, 2003*).

The benefits that China has derived from becoming a production base for the East Asian industrial firms include large capital inflows and a rapid rise of exports which have contributed to its outstanding economic growth, the modernisation of its industrial capacities and the building up of new industries (electrical and electronic industries) (*Lardy, 2002; Lemoine, 2000; Wu, 1999; Naughton, 1997; Huchet, 1997*).

As other latecomers such as Malaysia, Philippines, Thailand, China has developed a specialisation in low value-added production, based on its almost unlimited supply of low-cost labour. Its rise in international trade is heavily dependant on foreign affiliates which have developed limited backward and forward linkages (*Zhang, 1999; Sung, 2000; Wu, 1999; Lemoine and Ünal-Kesenci, 2004*).

2. CHINA IN THE INTERNATIONAL DIVISION OF LABOUR IN EAST ASIA

2.1. China's Selective Trade Policy

Trade policy is an important factor determining a country's involvement in the international splitting-up of the value-added chain. Tariff structure may affect the degree of effective protection of the different sectors as tariff exemptions and reductions on

imported inputs increase the effective protection enjoyed by the assembly activities using these inputs, as it reduces their costs of production (*Grubel and Johnson, 1971*).

Most East Asian economies have followed a "dual track" trade policy, which combined protection of the domestic industries through relatively high customs tariffs, and export promotion, through tariff exemptions on imported inputs for export production (*Ando and Kimura, 2003*).

China provides an outstanding case of such policy. Since the mid-eighties, the Chinese authorities have used different instruments to promote exports (*Lardy, 2002; Lemoine and Ünal-Kesenci, 2002a; Ianchovichina et alii, 2000; Naughton, 1996*). Duty exemptions have been granted to selected categories of imports in order to promote export-oriented industries and to stimulate inflows of capital and technology through foreign direct investment. Intermediate products imported to be used in production of exports (processing activities) have been the most important category benefiting from tariff exemptions. Concessionnal import duties have also been granted to equipment imported by foreign firms as a contribution to initial investment in affiliates in China.

Although China reduced its average customs tariff from 41% in 1992 to 16.8% in 1998-2001, the advantage derived from tariff exemptions has remained significant and this selective trade policy has proved very successful in creating export-oriented industries based on imported inputs. The large gap between nominal tariff rates and collected tariff rates provides evidence of the extensive use of tariff exemptions (*Lemoine and Ünal-Kesenci, 2004*).

The following analysis shows that China's selective trade liberalisation has led to an accelerated expansion of international processing activities, which have been the engine of the rapid diversification of its manufactured exports. The effective protection enjoyed by processing activities has favoured strong productive links between China and its East Asian partners. China's integration in the production and trade networks of Asian firms has been at the core of its foreign trade expansion. China's selective trade policy has thus strongly determined the commodity and geographic pattern of China's trade in the nineties.

2.2. China's Specialisation in Assembly Operations

China's dual track policy has resulted in a highly fragmented trade sector. Four broad segments can be distinguished in China's foreign trade:

1) Ordinary trade encompasses imports which are subjected to general tariff rates, *i.e.* imports aimed at the domestic market (for investment or consumption) and exports mainly based on local inputs.

2) Processing trade encompasses imports of goods to be assembled or transformed in China and re-exported. This corresponds to the international practice of "inward

processing" which is defined by the World Customs Organisation as "the customs procedure under which certain goods can be brought into a customs territory conditionally relieved from payment of import duties and taxes, on the basis that such goods are intended for manufacturing, processing or repair and subsequent exportation"[7]. China's Customs statistics distinguish two types of inward processing: a) "Processing and assembling" refers to the type of inward processing in which foreign suppliers provide raw materials, parts or components under a contractual arrangement for the subsequent re-export of the processed products. Under this type of transaction the imported inputs and the finished outputs remain property of the foreign supplier. b) "Processing with imported materials" refers to the type of inward processing in which raw materials or components are imported from other firm than the foreign supplier for the manufacture of the export-oriented products. In both cases the imported inputs (raw materials, semi-finished goods, parts and components) are exempted from customs tariffs. Neither these imported inputs, nor the output normally enter China's domestic market.

3) Imports of goods by foreign investors as part of their initial investment in China. These imports are exempted from customs duties and concern mainly equipment and machinery.

4) Other exports and imports, which are not subject to the general tariff regime (compensation trade, international aid, warehousing and entrepot trade).

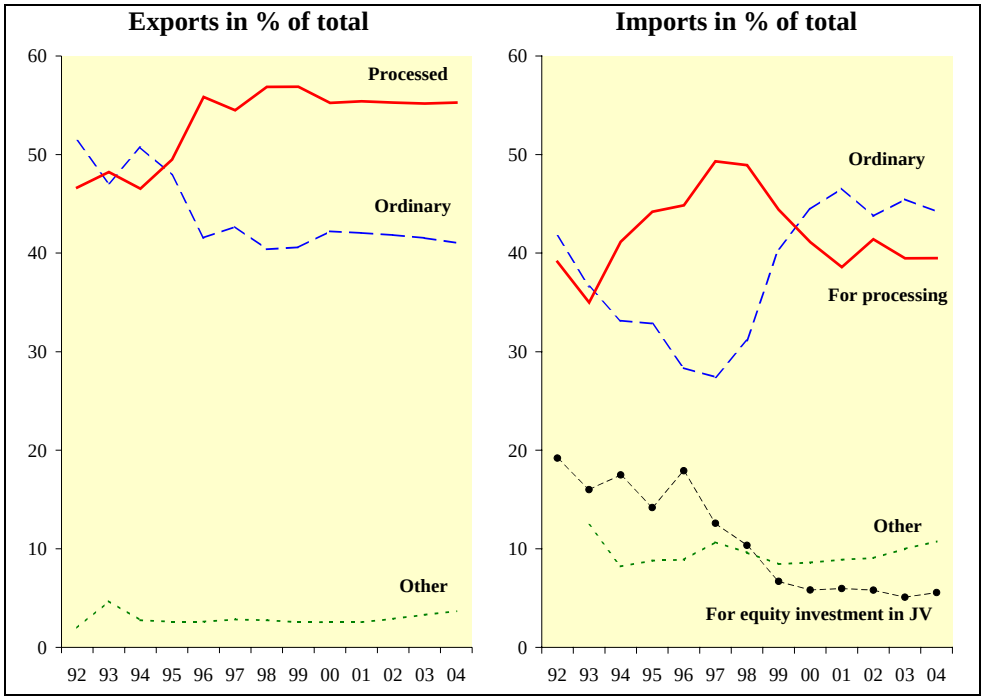
Trade figures corresponding to these different trade segments are available since 1992. Within each category it is possible to identify the respective contributions of domestic (wholly Chinese) firms and of foreign firm affiliates since 1994.

China's foreign trade expansion has relied mainly on processing operations. As early as 1992, processed exports made up 46% of China's total exports. This share rose to 55% in 1996 and has represented more than half of China's exports since then (**Figure 2**). During the Asian crisis (1997-1998), exports of processed goods performed better than other categories of exports, and this resilience can be explained by their high import content which makes them less vulnerable to the effects of a real appreciation of the exchange rate (*Dées and Lemoine, 1999*).

Correspondingly, imports for processing have increased rapidly since 1992 and their share in total imports rose from less than 40% to almost 50% in 1997-1998 (**Figure 2**). Since 1998 they have lagged behind ordinary imports which registered a strong rise partly due to the anti-smuggling measures implemented by the government but also, more substantially, to a rapid decline in the level of tariff rates in the late nineties. Imports for processing accounted for about 40% of total imports in 2003. Ordinary imports still accounted for less than half of total imports.

[7] http://www.wcoomd.org

Figure 2 – Breakdown of China's Trade by Customs Regimes, 1992-2004



Source: China's Customs Statistics, authors' calculations.

2.3. The Reorganisation of Production in Asia

The pattern of China's trade by partners and by customs regimes reveals China's position in the international segmentation of production processes and the ongoing reorganisation of industrial capacities in Asia (**Table 2**).

Assembly trade plays a dominant part in China's trade with Asia. The weight of Asian countries in China's total imports results from their strong involvement in processing trade. In 2002, almost 60% of China's imports from the Dragons (Hong Kong, South Korea, Taiwan and Singapore) and 40% of its imports from Japan (against 35% in 1993) were aimed at supplying inputs for processing industries. The strong intensity of Asian exports to China can thus be explained by the international splitting-up of the value-added chain within the region. As a result, Japan and the Dragons were by far the major source of inputs for China's processing activities, providing almost 60% of these imports: 40% of China's imports for processing came from the Dragons, and one-fifth from Japan.

By contrast Europe and the US contributed only marginally to the supply of goods for processing: taken together, they accounted for less than 10% of imports for processing in 2002. Their weak presence in this segment of China's imports partly explains their

relatively low export intensity to China compared to Asian countries (*Lemoine and Ünal-Kesenci, 2002a*). Supplies of inputs for processing accounted for a relatively small fraction of their exports: respectively 15% and 22% of China's imports from the EU and the US in 2002. Comparison with 1993 does not show major changes.

Table 2 – Breakdown of China's Trade by Main Partners and Customs Regimes

	Imports (% total)					
	World	Dragons*	Japan	EU 15	USA	ROW
1993						
Imports by all custom regimes	**100**	**28**	**22**	**15**	**10**	**25**
Ordinary imports	**37**	3	8	8	5	13
Imports for processing	**35**	18	8	2	2	6
Other custom regimes	**28**	7	7	6	3	6
2002						
Imports by all custom regimes	**100**	**29**	**18**	**13**	**9**	**31**
Ordinary imports	**44**	8	6	8	5	16
Imports for processing	**41**	17	8	2	2	11
Other custom regimes	**15**	3	3	3	2	4
	Exports (% total)					
	World	Dragons	Japan	EU 15	USA	ROW
1993						
Exports by all custom regimes	**100**	29	17	13	18	22
Ordinary exports	**47**	12	10	7	6	13
Processed exports	**48**	16	7	7	13	6
Other custom regimes	**5**	0	0	0	0	4
2002						
Exports by all custom regimes	**100**	**27**	**15**	**15**	**21**	**22**
Ordinary exports	**42**	8	6	7	7	14
Processed exports	**55**	18	9	8	14	7
Other custom regimes	**3**	1	0	0	1	1
	Trade Balance (billion of US$)					
	World	Dragons	Japan	EU 15	USA	ROW
1993						
All custom regimes	**-12.2**	**-2.4**	**-7.5**	**-3.5**	**6.3**	**-5.1**
Ordinary trade	**5.2**	8.0	0.7	-2.	-0.0	-1.5
Processing trade	**7.9**	-3.8	-1.3	4.2	9.7	-1.0
Other custom regimes	**-25.2**	-6.6	-6.9	-5.8	-3.4	-2.6
2002						
All custom regimes	**30.4**	**3.2**	**-5.0**	**9.7**	**42.7**	**20.1**
Ordinary trade	**7.1**	3.2	1.1	-3.1	6.7	-0.8
Processing trade	**57.7**	7.2	3.1	19.6	39.9	-12.1
Other custom regimes	**-34.4**	-7.2	-9.3	-6.8	-4.0	-7.2

* 2002 - 4 Dragons: Hong Kong, South Korea, Taiwan, Singapore.
1993 - 3 Dragons: Hong Kong, South Korea, Taiwan.
Source: China's Customs Statistics, authors' calculations.

Processed exports also account for a large share of Chinese exports to Asian countries (up to 60% in 2002, against 50% in 1993). Asian firms re-import a growing part of the production they relocated in the mainland. However, China's processed exports are much less concentrated on Asia than corresponding imports. Less than half of exports after processing is directed to the Dragons and Japan in 2002 (as in 1993), a share which is still overstated since the largest part of processed exports recorded as going to Hong Kong is in fact aimed at the US and the European markets (*EC, 1997*). The US and the EU account for a much larger share in China's processed exports (40% in 2002) than in its imports for processing (10%). Moreover, their importance as export markets would be even larger if exports transiting through Hong Kong were reallocated to their final destination. China's processing trade has thus a built-in geographical asymmetry, as exports and imports follow different geographical patterns. East Asia is the main source of imports for processing as East Asian firms have expanded production and export bases in China to improve their competitiveness, and as firms from other regions (the US, Europe, etc) operating in Asia have followed the same strategy and have also moved their production to China.

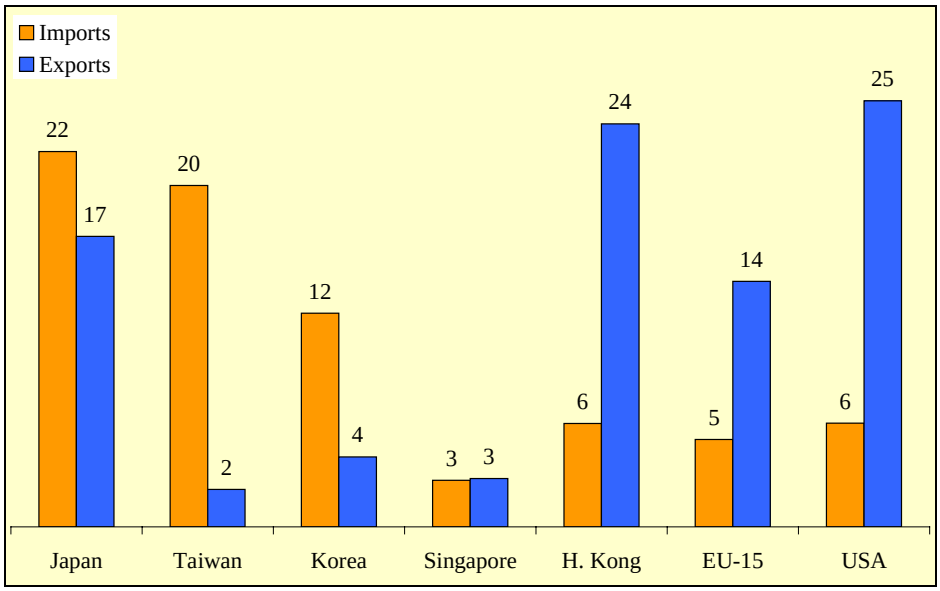
As a result, Chinese processed exports have a high content of imported Asian goods: ten dollars of processed exports incorporate four dollars of intermediate goods supplied by Japan and the Three Dragons.

Processing activities are responsible for almost all China's trade surplus. China records its largest processing trade surplus with its "Western" partners. Excluding processing trade, China's trade with the EU records a deficit, its trade with the US is almost balanced. Due to China's integration in Asian production networks, there is a built-in asymmetry in China's trade with the EU and the US. The US conflict with China about the bilateral deficit may be largely misplaced. This deficit has much do to with the activity of multinational firms, which derive large profits and strong competitiveness from low production costs in China.

Processing trade with Japan and the Dragons, which was a source of deficit in 1993, and still in 1997, has also become an important source of China's trade surplus in 2002. This indicates that since the end of the nineties firms in East Asia have more and more extensively used China as a production base not only to sell in world markets but also for supplying their own domestic markets.

However the bulk of China's processing activities is based on inputs coming from industrialised East Asian economies, and on re-exports of processed goods to Hong Kong, the US and the EU (**Figure 3**).

Figure 3 – Processing Trade of Foreign Affiliate Firms in China by Partner Country 2002 (% of processing imports or exports)



Note: The re-exportations of Hong Kong are not adjusted here.
Source: China's Customs Statistics, authors' calculations.

2.4. Commodity Changes in Processing Trade[8]

Over the last ten years, the rapid expansion of China's processing trade was associated with outstanding structural changes (**Table 3**).

1) From 1993 to 2002, there was a relative decline of processing trade in the most traditional industries (textile and garments, leather and shoes). The share of these sectors declined both on the export and import sides: taken together they accounted for more than 40% of total processed exports in 1993 and for only 15% in 2002. On the import side the corresponding shares were 30% and 17%.

2) The commodity composition of international processing operations shifted towards machinery and electrical machinery: the share of these two sectors taken together rose from 24 to 53% of imports for processing and from 29% to 56% of total processed exports.

3) Chemical products accounted for an important part of imported inputs (15%) but for a small part of exports, indicating that most of imported chemical materials are incorporated in the production of goods belonging to other sectors.

[8] For sector classification see **Appendix 1**.

Table 3 – Processing Trade: Sectoral Breakdown in 1993 & 2002

Sectors*	Imports for Processing			Processed Exports	
	1993	2002		1993	2002
Electrical machinery	17	38.9	Electrical machinery	18	30
Chemical products	17	14.6	Machinery	6	22
Fibber and cloths	23	10.6	Wearing Apparel	20	8
Machinery	3	9.0	Toys & miscellaneous manuf. prod.	12	7
Metallurgy	11	8.1	Leather and shoes	15	6
Precision instruments	4	5.2	Chemical products	5	5
Wood and paper products	5	3.4	Precision instruments	5	4
Leather and shoes	6	2.8	Wood and paper products	4	4
Toys & miscellaneous manuf. prod.	4	2.2	Fibber and cloths	5	3
Raw agricultural products	1	1.3	Metallurgy	4	3
Raw materials & fuels	3	1.2	Other transport equipment	1	2
Wearing Apparel	1	0.9	Motor Vehicles	1	1
Building materials	1	0.9	Food products	1	1
Metal products	1	0.3	Metal products	1	1
Food products	1	0.3	Raw agricultural products	1	1
Motor Vehicles	1	0.2	Raw materials & fuels	1	1
Other transport equipment	0	0.0	Building materials	1	1
Total	**100**	**100.0**	**Total**	**100**	**100**

* See Appendix 1 for sector classification.
Source: China's Customs Statistics, authors' calculations.

2.5. Foreign Affiliates: the Engine of China Trade Expansion

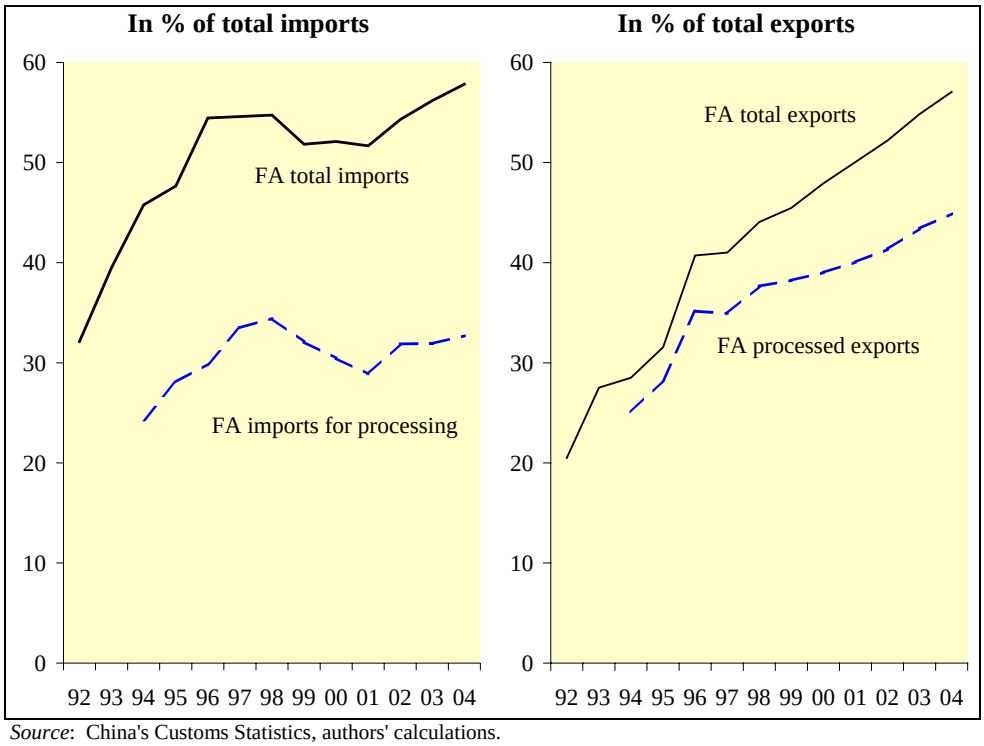
Foreign affiliates[9] play an important and growing part in China's foreign trade. In 2004, they accounted for more than 55% of exports and imports (against respectively 20% and 30% in 1992) (**Figure 4**). Their rise in China's foreign trade is based on the expansion of assembly activities, and in fact the overwhelming share of international assembly operations taking place in China is handled by foreign affiliates (almost 80%).

In 2004, foreign affiliates' processing activities accounted for 45% of China's total exports, meaning that processing activities represented 80% of foreign affiliates exports. On the import side, processing activities played a less prominent part but accounted nevertheless for more than half of foreign affiliates imports in 2004. It is worth noting

[9] "Foreign affiliate" in this paper encompasses all firms with foreign capital: joint ventures and firms in which foreign investors hold 100% of capital.

that between 1992 and 2004, foreign affiliates also rapidly increased their imports not aimed at processing activities: in 2004 imports for domestic use (*i.e.* excluding for processing) represented 45% of their total imports. This means that foreign affiliates were responsible for about one fourth of China's total imports for the domestic market.

Figure 4 – Share of Foreign Affiliates (FA) in Total China's Trade, 1992-2004



Source: China's Customs Statistics, authors' calculations.

Foreign affiliates play an especially important part in China's trade with East Asian countries (**Table 4**). In 2002 they accounted for between 60% and 67% of China's imports from Japan, and from NIEs, and for more than 60% of China's exports to Japan, Hong Kong and Singapore. Interestingly, the rise of foreign affiliates in China's trade with Asian countries between 1993 and 2002 is due to wholly-foreign firms which, in 2002, carried out more trade activities than joint-ventures. The importance taken by foreign affiliates suggests that China's bilateral trade with these countries is likely to include a significant amount of intra-firm trade.

By contrast foreign affiliates represent less than half of Chinese imports from Europe and the US. However, their share considerably increased in China's exports to Europe and the US, reflecting both the increased competitiveness of production bases in China and the outsourcing strategies of Western firms.

Table 4 – Foreign Affiliates in China's Trade with Major Partners, 1997 & 2002

1997	World	EU-15	USA	Japan	Hong Kong	Singapore	Korea	Taiwan
All Export Flows (% total flows)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
FA Total Exports	**41**	38	52	50	42	45	34	47
JV	**24**	21	25	31	28	25	17	22
WFOF	**17**	18	27	20	13	20	17	25
FA Processed exports	**35**	33	47	40	37	40	28	39
JV	**19**	16	21	24	24	21	12	17
WFOF	**16**	17	26	17	12	18	16	22
All Import Flows (% total flows)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
FA Total Imports	**55**	55	47	67	63	63	64	69
JV	**35**	45	33	41	38	40	36	30
WFOF	**20**	10	14	27	25	23	28	39
FA Imports for Processing	**33**	12	21	44	52	37	48	53
JV	**19**	8	12	25	30	20	24	23
WFOF	**15**	4	9	19	22	17	24	30
Overall Trade Balance (bn US$)	**40.4**	**4.6**	**16.4**	**2.8**	**36.8**	**-0.1**	**-5.8**	**-13.0**
FA Total Trade Balance	**-2.8**	-1.5	9.3	-3.5	13.9	-0.9	-6.4	-9.7
JV	**-5.7**	-3.8	2.7	-2.0	9.8	-0.7	-3.8	-4.2
WFOF	**2.9**	2.3	6.6	-1.5	4.1	-0.2	-2.6	-5.6
FA Processing Trade Balance	**16.2**	5.5	11.9	0.2	12.5	0.1	-4.6	-7.4
JV	**8.4**	2.3	4.9	0.4	8.5	0.1	-2.5	-3.2
WFOF	**7.8**	3.2	7.1	-0.2	4.0	0.0	-2.1	-4.2

2002	World	EU-15	USA	Japan	Hong Kong	Singapore	Korea	Taiwan
All Export Flows (% total flows)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
FA Total Exports	**52**	50	58	62	63	65	49	57
JV	**23**	21	21	30	27	34	21	15
WFOF	**30**	28	37	32	36	31	27	42
FA Processed exports	**41**	40	48	47	54	54	35	45
JV	**16**	15	15	21	21	28	14	10
WFOF	**25**	25	33	26	33	26	21	35
All Import Flows (% total flows)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
FA Total Imports	**54**	49	48	67	63	61	63	67
JV	**23**	31	21	30	28	20	28	16
WFOF	**31**	18	27	37	36	41	36	52
FA Imports for Processing	**32**	12	21	39	53	36	41	49
JV	**11**	6	6	16	23	11	15	11
WFOF	**21**	7	15	23	30	25	26	39
Overall Trade Balance (bn US$)	**30.4**	**9.7**	**42.7**	**-5.0**	**47.7**	**-0.1**	**-13.0**	**-31.5**
FA Total Trade Balance	**9.7**	5.0	27.4	-6.0	30.2	0.2	-10.5	-21.9
JV	**4.6**	-1.8	8.8	-1.5	12.7	0.9	-4.6	-5.0
WFOF	**5.2**	6.8	18.5	-4.5	17.5	-0.7	-5.9	-16.9
FA Processing Trade Balance	**40.5**	14.5	27.8	2.2	26.0	1.2	-6.2	-15.8
JV	**19.0**	4.9	8.7	1.8	10.1	1.2	-2.1	-3.4
WFOF	**21.5**	9.6	19.1	0.4	15.9	0.1	-4.1	-12.4

FA: foreign affiliates; JV: joint venture; FFOF: wholly foreign owned firm.
Source: China's Customs Statistics, authors' calculations.

In 2002, foreign affiliates were responsible for about one third of China's trade surplus. They record the bulk of their surpluses on "Western" markets (the US and to a lesser extent Europe) while they record large deficits with most East Asian partners. In fact, their surplus with Hong Kong should be eventually attributed to their trade with Europe and the US.

3. VERTICAL SPECIALISATION, TECHNOLOGY TRANSFER AND REGIONAL INTEGRATION

3.1. China's Trade by Stage of Production[10]

China's imports are heavily dominated by intermediate products which amounted to almost two-thirds of its total imports in 2002 (**Table 5**). Within this category, parts and components constitute by far the most dynamic imports (19% in 1997, 27% in 2002), although imports of semi-finished products are still more important (36%).

Table 5 – China's Trade Pattern and Comparative Advantage* by Stage of Production, 1997-2002

	Breakdown of imports		Breakdown of exports		Contribution to trade balance*	
	1997	2002	1997	2002	1997	2002
Primary goods	10.6	10.3	5.1	2.9	-27	-37
Intermediate goods	65.9	63.3	33.4	37.1	-160	-131
Semi-finished goods	47.0	35.9	25.3	21.6	-107	-71
Parts & components	18.9	27.5	8.2	15.5	-53	-60
Final goods	23.5	26.3	61.5	60.0	187	168
Consumption goods	4.4	5.1	48.9	40.3	219	176
Capital goods	19.1	21.2	12.6	19.7	-32	-8
Total	100.0	100.0	100.0	100.0	0	0

* See Appendix 4 for the indicator of contribution to trade balance.
Source: China's Customs Statistics, authors' calculations.

On the export side, final goods are by far the most important category (60% in 2002), within which consumer goods take an overwhelming share (40%), but capital goods are rising more rapidly (from 12% in 1997 to 20% in 2002). In final good exports, a shift occurred away from consumption goods towards capital goods, indicating that China is upgrading its export capacities towards more technology-intensive products. Moreover parts and components made up an increasing share of exports (16% in 2002).

[10] For the definition of the stages of production used in this section see **Appendix 2**.

The rapid increase in exports and imports of parts and components indicates a deepening international division of production processes. This finding is in line with the conclusions of studies on production sharing in East Asia (*Ng and Yeats, 1999 and 2003*), showing that trade in components has been the most dynamic part of East Asian trade in the nineties. Following the distinction proposed by the authors between the producers of components (countries having a positive trade balance in components) and the assembly countries (countries having a negative trade balance in components), China clearly stands as an assembly country, a position similar to that of other low-wage Asian countries (Indonesia, Thailand, Malaysia).

The indicator of contribution to trade balance confirms that China's position in the international division of labour is characterised by strong comparative advantage (structural surpluses) in consumption goods, associated with large disadvantages (structural deficits) in intermediate goods, and small structural deficits in capital goods and in primary goods.

A previous study has shown that in industries which represent the most dynamic exports and which are also the technologically advanced sectors, (machinery and equipment, office machinery and computers, electrical machinery, radio and TV equipment, instruments), China shows a vertical specialisation, *i.e.* there is a reversal of its comparative advantages along the production processes: it switches from a relative deficit in parts and components to a surplus in consumption, and in some cases in capital goods. This vertical specialization highlights the crucial role of international production sharing in explaining China's export performance in these sectors (*Lemoine and Ünal-Kesenci, 2004*).

China's trade in intermediate goods is heavily concentrated on Asia, confirming that production sharing is above all a regional process (**Table 6**). More than 80% of intermediate imports (semi-finished products and parts and components) come from Asia and more than 60% of exports of parts and components are directed to Asia. With Asia, China records its largest structural deficit[11] in intermediate goods, a smaller deficit in capital goods, and a large surplus in consumption goods. With the rest of the world, China's trade surpluses stem from consumption goods, and also from capital goods in its trade with North America, due to a rapid rise of exports of computer equipment.

[11] Structural deficit (surplus) is measured by the indicator of contribution to trade balance, see **Appendix 4**.

Table 6 – China's Trade Pattern by Region and Stage of Production, 2002

	Primary Goods	Semi-finished Goods	Parts & components	Capital Goods	Consumption Goods	Total
Contribution to Trade Balance* (in thousands of total trade)						
World	**-37**	**-71**	**-60**	**-8**	**176**	**0**
Asia-Oceania	-5	-62	-53	-16	72	-64
Western Europe	-2	-2	-9	-6	25	6
America	-9	-1	1	11	60	62
Others	-21	-6	1	4	18	-4
Export Breakdown (% of World Total)						
World	**3**	**22**	**16**	**20**	**40**	**100**
Asia-Oceania	2	12	10	9	17	51
Western Europe	0	3	2	4	6	15
America	0	4	3	6	13	26
Others	0	2	1	1	4	9
Import Breakdown (% of World Total)						
World	**10**	**36**	**27**	**21**	**5**	**100**
Asia-Oceania	3	25	20	12	3	63
Western Europe	1	3	4	5	1	14
America	2	4	3	3	1	13
Others	4	3	1	0	0	9

Notes: * See Appendix 4. Asia-Oceania includes all countries located in Asia and in Pacific area (including Australia, and New Zealand). Western Europe includes EU-15 and EFTA; America includes all American countries.
Source: China's Customs Statistics, authors' calculations.

3.2. Production Sharing and Technological Catch-up

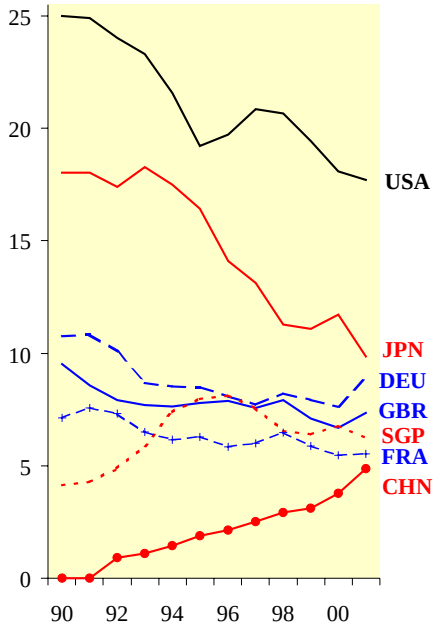
How has production sharing with Asian countries enhanced China's technological catch up? Looking at the technological content of China's exports and imports it stands out that China has succeeded in rapidly upgrading the technological content of its foreign trade. A recent OECD study (2004) shows that the share of high-tech goods in China's manufactured exports rose from 10% in 1992 to 24% in 2001. Calculations based on the data provided by the World Bank (WDI) show that China's share of world exports in high-tech goods rose from zero to almost 5% in 2002 (**Figure 5**).

The present analysis uses the CEPII's high-tech product classification based on OECD and Eurostat studies which corresponds to a narrower definition of high-tech products[12]. **Figure 6** confirms that the high-technology content of China's trade rapidly increased in recent years. High-tech exports increased more rapidly than high-tech imports and China's trade deficit in this category of products narrowed significantly. In 2002, imports of high-technology products accounted for 15% of China's imports and for 12% of its exports (against respectively 11% and 7% in 1997). High-tech products hold an

[12] For the classification of high-tech products, see **Appendix 3**.

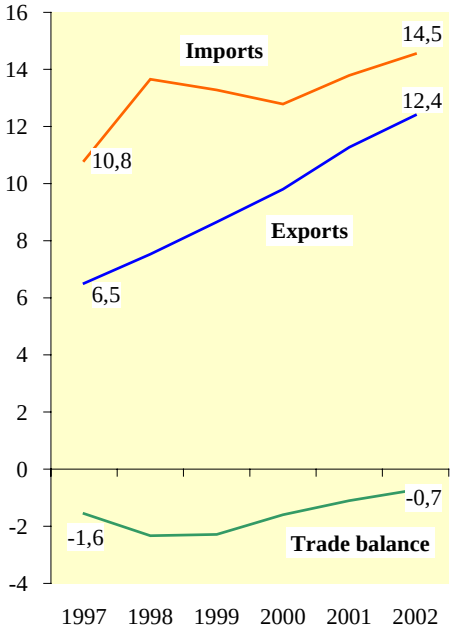
unexpectedly large share in China's trade, compared to other developing economies (*Lemoine and Ünal-Kesenci, 2003*).

Figure 5 – Share in World Exports of High-Tech Products 1990-2001 (%)



Note: Block letters refer to countries' ISO code.
Source: Word Bank, WDI.

Figure 6 – China's Trade in High-Tech Products* 1997-2002

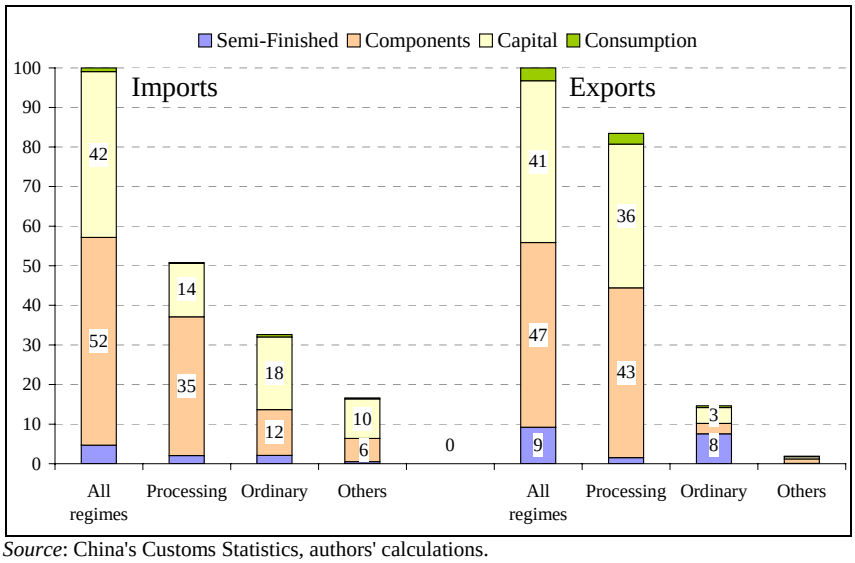


* High tech flows in % of total imports or exports. Trade balance is in % of total exports plus imports.
Source: China's Customs Statistics, authors' calculations.

There is a strong relation between China's trade in high-tech goods and its position in the international segmentation of production processes. As shown in **Figure 7**, more than half of high-tech imports are parts and components, most of them being incorporated in processed exports. Half of high-tech imports is used for export processing activities (and not directed to the domestic market).

The high-tech content of China's exports can thus be explained by their high-tech import content. Interestingly, most exports of high-tech products also take place in parts and components, illustrating the deepening of the international division of labour. China is not only a location for the final stages of production but has taken place in the middle of the value-added chain. Final goods account for less that half of high-tech exports, with capital goods representing by far the largest category.

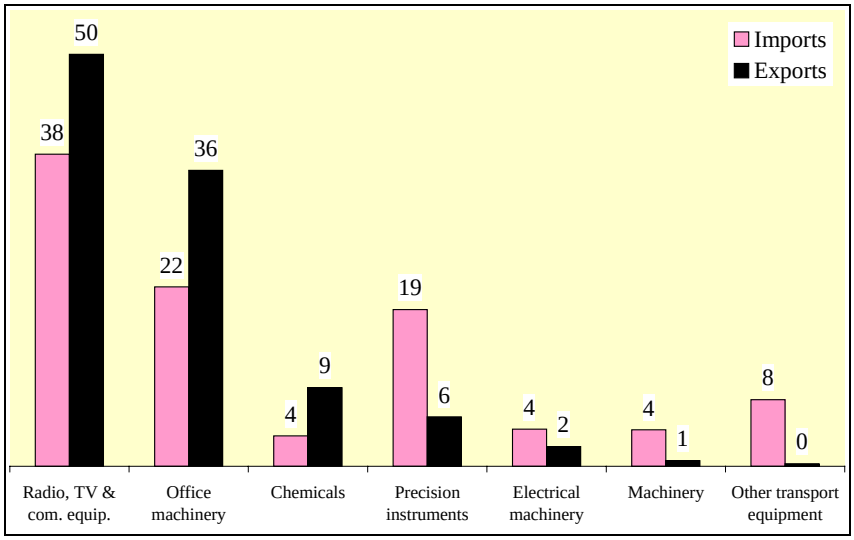
Figure 7 – China's High-Tech Trade by Custom Regime and Production Stage in 2002 (%)



Source: China's Customs Statistics, authors' calculations.

China's high-tech trade is heavily concentrated in a limited number of products (**Figure 8**). Three branches account for 80% of China's high-tech imports: radio and TV; office machinery; precision instruments. The two top export products (radio and TV; office machinery) account for 85% of high-tech imports.

Figure 8 – Breakdown of China's High-Tech Trade by Branch*
(in % of high-tech products flows)



* ISIC classification, 2 digit level.
Source: China's Customs Statistics, authors' calculations.

3.3. China's High-tech Trade and Regional Integration

The overwhelming share of China's high tech imports originates from Asia (**Table 7**). This share reached 70% in 2002, against 56% in 1997. Since 1997, the US and Europe have lost ground in the supply of high-tech products to China. The pattern of China's high-tech exports is stable: more than half is going to Asia, one fourth to America and one sixth to Europe.

High-technology trade between China and Asia is concentrated in parts and components, which account for almost 60% of both China's high-tech exports and imports to and from the region.

Production sharing with Asian countries has thus been an important factor stimulating technological transfer to China and favouring the upgrading of its export capacity. However, looking more in depth into the channels of technology transfer raises questions about its broad impact on the diffusion and assimilation of foreign technology by Chinese industry. Two observations cast some doubt on the progress of indigenous technological level: first, four-fifth of high-tech exports in 2002 come from processing activities, as mentioned above; second China's high-tech trade is more and more heavily dominated by foreign affiliates, as shown in the following section.

Table 7 – Breakdown of China's Trade in High Technology Products by Production Stage and Major Zone, 2002 (in %)

IMPORTS					
	Asia-Oceania	Western Europe	America	Others	World
Semi-Finished Products	3	1	1	0	5
Parts & Components	40	5	6	1	52
Capital Goods	27	5	8	1	42
Consumption Goods	0	0	0	0	1
Total	**70**	**11**	**15**	**3**	**100**
EXPORTS					
	Asia-Oceania	Western Europe	America	Others	World
Semi-Finished Products	5	2	2	1	9
Parts & Components	33	5	8	1	47
Capital Goods	17	8	14	2	41
Consumption Goods	1	1	1	0	3
Total	**56**	**15**	**25**	**5**	**100**

Notes: Asia-Oceania includes all countries located in Asia and in Pacific area (including Australia, and New Zealand). Western Europe includes EU-15 and EFTA; America includes all American countries.
Source: China's Customs Statistics, authors' calculations.

3.4. The Dependence of China's High-tech Trade on Foreign Affiliates

Foreign affiliates are at the core of China's foreign trade in high-tech products (**Table 8**). They are responsible for an ever-growing share of China's high-tech trade and played a dominant part both in exports and imports in 2002. They accounted for more than two-thirds of China's high-tech imports in 2002, against 58% in 1997. Foreign affiliates held an even more dominant position in high-tech exports as they carried out three-quarter of China's high-tech exports. The rising role of foreign affiliates in China's high-tech trade was entirely due to wholly foreign firms, which accounted for almost half of China's high tech exports and imports in 2002. Chinese firms are clearly loosing ground in high-tech trade, and held only one third of high-tech imports and one fourth of high-tech exports in 2002 (against more than 40% in both exports and imports in 1997).

Table 8 – Breakdown of China's High-Tech Trade by Category of Firms

	M %		X %		Trade Balance (% X+M)	
	1997	**2002**	**1997**	**2002**	**1997**	**2002**
Chinese firms	42	33	42	24	-13	-18
Joint Venture	33	22	28	29	-20	10
Fully foreign owned firms	25	45	30	47	-4	-1
All firms	100	100	100	100	-37	-9

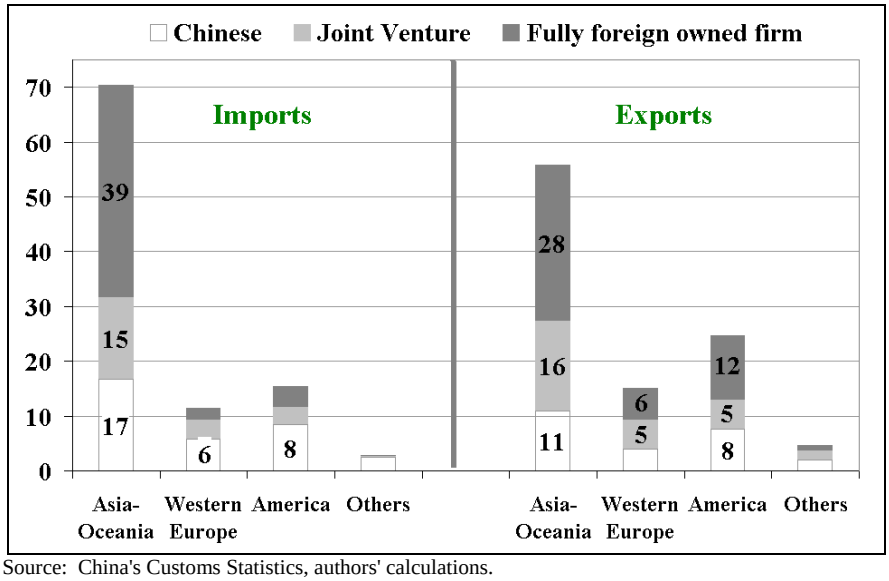
Source: China's Customs Statistics, authors' calculations.

China's high-tech trade with Asia shows an especially high dependence on foreign affiliates (**Figure 9**). Almost 80% of China's high-tech exports to and imports from Asia rely on foreign affiliates, with more than half on wholly foreign firms.

The distribution of high tech imports from the US and Europe is much less biased in favour of foreign affiliates. Chinese firms realise more than half of these imports, and the rest is more or less evenly distributed between joint-ventures and wholly-foreign firms (**see appendix 5**). Technology transfer from Europe and America follows a more traditional pattern, based on arm's length exports of capital goods, which contrasts with the Asian pattern based on sales of parts and components. However in China's high-tech exports to the US and Europe, foreign affiliates play a dominant part.

Production sharing with Asian partners has hence undoubtedly raised the technological level of China's exports and imports. But this upgrading seems to have remained quite circumscribed to the production and export bases created in the mainland by Asian firms.

Figure 9 – Breakdown of China's High-Tech Trade by Region Partner and Category of Firms

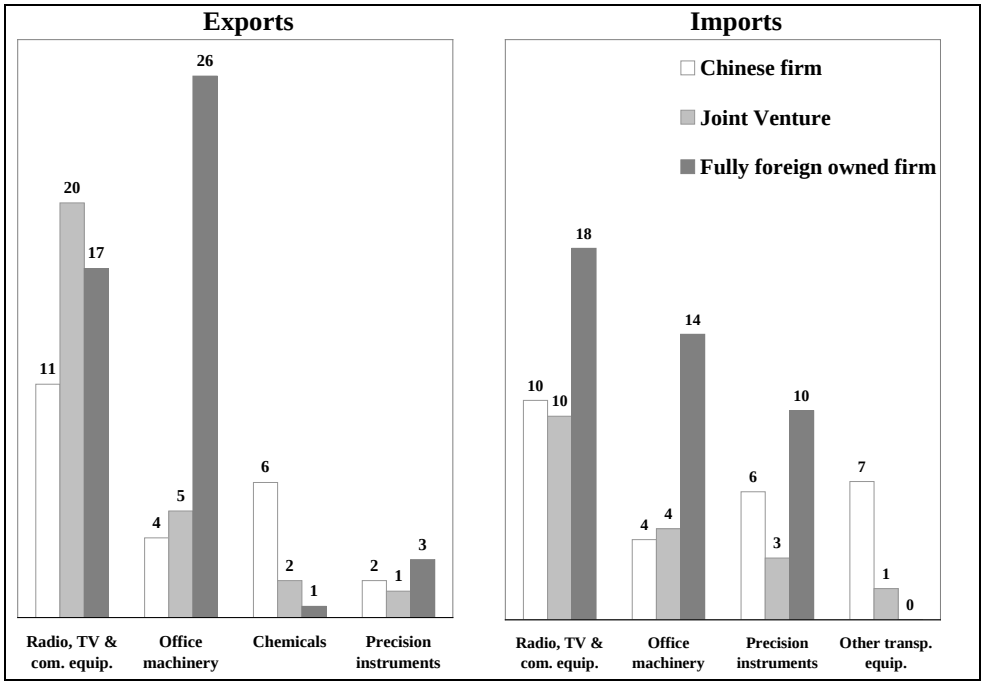


Source: China's Customs Statistics, authors' calculations.

Looking at the product composition of high-tech trade, the following observations stand out: wholly foreign firms appear to concentrate their high-tech exports in office machinery (computers), which are products likely to require the most advanced technology; joint ventures' exports are concentrated on more Radio, TV and telecommunication equipment, while high-tech exports of Chinese firms are more diversified (**Figure 10**). On the import side, the product distribution is less concentrated; it is worth noting that wholly foreign firms dominate imports of all major categories of products.

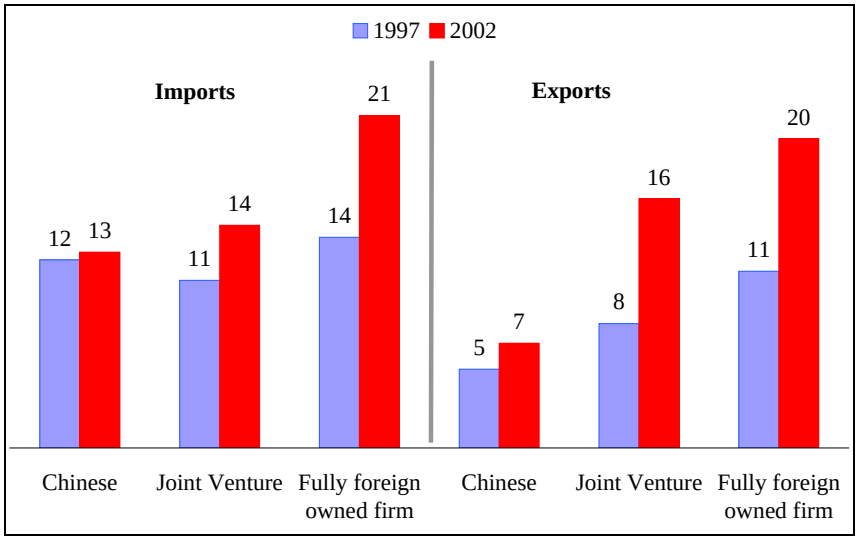
The "high-tech intensity" of trade flows by category of firms was defined as the share of high-tech products in the exports (imports) of each category of firms. It stands out that foreign affiliates' trade have a higher high-tech intensity than Chinese firms', *i.e.* high-tech products represent a much larger share of their exports (and imports) that in Chinese firms exports (imports) (**Figure 11**). The gap between the different categories of firms increased from 1997 to 2002, both on the export and import sides. In 1997 the high-tech intensity of imports was quite similar across the different categories of firms, but it remained almost stable up to 2002 in the case of the Chinese firms while it rose fast in the case of wholly foreign firms. In 2002, the high-tech content stands at 13% in the Chinese firms imports, 14% in JV imports and 21% in wholly foreign firm imports. On the export side, the diverging trends are even more remarkable, and in 2002, the high-tech export intensity is almost three times higher in the case of wholly foreign firms (20%) than in the case of Chinese firms (7%).

Figure 10 – Breakdown of China's High-Tech Trade by Branch and Category of Firms



Source: China's Customs Statistics, authors' calculations.

Figure 11 – High-Tech Trade in % of Total Trade for Each Category of Firms, 1997 and 2002



Source: China's Customs Statistics, authors' calculations.

The intensity of high-tech trade by industry and category of firms helps understanding the relatively low performance of Chinese firm's high-tech exports: the high-tech intensity of their exports by product is relatively similar to that of foreign affiliates; the low level of their overall high-tech exports thus comes from their product specialisation: in contrast to foreign affiliates, their exports are not concentrated in industries incorporating high technology (**Table 9**).

Table 9 – High-Tech Intensity of China's Trade Flows by Category of Firms and Branch* (high-tech flows in % of total trade by firm type in the branch)

	IMPORTS				EXPORTS			
	Chinese firms	Joint Venture	Fully foreign owned firms	All firms	Chinese firms	Joint Venture	Fully foreign owned firms	All firms
Chemicals	3	6	3	4	24	23	11	22
Metal products	**29**	0	0	12	0	0	0	0
Machinery	5	4	6	5	1	1	1	1
Office machinery	30	**74**	**64**	54	34	32	41	39
Electrical machinery	15	14	9	12	3	6	6	5
Radio, TV & com. equip.	31	28	30	29	46	**51**	40	45
Precision instruments	51	53	**67**	58	22	30	**43**	31
Other transport equip.	64	65	1	62	2	4	0	2
TOTAL	**13**	**14**	**21**	**16**	**7**	**16**	**20**	**13**

* ISIC classification, 2 digit level.
Source: China's Customs Statistics, authors' calculations.

4. THE IMPACT OF CHINA'S EMERGENCE ON ASIAN TRADE

China's integration in Asian production networks, described in the above section, has considerably affected both the distribution of intra-regional trade and the positions of East Asian countries in their trade with the rest of the world.

4.1. The Rise of East Asia in World Trade

From 1980 to 2002, the contribution of East Asia[13] to world trade increased considerably. The share of East Asia in world exports rose from 13% to 23% and in world imports from 13% to 19% (**Table 10**). Except Japan and Hong Kong, all East Asian economies contributed to this rise but China alone accounted for half of the registered increase.

[13] Japan, NIEs (HK, Taiwan, Korea, Singapore), ASEAN* (Indonesia, Malaysia, Philippines, Thailand, Vietnam, Lao, Cambodia, Brunei).

Table 10 – Share in World Trade (%)

	Exports			Imports		
	1980	**1990**	**2002**	**1980**	**1990**	**2002**
Japan	6.6	8.6	6.7	6.3	6.2	5.0
China	0.9	1.7	6.0	1.1	1.3	4.1
Asian NIEs	3.2	5.9	6.1	3.8	6.1	6.4
South Korea	0.9	1.9	2.6	0.8	1.2	1.1
Taiwan	1.0	2.0	2.1	1.1	1.5	1.3
Singapore	0.7	1.1	1.1	1.1	1.9	2.3
Hong Kong	0.7	0.9	0.3	0.8	1.5	1.7
ASEAN (without Singapore)	2.8	2.7	4.7	2.0	2.6	3.5
Malaysia	0.7	0.9	1.6	0.5	0.7	1.1
Thailand	0.3	0.6	1.1	0.4	0.9	0.9
Indonesia	1.2	0.8	1.0	0.6	0.6	0.6
Philippines	0.3	0.3	0.6	0.4	0.4	0.6
Vietnam, Cambodia, Laos	0.1	0.1	0.3	0.1	0.0	0.3
Brunei Darussalam	0.2	0.1	0.1	0.0	0.0	0.0
East Asia	13.4	18.8	23.4	13.2	16.2	18.9

Source: CEPII-CHELEM database, authors' calculations.

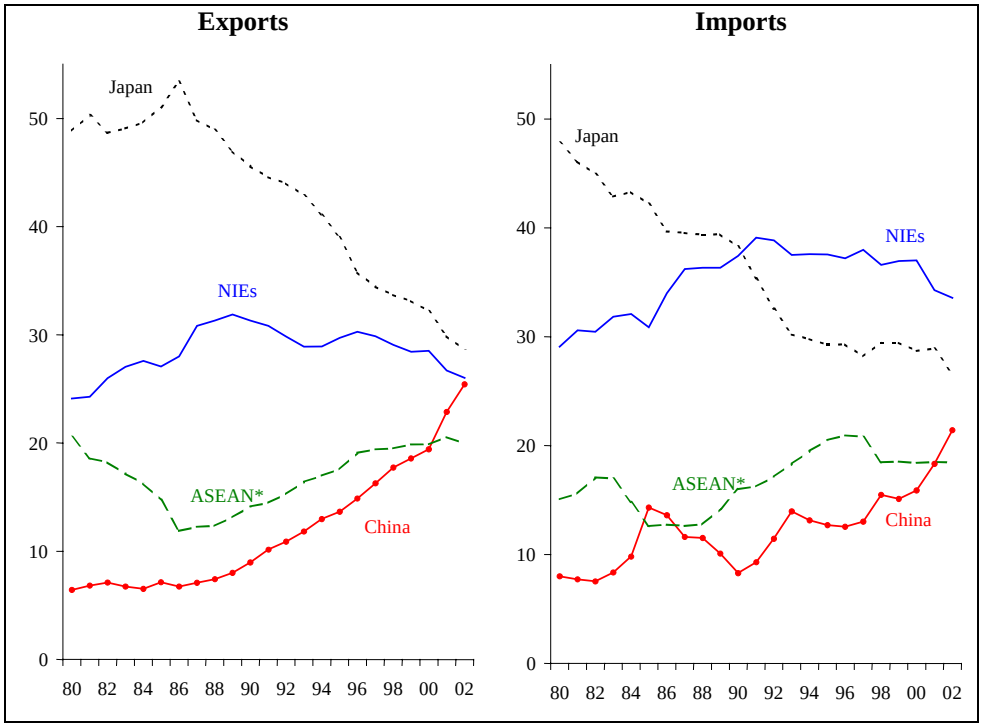
The pattern of regional trade has thus dramatically changed since the beginning of the eighties (**Figure 12**). From 1980 to 2002, the rise of China in East Asian exports (from 6% to 25% of the region's exports) almost completely compensated the relative fall of Japan (from 50% to 30%). The weight of NIEs remained almost stable, at about one fourth of regional exports. ASEAN* exports recorded a relative decline during the eighties and a revival in the nineties which puts its share of regional exports in 2002 at the same level as in 1980 (20%).

On the import side, the major change in East Asian trade also came from the contraction of Japan's share (from 48% to 27% of the regional total), which was compensated by the rise of China, whose share rose from 8% to 21%. The weight of NIEs also increased. The gain recorded by ASEAN* occurred in the nineties (form 16% to 18% of regional imports).

Over the last two decades, there was thus a convergence in the positions of the different countries/groups of countries in the region's trade. On the export side, China with one fourth of the region's trade in 2002, is catching up with Japan (29%), and with the NIEs (26%). ASEAN* is also on a catching up process (20% of the regions' exports in 2002), although at a slower pace than China.

On the import side, a similar convergence of intra-regional trade powers is taking place. Since the beginning of the nineties, the NIEs (34% of regional imports in 2002), have overtaken Japan (27%). In 2002, China (21%) overtook ASEAN* (18%).

Figure 12 – Share of East-Asian Countries in Regional Trade
(% of total East-Asian trade)



Note: NIEs: Hong Kong, Singapore, South Korea, Taiwan; ASEAN*: ASEAN countries excluding Singapore.
Source: CEPII-CHELEM database, authors' calculations.

4.2. The Rise of Intra-Regional Trade

The segmentation of production processes between China and Asian countries has led to an increased concentration of Asian countries' trade within the region. In 2002 East Asian countries directed 42% of their exports to the region (against 36% in 1990) and had 50% of their imports coming from the region (against 42% in 1990). The increased concentration on intra-regional trade is to a large extent due to China's enlarged role in regional trade. China's share in intra-regional trade almost doubled, from 10% to 20% (**Table 11**).

Table 11 – East Asia: Distribution of Intra-Regional Trade in 1990 and 2002 (%)

2002	**Importer**				
Exporter	Japan	NIEs*	China	Asean**	East Asia
Japan		12	9	7	28
NIEs*	5	7	10	8	30
China	10	6		3	19
Asean**	7	9	3	4	23
East Asia	23	35	22	21	100
1990	**Importer**				
Exporter	Japan	NIEs*	China	Asean**	East Asia
Japan		23	4	10	37
NIEs*	11	9	5	8	32
China	5	4		1	10
Asean**	11	8	1	2	21
East Asia	27	43	10	21	100

* New industrialised economies: South Korea, Hong Kong, Singapore, Taiwan
** Without Singapore
Source: CEPII-CHELEM data base, authors' calculations.

4.3. Substitution and Competition in World Markets

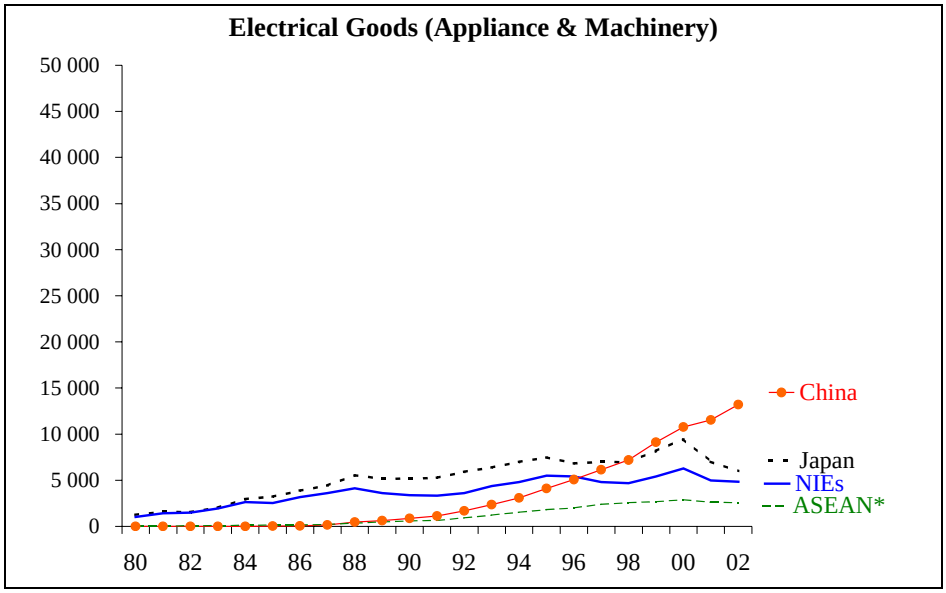
As a result of the reorganisation of production in Asia, a triangular trade pattern has emerged. China is used as an export base by the firms located in advanced Asian economies, which instead of exporting finished goods to the American and European markets, now export intermediate goods to their affiliates in China. China's exports to the EU and the US have skyrocketed and have displaced Japan's and NIEs' exports at accelerated pace.

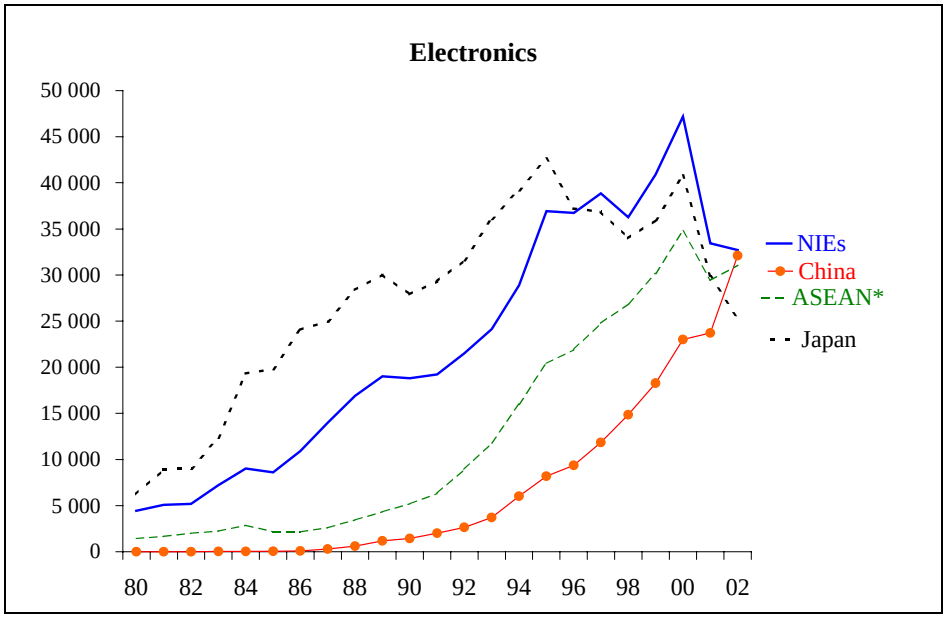
The cases of Asian exports of electrical and electronic goods to the US and Europe provide a clear evidence of this substitution.

The tremendous rise of China's exports of electrical goods to the US since the mid-eighties has been accompanied by a relative stagnation of exports by Japan and the NIEs (**Figure 13**). As a result Chinese exports overtook NIEs and Japanese exports in the late nineties; ASEAN* exports continued to rise up to the end of the nineties and have declined since. In electronic goods, the differences in market shares of the different exporters to the US were much wider up to the early nineties. NIEs and Japanese exports have stagnated since the mid-nineties while China's and ASEAN* exports continued their accelerated growth. Since 2001, following the drop of other Asian exporters, China has caught up the NIEs as the largest exporter of electronic goods to the US.

Similar trends are observed in Asian exports to the EU (**Figure 14**). In electronic and electrical goods, the steady rise of China's exports was accompanied by the drop or the levelling of Japan and NIEs exports in the late nineties. As a result of this substitution effect, China's has become the major Asian supplier of electrical goods to the EU, and has almost caught up Japan. ASEAN* exports in both sectors continued to increase rapidly up to 2000 and have fallen since.

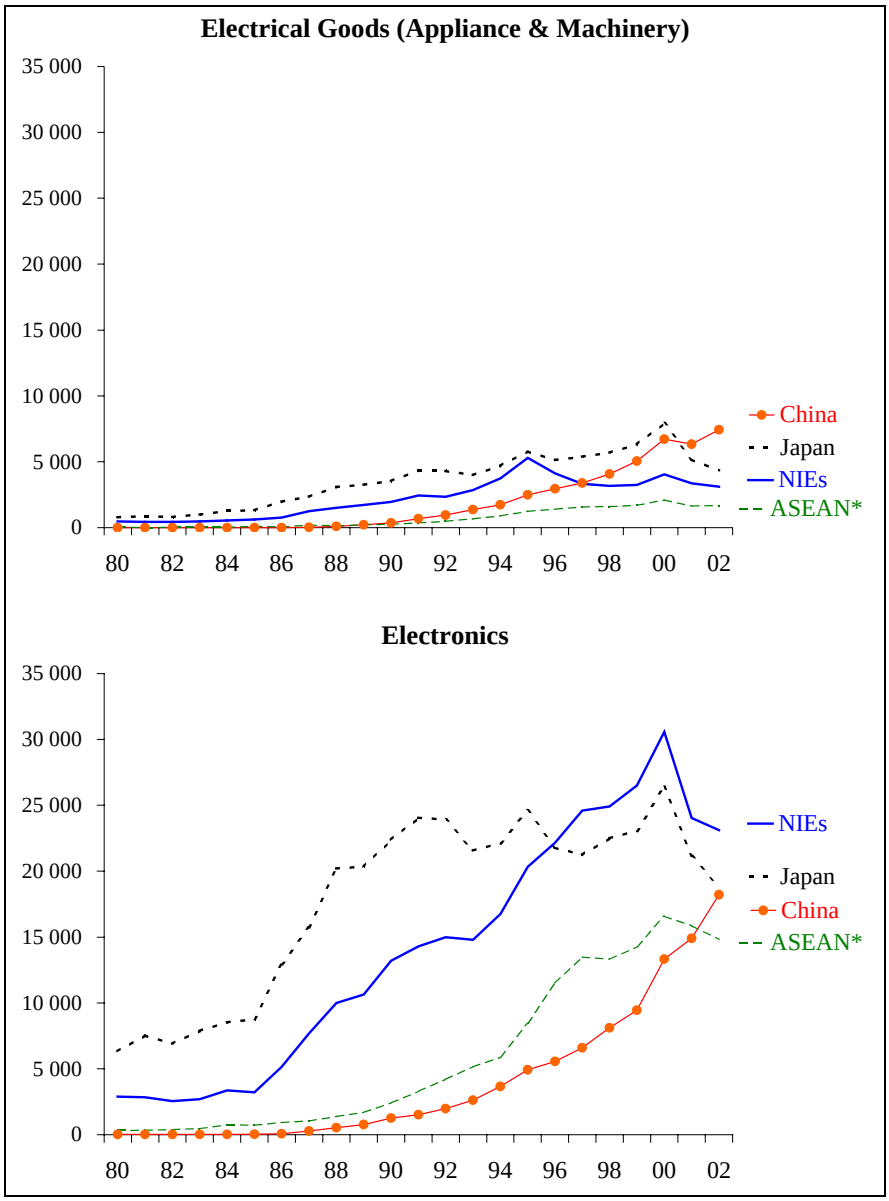
Figure 13 – US Imports from East-Asia, 1980-2002
(thousand US$)





Note: NIEs: Hong Kong, Singapore, South Korea, Taiwan; ASEAN*: ASEAN countries excluding Singapore.
Source: CEPII-CHELEM data base, authors' calculations.

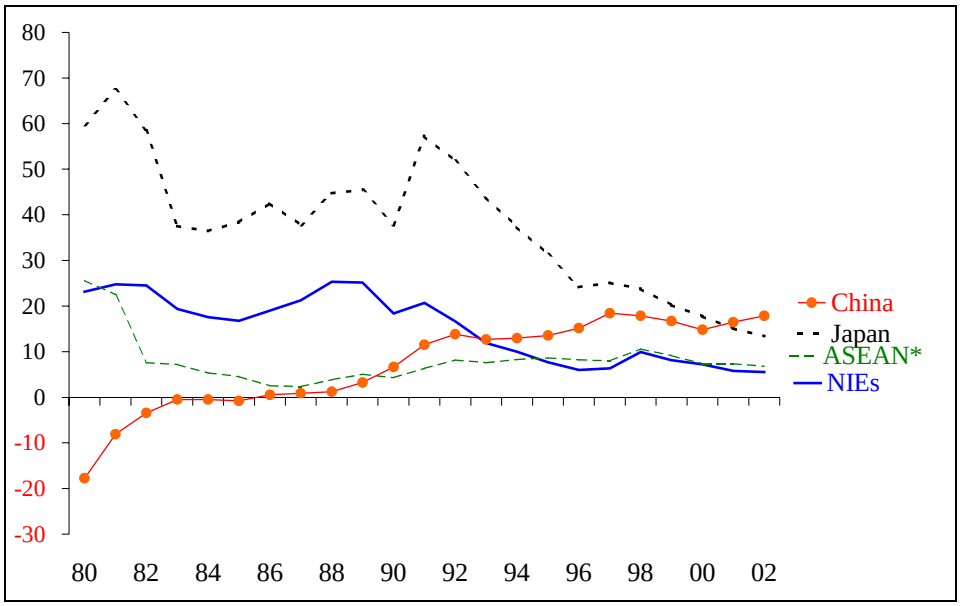
Figure 14 – EU-15 Imports from East-Asia, 1980—2002
(thousand US$)



Note: NIEs: Hong Kong, Singapore, South Korea, Taiwan; ASEAN*: ASEAN countries excluding Singapore.
Source: CEPII-CHELEM data base, authors' calculations.

The contribution of the different Asian countries or group of countries to US trade deficit reflects the substitution of China's exports for Japan and NIEs ones. In the nineties, the share of Japan and NIEs in US trade deficit declined significantly, while China was responsible for an increasing share of this deficit (**Figure 15**).

Figure 15 – The Share of East Asia in Total US Trade Deficit
(% of US Total Trade Balance)



Note: NIEs: Hong Kong, Singapore, South Korea, Taiwan; ASEAN*: ASEAN countries excluding Singapore.
Source: CEPII-CHELEM data base, authors' calculations.

4.4. Triangular Trade

China's emergence has considerably accentuated the "triangular" trade pattern, by speeding up the withdrawal of the most advanced Asian economies from the production and exports of labour intensive products (consumption goods) and enlarging trade of sophisticated intermediate goods within Asia. The structural factors underlying the triangular trade pattern will remain strong in the coming years.

China is likely to maintain a long-lasting specialisation in labour-intensive products. Its huge labour supply, and the expected migration of its labour force from agriculture to industry in the coming years will maintain the country's comparative advantage in this field. China's gains in market share, which have come primarily at the expense of the advanced economies of the region, will continue to be an incentive for the latter to move up the value-added chain. China will displace the NIEs in labour intensive industries that

they relinquish, just as in an earlier period the NIEs displaced Japan in these industries (*Ahearne et alii, 2003*). The main threat is to the less advanced Asian economies which face China's competition in labour intensive products. It is not clear whether they can move up the quality and technology ladder to keep a competitive edge over China (*Lall and Albaladejo, 2004*).

The analysis of trade in high-technology products suggests rather complementarity than competition between China and the East Asian advanced economies (*Lall and Albaladejo, 2004*). The present study has shown that most China's trade in high-tech products is related to processing activities and is handled by foreign affiliates. The technological upgrading of China's exports will remain dependent on FDI. The distribution of FDI between China and ASEAN* countries will be an important determinant of the evolution of their respective specialisation in the future.

However, several factors are likely to play in favour of a reduction of trade imbalances associated with triangular trade. Recent trends in China's foreign trade indicate that the country is not only an export base but more and more a market for foreign firms. China has considerably cut its tariff rates since the late 1990s and this has led to a accelerated growth of imports for the domestic market (ordinary imports). The further reductions in tariff rates which have been scheduled in China's agreement with WTO, combined with the economic growth which has accelerated since 2002, resulted in an outstanding growth of imports for domestic use. The opening of its potentially huge market has tended to limit China's global trade surplus around 2% of GDP. As European and US firms have relatively strong position on this "domestic segment" of China's imports, and as their economies show strong complementarity with China's economy, they should benefit from the enlarged access to this market. Most studies on the consequences of China's accession to WTO conclude that developed countries will benefit from most of the gains linked with China's opening up (*Ianchovichina and alii, 2000; Fan and Zheng, 2000; Lejour, 2000; Lemoine and Ünal-Kesenci, 2002b; Wang, 1999*). However as barriers to entry into this market are lowered, the competition also increases, as more and more countries will be able to bear the costs of entry. Moreover, as advanced Asian economies are increasing their imports from China, this will reduce the dependence of China's exports on Western markets. The positive balance that China has recently recorded in its processing trade with these economies indicates that production bases in China are more and more oriented towards supplying their Asian domestic markets.

4.5. China's Technological Catch-up?

Up to now the rapid technological upgrading of China's trade has been associated with an increased dependence on foreign capital and technology. The question is whether this dependence is due to be a long-lasting tendency or whether China will develop its own technological capacity in the coming years.

Up to the end of the nineties, China has heavily relied on FDI for its technological modernisation and there is evidence that FDI have not had all the positive effects that were expected by the Chinese authorities (*Sigurdson, 2002*). On the one hand, the

acquisition of technology through imports of products incorporating high-technology is usually less favourable to its dissemination than other channels such as patents or licences. The fact that the bulk of China's high tech imports is handled by foreign affiliates and especially by wholly foreign firms, is likely to have increased the obstacles to the dissemination of high technology. On the other hand, there is evidence that high-tech imports have been used as a substitute for local expenses in R&D. During the nineties, the value of high-tech imports exceeded the local expenses devoted to R&D. Moreover in sectors of new technology, which benefited from large high-tech imports and substantial FDI, the increase in R&D expenses has been slower that in other industries. Surveys of industrial firms in China in the nineties tend to confirm that high-tech imports have had a rather limited effect on the domestic innovative capacity (*Hu et alii, 2003*). Foreign firms remained relatively isolated from the local technology market. The performance of the Chinese firms in terms of productivity and innovation have been determined by their own efforts and the acquisition of foreign technology has had a positive effect only when associated with in-house R&D expenses.

The shortcomings of this reliance on imported technology have thus become evident and at the end of the nineties the authorities began to implement a new policy which put emphasis on the development of domestic innovative capacities. As a result R&D expenditures have increased, and their share in GDP rose from 0.7% in 1997 to 1.3% in 2002 and was expected to reach 1.5% in 2005. A key element of this new policy is the effort made by the authorities to define new Chinese standards, and to impose them instead of the existing technical standards to companies (multinational or local firms) operating in China. China is thus trying to impose its own standard for the third generation of mobile phone, for a new generation of DVD player, for internet communications. This is aimed at reducing the cost of dependence. China now produces most of the DVD players sold in the world, but the royalties paid to multinational companies (Philips, Sony or Pioneer) represent one third of the export price. This strategy also aims at promoting national industries in the new context created by Chinese entry into WTO, which limits the instruments available to protect domestic producers. China thus tries to take advantage of the attractiveness of its huge market to overcome its present technological weakness. But this strategy implies some risks, as it can end in failures or imply opportunity costs to some domestic enterprises (*Suttmeier and Yao, 2004; Cao, 2004*).

FDI may also help China to catch up. Foreign firms investing in China tend to increase their involvement in R&D activities. This is not only the result of a political pressure by the Chinese government to intensify technology transfer but is also part of multinational firms' strategy in order to consolidate their presence in the Chinese market and strengthen their position in inter-firm rivalry (*Walsh, 2003*). All multinational companies in China have built one or several R&D centres in China. Although their programmes may include mainly expenses for the development of products and their adaptation to the domestic market, they indicate a clear change in the strategy of the foreign firms investing in China.

Finally, despite the fact that the vast majority of Chinese firms have still a low scientific and technical level, a small number of them has emerged as important actors in the sectors of new technology. Their partnership with multinational firms have helped them to build up their capacity to develop new technical standards. They are now both partners and competitors of world giants in strategic alliances. Although these firms are still more the exception than the rule, they raises the question of whether China can shift from its present position of rapid follower to a position of leader (*Gilboy, 2004*).

Indicators of technological development show that the gap with industrialised countries remained huge but that China has made impressive progress in the field of scientific and technical innovation (**Tables 12 and 13**). The share of R&D expenditures in GDP is still low compared to that reached in advanced East Asian economies, but China's performance has improved significantly in the area of patent applications and grants, especially for innovation patents (as opposed to design patents of utility models): in 1994 foreign firms accounted for the majority of innovation patent applications and grants in China; in 2000, there are almost as many patents of Chinese origin as of foreign origin. However, in the number of patents applications at world level, China still play a very marginal part, accounting for 0.2-0.3% of the total, and stands well behind Taiwan and South Korea.

Table 12 – Science & Technology Indicators

	Researchers per 1000 persons employed	R&D expenditures in % of GDP	Number of patent applications in China	Number of patent applications to the European Patent office	Number of patent applications to the US Patent office
	2001	2001-2002	1999	2000	1999
US	6,6*	2.7	7 334	28 140	92 349
EU-15	5.9	1.9	8 376	49 353	27 220
Japan	10.2	3.1	9 813	20 676	35 443
Korea	6.3	2.9	1 707	1 218	3 752
Singapore	8.2	2.2	45	137	395
Taiwan	6.4	2.2		243	5 530
Hongkong			114	45	234
China	1.0	1.3	15 943	301	282

* 1999

Source: OECD, An Emerging knowledge-based Economy in China? Indicators from OECD database, STI Working Paper 2004/4.

Table 13 – Patent Applications and Grants by Type and Nationality

	Patent applications			
	Invention patents		Other patents	
	Chinese	Foreign	Chinese	Foreign
1994	11 191	7 876	56 616	2 052
1999	15 596	21 098	94 362	3 183
2000	25 346	26 401	114 993	3 942
	Patent grants			
	Invention patents		Other patents	
	Chinese	Foreign	Chinese	Foreign
1994	1 659	2 224	38 218	1 296
1999	3 097	4 540	89 004	3 515
2000	6 177	6 506	89 059	3 603

Source: Bhattasali, Deepak, Shantong Li, Will Martin (2004).

4. CONCLUSION

The emergence of China has had far-reaching implications on the East Asian economies. It has accelerated the reorganisation of production in East Asia and the expansion of East Asian trade both within the region and with the rest of the world. The international division of labour within the region has expanded and intensified, as firms have developed production and export bases on the mainland. Production of labour intensive goods has moved to China, which has expanded its share in Western markets at the expense of the advanced Asian countries. The latter have accelerated their exports of sophisticated intermediate goods to China. In this triangular trade pattern, the US and the EU trade deficits with China have widened, while their deficits with Japan and the NIEs have narrowed.

China has become a major partner in the development of East Asian production networks, and hence its trade performance has also become highly dependent on the investment of East Asian firms. Trade data show that East Asian firms (together with other foreign firms located in East Asia) have decisively contributed both to the accelerated increase of China's exports and to their rapid technological upgrading over the last ten years. Foreign firms handle the bulk of China's trade in high-tech products, which raises the question of their dynamic impact on the upgrading of the domestic industrial capacities. The prospects of China's technological catch-up will depend on its ability to disseminate foreign technology into the local industrial sector and to develop its own innovative capacities.

The opening up of China's domestic market, since its WTO accession, combined with its sustained economic growth rate, should lead to a reduction of trade imbalances, as strong domestic demand will boost imports of capital goods, and to a lesser extent of sophisticated consumption goods from industrialised countries. It will also raise imports of raw materials and agricultural commodities, including commodities coming from developing or emerging countries. The related pressure on prices of raw materials (and energy) is likely to remain an important issue in the future.

Appendices

APPENDIX 1 – SECTOR CLASSIFICATION

SECTORS	HS2	HS2 TITLE
Raw agricultural products	01	Live animals.
	02	Meat and edible meat offal.
	03	Fish & crustacean, mollusc & other aquatic invertebrate
	05	Products of animal origin, nes or included.
	06	Live tree & other plant; bulb, root; cut flowers etc
	07	Edible vegetables and certain roots and tubers.
	08	Edible fruit and nuts; peel of citrus fruit or melons.
	10	Cereals.
	12	Oil seed, oleagi fruits; miscell grain, seed, fruit etc
	13	Lac; gums, resins & other vegetable saps & extracts.
	14	Vegetable plaiting materials; vegetable products nes
Food products	04	Dairy prod; birds' eggs; natural honey; edible prod nes
	09	Coffee, tea, mat– and spices.
	11	Prod mill indust; malt; starches; inulin; wheat gluten
	15	Animal/veg fats & oils & their cleavage products; etc
	16	Prep of meat, fish or crustaceans, molluscs etc
	17	Sugars and sugar confectionery.
	18	Cocoa and cocoa preparations.
	19	Prep of cereal, flour, starch/milk; pastrycooks' prod
	20	Prep of vegetable, fruit, nuts or other parts of plants
	21	Miscellaneous edible preparations.
	22	Beverages, spirits and vinegar.
	23	Residues & waste from the food indust; prepr ani fodder
	24	Tobacco and manufactured tobacco substitutes.
Raw materials & fuels	25	Salt; sulphur; earth & ston; plastering mat; lime & cem
	26	Ores, slag and ash.
	27	Mineral fuels, oils & product of their distillation;etc
Chemical products	28	Inorgn chem; compds of prec met, radioact elements etc
	29	Organic chemicals.
	30	Pharmaceutical products.
	31	Fertilisers.
	32	Tanning/dyeing extract; tannins & derivs; pigm etc
	33	Essential oils & resinoids; perf, cosmetic/toilet prep
	34	Soap, organic surface-active agents, washing prep, etc
	35	Albuminoidal subs; modified starches; glues; enzymes.
	36	Explosives; pyrotechnic prod; matches; pyrop alloy; etc
	37	Photographic or cinematographic goods.
	38	Miscellaneous chemical products.
	39	Plastics and articles thereof.
	40	Rubber and articles thereof.
Wood and paper products	44	Wood and articles of wood; wood charcoal.
	45	Cork and articles of cork.
	46	Manufactures of straw, esparto/other plaiting mat; etc
	47	Pulp of wood/of other fibrous cellulosic mat; waste etc
	48	Paper & paperboard; art of paper pulp, paper/paperboard
	49	Printed books, newspapers, pictures & other product etc
	94	Furniture; bedding, mattress, matt support, cushion etc

SECTORS	HS2	HS2 TITLE
Leather and shoes	41	Raw hides and skins (other than furskins) and leather.
	42	Articles of leather; saddlery/harness; travel goods etc
	43	Furskins and artificial fur; manufactures thereof.
	64	Footwear, gaiters and the like; parts of such articles.
Fibber and cloths	50	Silk.
	51	Wool, fine/coarse animal hair, horsehair yarn & fabric
	52	Cotton.
	53	Other vegetable textile fibres; paper yarn & woven fab
	54	Man-made filaments.
	55	Man-made staple fibres.
	56	Wadding, felt & non woven; yarns; twine, cordage, etc
	57	Carpets and other textile floor coverings.
	58	Special woven fab.; tufted tex fab; lace; tapestries etc
	59	Impregnated, coated, cover/laminated textile fabric etc
	60	Knitted or crocheted fabrics.
Wearing Apparel	61	Art of apparel & clothing access, knitted or crocheted.
	62	Art of apparel & clothing access, not knitted/crocheted
	63	Other made up textile articles; sets; worn clothing etc
Building materials	68	Art of stone, plaster, cement, asbestos, mica/sim mat
	69	Ceramic products.
	70	Glass and glassware.
Metallurgy	72	Iron and steel.
	73	Articles of iron or steel.
	74	Copper and articles thereof.
	75	Nickel and articles thereof.
	76	Aluminium and articles thereof.
	78	Lead and articles thereof.
	79	Zinc and articles thereof.
	80	Tin and articles thereof.
	81	Other base metals; cermets; articles thereof.
Metal products	82	Tool, implement, cutlery, spoon & fork, of base met etc
	83	Miscellaneous articles of base metal.
Machinery	84	Nuclear reactors, boilers, mchy & mech appliance; parts
	93	Arms and ammunition; parts and accessories thereof.
Electrical machinery	85	Electrical mchy equip parts thereof; sound recorder etc
Motor Vehicles	87	Vehicles other than railw/tramw roll-stock, pts & accessories
Other transport equipment	86	Railw/tramw locom, rolling-stock & parts thereof; etc
	88	Aircraft, spacecraft, and parts thereof.
	89	Ships, boats and floating structures.
Precision instruments	90	Optical, photo, cine, meas, checking, precision, etc
	91	Clocks and watches and parts thereof.
	92	Musical instruments; parts and access of such articles
Toys & miscellaneous manuf. prod.	65	Headgear and parts thereof.
	66	Umbrellas, walking-sticks, seat-sticks, whips, etc
	67	Prepr feathers & down; arti flower; articles human hair
	71	Natural/cultured pearls, prec stones & metals, coin etc
	95	Toys, games & sports requisites; parts & access thereof
	96	Miscellaneous manufactured articles.
	97	Works of art, collectors' pieces and antiques.
	98	Special Classification Provisions

APPENDIX 2 – PRODUCTION STAGES ACCORDING TO THE BEC CLASSIFICATION

In this study, the data from China's Customs statistics available at 6 digits of Harmonised System were aggregated according to the BEC classification (Broad Economic Categories of the United Nations of production stages). The BEC reclassifies the Standard International Trade Classification (SITC, Rev. 3) headings on the basis of the principal use of the products. It converts foreign trade data into categories of final or intermediate use, such us capital goods, intermediate goods or consumer goods, following the usage in the System of National Accounts (SNA). We grouped BEC items into five stages of production as following:

3 stages	5 stages	Code BEC	Title BEC
Primary goods		111	Food and beverages mainly for industry
		21	Industrial supplies, n.e.s., primary
		31	Fuels and lubricants, primary
Intermediate goods	Semi-finished goods	121	Food and beverages, processed, mainly for industry
		22	Industrial supplies, n.e.s., processed
		322	Fuels and lubricants, processed
	Parts&components	42	Of capital goods, except transport equipment
		53	Parts and accessories of transport equipment
Final goods	Capital goods	41	Capital goods except transport equipment
		521	Other industrial transport equipment
	Consumption goods	112	Food & bev., primary, mainly for household consumption
		122	Food & bev., primary, processed, for house. consumption
		51	Passenger motor cars
		522	Other non-industrial transport equipment
		61	Durable consumer goods n.e.s.
		62	Semi-durable consumer goods n.e.s.
		63	Non-durable consumer goods n.e.s.

APPENDIX 3 – THE DEFINITION OF HIGH-TECH PRODUCTS

The definition of high-technology products is based on indicators of technological intensity in OECD countries, such as R&D expenditures divided by value added, R&D expenditures divided by production.

On the basis of this definition two types of classification can be made of high-technology products:

- at a broad category level: the indicators of high-tech content are calculated at the branch level and all the products within an high-tech branch are considered as selected "high-tech" products;
- at a detailed product level within a broad category.

The first methodology is the most widely used. For instance, the latest OECD classification (2004) based on technology indicators groups manufacturing branches (ISIC rev.3, at 2 or 3 digit level) into 4 technological levels: high-technology, medium-high-technology; medium-low-technology; and low technology. In this classification high-technology industries includes all products belonging to the following branches:

- aircraft and spacecraft (ISIC 353);
- pharmaceuticals (ISIC 2423);
- office, accounting, and computing machinery (ISIC 30);
- radio, TV and communication equipment (ISIC 32);
- medical, precision and optical instrument (ISIC 33).

In the same way, according to World Development Indicators of United Nations (WDI database), high-technology exports include all the exports of the following branches: aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. **Figure 5** in present study refers to this definition.

It has to be noted that this methodology introduces a serious selection bias, since not all product in a "high-technology industry" necessarily have a high technology content. Likewise, some products in industries with low technology intensity may well incorporate a high degree of technological sophistication.

The second methodology first defines large high-tech sectors (as described above) and then selects,within this high-tech branches and a detailed level of the products having a high content in R&D. The definition of high-tech products used in CEPII studies refers to this second way (*Fontagné et alii, 1999*). The nine high-tech industries that were selected in the first step were the following:

- aerospace;
- computers, office machinery;
- electronics-communications;

- pharmaceuticals;
- scientific instruments;
- electrical machinery;
- chemicals;
- other transport equipment;
- non-electrical machinery;
- weapons.

In the second step, within these broad categories, a list of 252 products (at the 6 digits level of the Harmonised System) were identified as high-tech. It has to be noted that this methodology introduces another selection bias, since it examines whether products are of a high-technology nature or not, only in branches that are considered high-technology: the high-technology products belonging to non technological branches are thus implicitly considered as non-technological.

252 high-tech products (HS, 6 digits) of the present study (except **Figure 5**) are presented below:

280450	293710	300410	840140	846231	852691	854330	900921	902140	903040
280461	293721	300420	841111	846241	852692	854390	900922	902150	903089
280469	293722	300431	841112	846693	852790	854470	901110	902230	903090
280470	293729	300432	841121	846694	853110	871000	901120	902300	903210
280480	293791	300439	841122	847110	853120	880211	901180	902410	903220
280490	293792	320411	841181	847330	853180	880212	901190	902480	903281
280521	293799	320412	841182	851521	853221	880220	901210	902490	903289
280522	293810	320413	841191	851531	853222	880230	901290	902511	903290
280530	293890	320414	841199	851730	853223	880240	901320	902519	903300
282520	294110	320415	841210	851790	853224	880310	901380	902580	930100
282530	294120	320416	845610	851810	853400	880320	901410	902590	930200
282540	294130	320417	845620	851821	853710	900110	901420	902610	930310
282550	294140	320419	845630	851822	854081	900120	901480	902620	930320
282560	294150	320420	845710	851829	854089	900130	901490	902680	930330
282570	294190	320490	845811	851830	854110	900190	901510	902690	930390
282580	300110	320500	845891	851840	854121	900510	901520	902710	930400
284410	300120	380810	845921	851850	854129	900580	901530	902720	930510
284420	300190	380820	845931	851890	854130	900610	901540	902730	930521
284430	300210	380830	845951	851999	854140	900620	901580	902740	930529
284440	300220	380840	845961	852110	854150	900630	901590	902750	930590
284450	300290	380890	846011	852190	854160	900640	901600	902780	930610
284510	300310	390760	846021	852510	854190	900711	901841	902790	930621
284590	300320	840110	846031	852520	854219	900719	902111	903010	930629
284610	300331	840120	846040	852530	854290	900911	902119	903020	930630
284690	300339	840130	846221	852610	854320	900912	902130	903031	930690
								903039	930700

APPENDIX 4 – INDICATOR OF CONTRIBUTION TO TRADE BALANCE

To measure China's revealed comparative advantages, we used the indicator of "contribution to the trade balance" (*Lafay, 1994*). The idea is to measure comparative advantages (largo sensu) under an assumption of balanced trade.

$$CTB_{ij}^{k} = 1000 * \left[\left(X_{ij}^{k} - M_{ij}^{k} \right) - \sum_{k} \sum_{j} \left(X_{ij}^{k} - M_{ij}^{k} \right) \left(\frac{X_{ij}^{k} + M_{ij}^{k}}{\sum_{k} \sum_{j} \left(X_{ij}^{k} + M_{ij}^{k} \right)} \right) \right]$$

with *i* for the declaring country (China), *j* for its partner and *k* for the products.

If there were no comparative advantage or disadvantage for any product *k*, then the country's total trade balance (surplus or deficit) should be distributed across all industries according to their share in total trade. The "contribution to the trade balance" is the difference between the observed and this theoretical balance. Here, these "contributions" are weighted by total trade of the China.

A positive contribution is interpreted as a "revealed comparative advantage" for that industry. By definition, the sum over all industries and partners is zero. The indicator is additive: thus the values for products or industries can be aggregated to any desired level.

Contribution to the trade balance is a structural indicator which tries to eliminate business cycle variations -by comparing an industry's performance to the overall one- and, unlike many other indicators, a symmetrical indicator in the sense that it focuses not only on exports, but also on imports.

APPENDIX 5 – HIGH-TECH TRADE BY REGION, FIRM CATEGORY & PRODUCTION STAGES

Imports of China, 2002 (% world total)

	Firm Category	Chinese	JV*	FFOF*	Total
Partner	***Production Stage***				
Asia-Oceania	**Total**	**17**	**15**	**39**	**70**
	Semi-Finished Products	1	1	1	3
	Parts & Components	7	9	24	40
	Capital Goods	8	5	14	27
	Consumption Goods	0	0	0	0
Western Europe	**Total**	**6**	**4**	**2**	**11**
	Semi-Finished Products	0	0	0	1
	Parts & Components	2	2	1	5
	Capital Goods	4	1	1	5
	Consumption Goods	0	0	0	0
America	**Total**	**8**	**3**	**4**	**15**
	Semi-Finished Products	0	0	0	1
	Parts & Components	2	2	3	6
	Capital Goods	6	1	1	8
	Consumption Goods	0	0	0	0
Other	**Total**	**2**	**0**	**0**	**3**
	Semi-Finished Products	0	0	0	0
	Parts & Components	1	0	0	1
	Capital Goods	1	0	0	1
	Consumption Goods	0	0	0	0
World	**Total**	**33**	**22**	**45**	**100**
	Semi-Finished Products	2	1	1	5
	Parts & Components	12	13	28	52
	Capital Goods	19	8	16	42
	Consumption Goods	0	0	0	1

* JV: Joint venture; FFOF: Fully foreign owned firm.
Source: China's Customs Statistics, authors' calculations.

Exports of China, 2002 (% world total)

	Firm Type	Chinese	JV	FFOF	Total
Partner	***Stage***				
Asia-Oceania	**Total**	**11**	**16**	**28**	**56**
	Semi-Finished Products	3	1	0	5
	Parts & Components	4	7	22	33
	Capital Goods	4	8	5	17
	Consumption Goods	0	0	0	1
Western Europe	**Total**	**4**	**5**	**6**	**15**
	Semi-Finished Products	1	1	0	2
	Parts & Components	1	1	3	5
	Capital Goods	2	4	2	8
	Consumption Goods	0	0	0	1
America	**Total**	**8**	**5**	**12**	**25**
	Semi-Finished Products	2	0	0	2
	Parts & Components	1	1	6	8
	Capital Goods	4	4	5	14
	Consumption Goods	0	0	0	1
Other	**Total**	**2**	**2**	**1**	**5**
	Semi-Finished Products	1	0	0	1
	Parts & Components	0	0	1	1
	Capital Goods	1	1	0	2
	Consumption Goods	0	0	0	0
World	**Total**	**24**	**29**	**47**	**100**
	Semi-Finished Products	7	2	1	9
	Parts & Components	6	9	32	47
	Capital Goods	11	17	13	41
	Consumption Goods	1	1	1	3

* JV: Joint venture; FFOF: Fully foreign owned firm.
Source: China's Customs Statistics, authors' calculations.

REFERENCES

AHEARNE, A, J. FERNALD, P LOUNGANI & J SCHINDLER (2003), "Comrades or Competitors?", *Federal Reserve Bank of Chicago*, Working Paper, WP-03-27. March.

AKAMATSU K. (1961), "A Theory of Unbalanced Growth in the World Economy", *Weltwirtschafliches Archiv*, Vol.86: 196-215.

ANDO A. & F. KIMURA (2003), "The Formation of International Production and Distribution Networks in East Asia", *NBER Working Paper*, n° 10167, December.

BERNARD M. & J. RAVENHIL (1995), "Beyond Product Cycles and Flying Geese. Regionalization, Hierarchy, and the Industrialization of East Asia", *World Politics*, 47(2): 171-179.

BORRUS M. (1996), "Left for Dead: Asian Production Networks and the Revival of US Electronics". Berkeley Roundtable on the International Economy, University of California, Berkeley. http://www.ap.harvard.edu/mainsite/papers/recoop/borrus/borrus.html

BORRUS M., D. ERNST & S. HAGGARD (2000). *International production networks in Asia: rivalry or riches?*, London and New York, Routledge.

CAO C. (2004), "L'industrie chinoise face au défi technologique", *Perspectives Chinoises*, n°83, mai-juin.

DÉES S. & F. LEMOINE (1999), "The Devaluation of the Yuan: 'A Little Impatience May Ruin a Great Project' " (Confucious), *La Lettre du CEPII*, n°178, avril.

EC (1997), European Commission and CESD, The Customs General Administration of the PRC and the International Trade Center UNCTAD/WTO: *Comparison of Bilateral Trade Statistics of China and the European Union: Discrepancies and Underlying Factors*, Geneva, 4 November.

ESCAP UN (1991), *Industrial restructuring in Asia and the Pacific*, March, Bangkok, United Nations.

FAN M. & Y. ZHENG (2000), "The Impact of China's Trade Liberalisation for WTO Accession: A Computable General Equilibrium Analysis", paper presented at the *Annual Conference of Global Economic Analysis*, Melbourne, Australia, June 20-30.

FONTAGNÉ L., 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): 561-582.

FONTAGNÉ L. & T. MAYER (2005), "Determinants of Location Choices by Multinational Firms: a Review of the Current State of Knowledge", *Economie internationale*, forthcoming.

FUKAO K., H. ISHIDO & K. ITO (2003), "Vertical Intra-Industry Trade and Foreign Direct Investment in East Asia", *Journal of the Japanese and International Economies*, 17(4): 468-506.

FUNG K.C., H. IIZAKA, H.-K. KIM & K.F. SIU (2003), "Korean, Japanese and Taiwanese Direct Investment in China", *Proceedings on Rising China and the East Asian Economy*, Korean Institute of International Economic Policy, Korea, March 20th.

GILBOY G.J. (2004),"The Myth Behind China's Miracle", *Foreign Affairs*, July-August: 33-44.

GRUBEL H.G. & H. JOHNSON (1971), "The Welfare Implications of Effective Protection", In *Effective Tariff Protection*, eds. H.G. Grubel and H.G. Johnson, Geneva: Graduate Institute of International Studies and General Agreement on Tariffs and Trade.

GUERRIERI P. (2000), "International Competitiveness, Regional Integration, and Corporate Strategies in the East Asian Electronic Industry", In *International Production Networks in Asia: Rivalry or Riches?* eds. M. Borrus, D. Ernst & S Haggard, London and New York: Routledge.

HU A.G.Z., G.H. JEFFERSON, G. XIAOJING and Q. JINCHANG (2003), "R&D and Technology Transfer: Firm-Level Evidence from Chinese Industry" The William Davidson Institute, Working Paper number 582, June.

HUCHET J.-F. (1997), "The China Circle and Technological Development in the Chinese Electronic Industry", In *The China Circle: Economic and Technology in the PRC, Taiwan and Hong Kong*, ed. B. Naughton, Washington, D.C.: Brookings Institution Press.

HUMMELS D., RAPOPORT D. & YI K.-M. (1998), "Vertical specialization and the changing nature of world trade", Economic Policy Review, Federal Reserve Bank of New York, issue Jun), pages 79-99.

IANCHOVICHINA E., MARTIN W. & FUKASE E. (2000), "Comparative Study of Trade Liberalization Regimes: the Case of China's Accession to the WTO", paper prepared for the *Annual Conference of Global Economic Analysis*, Melbourne, Australia, June 20-30.

KAPLINSKY R., D MORRIS & J. READMAN (2002), "Globalization of Product Markets and Immisering Growth: Lessons from the South-African Furniture Industry", *World Development*, 30(7): 1159-1177.

LAFAY G. (1994), "The Measurement of Revealed Comparative Advantages", In *International Trade Modelling*, Eds. M.G. Dagenais & P.A. Muet, London: Chapman & Hall.

LALL S. & M. ALBALADEJO (2004), "China's Competitive Performance: a Threat to East Asian Manufactured Exports?", *World Development*, 32(9): 1441-1466.

LARDY N. (2002), *Integration China into the Global Economy*, Washington, D.C.: Brookings Institution Press.

LEE K. & M. KIM (2004), "The Rise of china and the Korean Firms Looking for a New Division of Labour", *Proceedings on Rising China and the East Asian Economy*, Korean Institute of International Economic Policy, Korea, March 20th.

LEJOUR A. (2000), "China and the WTO: the Impact on China and the World Economy", paper prepared for the *Annual Conference of Global Economic Analysis*, Melbourne, Australia, June 20-30.

LEMOINE F. (2000), "FDI and the Opening Up of China's Economy", *CEPII Working Paper* 2000-11, June, www.cepii.fr.

LEMOINE F. & D. ÜNAL-KESENCI (2002a), "China in the International segmentation of Production Processes", *CEPII Working Paper*, n°2002-02, March, www.cepii.fr.

LEMOINE F. & D. ÜNAL-KESENCI (2002b), "The Impact of China's WTO Accession on EU Trade", In *China's Accession to the World Trade Organization. National and International Perspectives*, Eds. H. Holbig & R. Ash, English-language Series of the Institute of Asian Affairs (IFA) Hamburg, RoutledgeCurzon.

LEMOINE F. & D. ÜNAL-KESENCI, "Trade and Technology Transfers: a Comparative Study of Turkey, India and China", *CEPII Working Paper*, n° 2003-16, November www.cepii.fr.

LEMOINE F. & ÜNAL-KESENCI D. (2004), "Assembly Trade and Technology Transfer: The Case of China", *World Development*, Vol. 32, n° 5, May.

MASUYAMA S. (2004), "The Asian Strategy of Japanese Multinationals: Focus on China", *Tokyo Club Research Meetings*, February 9.

NAUGHTON B. (1996), "China's Emergence and Prospects as a Trading Nation", *Brookings Paper on Economic Activity*, Vol.2: 273-344.

NAUGHTON B. (1997), *The China Circle: Economic and Technology in the PRC, Taiwan and Hong Kong*, Brookings Institution Press, Washington D.C.

NG F. & YEATS A. (1999), "Production Sharing in East Asia: Who Does What, for Whom and Why?", *World Bank Policy Research Paper Working Paper Series*, 2197.

NG, F. & YEATS A. (2003), "Major Trade Trends in East Asia. What are their Implications for Regional Cooperation and Growth", *World Bank Policy Research Paper Working Paper Series*, 3084, June.

OECD (1999), *Foreign Direct Investment and Recovery in South-East Asia*, Paris: OECD Proceedings.

OECD (2004), "An emerging knowledge-based economy in China? Indicators from OECD databases, *OECD Science, Technology and Industry Department Working Papers*, no.(2004)4.

SIGURDSON J., (2002), "Le nouveau paysage des technologies en Chine", *Perspectives chinoises*, n°71 – mai-juin, 37-54.

SUNG Y.W. (2000), "Costs and Benefits of Exports-Oriented Foreign Investment: the Case of China", *Asian Economic Journal*, 14(1), 55-70.

SUTTMEIER R.P. & X. YAO (2004), "China's Post-WTO Technology Policy: Standards, Software, and the Changing Nature of Techno-Nationalism", *NBER Special Report*, n°7, May.

TSO A. (1998), "Foreign Direct Investment and China's Economic Development", *Issues and Studies*, 34(2): 1-34.

UNCTAD (1996), *Trade and Development Report*, New York and Geneva, United Nations.

UNCTAD (1999), *World Investment Report*, New York and Geneva, United Nations.

UNCTAD 2001, *Trade and Development Report*, New York and Geneva, United Nations.

UNCTAD (2002), *Trade and Development Report*, New York and Geneva, United Nations.

WALSH K. (2003), "Foreign High-Tech R&D in China. Risks, Rewards and Implications for US-China Relations", *Report of the Stimson Center*.

WANG Z. (1999), "The Impact of China's WTO Entry on the World Labour-Intensive Export Market: A Recursive Dynamic CGE Analysis", *The World Economy*, 22(3): 379-406.

WU Y. (1999), "The performance of FDI", In *Foreign Direct Investment and Economic Growth in China*, ed. Y. Wu, Cheltenham, UK-Northampton, MA, USA: Edward Elgar.

WEI Y. & X. LIU (2001), *Foreign Direct Investment in China: Determinants and Impact*. Cheltenham, UK-Northampton, MA, USA: Edward Elgar.

ZHANG X. (1999), "Foreign Investment Policy", *Contribution and Performance* In *Foreign Direct Investment and Economic Growth in China*, ed. Y. Wu, Cheltenham, UK-Northampton, MA, USA: Edward Elgar.

ZHANG Z. (1995), "International Trade and Foreign Direct Investment: Further Evidence from China", *Asian Economic Journal*, 9(21): 153-167.

ZYSMAN J., E. DOHERTY & A. SCHWARTZ (1996), "Tales from the Global Economy: Cross-National Production Networks and the Reorganisation of the European Economy", *Berkeley Rountable on the International Economy Working Paper*, WP-83, June.

LIST OF WORKING PAPERS RELEASED BY CEPII[14]

No	*Title*	*Authors*
2005-08	Tax Competition and Public Input	A. Bénassy-Quéré, N. Gobalraja & A. Trannoy
2005-07	Trade Liberalisation, Growth and Poverty in Senegal: A Dynamic Microsimulation CGE Model Analysis	N. Annabi, F. Cissé, J. Cockburn & B. Decaluwé
2005-06	Migration, Trade and Wages	A. Hijzen & P. Wright
2005-05	Institutional Determinants of Foreign Investment	A. Bénassy-Quéré, M. Coupet & T. Mayer
2005-04	L'économie indienne : changements structurels et perspectives à long terme	S. Chauvin & F. Lemoine
2005-03	Programme de travail du CEPII pour 2005	
2005-02	Market Access in Global and Regional Trade	T. Mayer & S. Zignago
2005-01	Real Equilibrium Exchange Rate in China	V. Coudert & C. Couharde
2004-22	A Consistent, *ad-valorem* Equivalent Measure of Applied Protection Across the World: The MAcMap-HS6 Database	A. Bouët, Y. Decreux, L. Fontagné, S. Jean & D. Laborde
2004-21	IMF in Theory: Sovereign Debts, Judicialisation and Multilateralism	J. Sgard
2004-20	The Impact of Multilateral Liberalisation on European Regions: a CGE Assessment	S. Jean & D. Laborde
2004-19	La compétitivité de l'agriculture et des industries agroalimentaires dans le Mercosur et l'Union européenne dans une perspective de libéralisation commerciale	N. Mulder, A. Vialou, B. David, M. Rodriguez & M. Castilho
2004-18	Multilateral Agricultural Trade Liberalization: The Contrasting Fortunes of Developinc Countries in the Doha Round	A. Bouët, J.C. Bureau, Y. Decreux & S. Jean
2004-17	UK in or UK out? A Common Cycle Analysis	J. Garnier

[14] Working papers are circulated free of charge as far as stocks are available; thank you to send your request to CEPII, Sylvie Hurion, 9, rue Georges-Pitard, 75015 Paris, or by fax : (33) 01 53 68 55 04 or by e-mail sylvie.hurion@cepii.fr. Also available on: \\www.cepii.fr. Working papers with * are out of print. They can nevertheless be consulted and downloaded from this website.

	between the UK and the Euro Zone	
2004-16	Regionalism and the Regionalisation of International Trade	G. Gaulier, S. Jean & D. Ünal-Kesenci
2004-15	The Stock-Flow Approach to the Real Exchange Rate of CEE Transition Economies	B. Egert, A. Lahrècche-Révil & K. Lommatzsch
2004-14	Vieillissement démographique, épargne et retraite : une analyse à l'aide d'un modèle d'équilibre général à agents hétérogènes	C. Bac & J. Chateau
2004-13	Burden Sharing and Exchange-Rate Misalignments within the Group of Twenty	A. Bénassy-Quéré, P. Duran-Vigneron, A. Lahrèche-Révil & V. Mignon
2004-12	Regulation and Wage Premia	S. Jean & G. Nicoletti
2004-11	The Efficiency of Fiscal Policies: a Survey of the Literature	S. Capet
2004-10	La réforme du marché du travail en Allemagne : les enseignements d'une maquette	S. Capet
2004-09	Typologie et équivalence des systèmes de retraites	P. Villa
2004-08	South – South Trade: Geography Matters	S. Coulibaly & L. Fontagné
2004-07	Current Accounts Dynamics in New EU Members: Sustainability and Policy Issues	P. Zanghieri
2004-06	Incertitude radicale et choix du modèle	P. Villa
2004-05	Does Exchange Rate Regime Explain Differences in Economic Results for Asian Countries?	V. Coudert & M. Dubert
2004-04	Trade in the Triad: How Easy is the Access to Large Markets?	L. Fontagné, T. Mayer & S. Zignago
2004-03	Programme de travail du CEPII pour 2004	
2004-02	Technology Differences, Institutions and Economic Growth: a Conditional Conditional Convergence	H. Boulhol
2004-01	Croissance et régimes d'investissement	P. Villa
2003-22	A New Look at the Feldstein-Horioka Puzzle using a Integrated Panel	A. Banerjee P. Zanghieri

2003-21	Trade Linkages and Exchange Rates in Asia :The Role of China	A. Bénassy-Quéré & A. Lahrèche-Révil
2003-20	Economic Implications of Trade Liberalization Under the Doha Round	J. Francois, H. van Meijl & F. van Tongeren
2003-19	Methodological Tools for SIA - Report of the CEPII Worshop held on 7-8 November 2002 in Brussels	
2003-18	Order Flows, Delta Hedging and Exchange Rate Dynamics	B. Rzepkowski
2003-17	Tax Competition and Foreign Direct Investment	A. Bénassy-Quéré, L. Fontagné & A. Lahrèche-Révil
2003-16	Commerce et transfert de technologies : les cas comparés de la Turquie, de l'Inde et de la Chine	F. Lemoine & D. Ünal-Kesenci
2003-15	The Empirics of Agglomeration and Trade	K. Head & T. Mayer
2003-14	Notional Defined Contribution: A Comparison of the French and German Point Systems	F. Legros
2003-13	How Different is Eastern Europe? Structure and Determinants of Location Choices by French Firms in Eastern and Western Europe	A.C. Disdier & T. Mayer
2003-12	Market Access Liberalisation in the Doha Round: Scenarios and Assessment	L. Fontagné, J.L. Guérin & S. Jean
2003-11	On the Adequacy of Monetary Arrangements in Sub-Saharian Africa	A. Bénassy-Quéré & M. Coupet
2003-10	The Impact of EU Enlargement on Member States: a CGE Approach	H. Bchir, L. Fontagné & P. Zanghieri
2003-09	India in the World Economy: Traditional Specialisations and Technology Niches	S. Chauvin & F. Lemoine
2003-08	Imitation Amongst Exchange-Rate Forecasters: Evidence from Survey Data	M. Beine, A. Bénassy-Quéré & H. Colas
2003-07	Le Currency Board à travers l'expérience de l'Argentine	S. Chauvin & P. Villa
2003-06	Trade and Convergence: Revisiting Ben-Davil	G. Gaulier
2003-05	Estimating the Fundamental Equilibrium Exchange Rate of Central and Eastern European Countries the EMU Enlargement Perspective	B. Egert & A. Lahrèche-Révil

2003-04	Skills, Technology and Growth is ICT the Key to Success?	J. Melka, L. Nayman, S. Zignago & N. Mulder
2003-03	L'investissement en TIC aux Etats-Unis et dans quelques pays européens	G. Cette & P.A. Noual
2003-02	Can Business and Social Networks Explain the Border Effect Puzzle?	P.P. Combes, M. Lafourcade & T. Mayer

CEPII
DOCUMENTS DE TRAVAIL / WORKING PAPERS

Si vous souhaitez recevoir des Documents de travail,
merci de remplir le coupon-réponse ci-joint et de le retourner à :

Should you wish to receive copies of the CEPII's Working papers,
just fill the reply card and return it to:

Sylvie HURION – Publications
CEPII – 9, rue Georges-Pitard – 75740 Paris – Fax : (33) 1.53.68.55.04

M./Mme / Mr./Mrs .....

Nom-Prénom / Name-First name .....

Titre / Title .....

Service / Department.....

Organisme / Organisation .....

Adresse / Address.....

Ville & CP / City & post code.....
Pays / Country.....Tél.....

Désire recevoir les **Document de travail** du CEPII n° :

*Wish to receive the **CEPII's Working Papers No**:*.....

.....

.....

.....

.....

.....

.....

.....

.....

☐ Souhaite être placé sur la liste de diffusion permanente (**pour les bibliothèques**)
*Wish to be placed on the standing mailing list **(for Libraries)**.*