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Trade and Technology Transfers: a Comparative Study of Turkey, India and China

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SUMMARY

This paper pursues previous CEPII research analyzing the relationships between openness, international specialization and economic growth. Over the last two decades, China, India and Turkey have adopted policies aimed at opening up their economies to international trade, with each country facing different regional environment. Ten years ago, the patterns of industrial specialization of the three countries were still relatively similar. Since the early 1990s, they have diverged as each country has followed a different path of integration in the international division of labor.

The CEPII's research has amply shown that the nature of specialization matters for economic growth and that the adaptation of a country's exports to international demand plays an important part in catch-up processes. Studies have also put stressed the gains associated with imports of intermediate products when these products have a strong technology content and significant productivity potential.

The present study provides evidence that China, India and Turkey have developed their foreign trade at different paces, and that their patterns of industrial specialization have followed different paths. Based on a breakdown of trade flows by technology level and by production stage, the paper highlights the following characteristics of their integration in the world economy:

- China has become an assembly country, strongly integrated in the international segmentation of production processes in Asia. Most of China's imports of high technology products are parts and components. These high-tech imports are predominantly incorporated into the production of exports and not used to modernize domestic production capacities. Given its level of development, China's exports display an outstandingly strong content of high technology.

- By contrast, Turkey's high-tech imports consist mainly of capital goods, and correspond to a classical form of technology transfer, aimed at upgrading indigenous industrial capacities. Turkey's foreign trade is strongly structured by its traditional complementarities with Europe.

- India is characterized by a limited participation in the international division of production processes and by a low level of imports in high-tech products. These high-tech imports are evenly distributed among the different stages of production and the different sectors, while high-tech exports are concentrated in chemical industries. Geography matters, and India is located in a regional economic environment which has not stimulated its opening up to international trade.

The opening up of the three economies has been accompanied by structural changes in their domestic industrial output. Interestingly, in the three countries a shift occurred away from textiles, towards electrical and electronic goods in China and Turkey and towards chemical industries in India.

The case of these countries suggests that there are no direct link between the degree of economic openness and growth: Turkey is the most open economy according to most indicators, but it is also the country which has had the slowest economic growth over the last twenty years. China, which has followed selective trade liberalization, has recorded the highest rate of economic growth. The Indian economy is still relatively closed but since the mid-nineties has outpaced the growth rates of most Asian economies (besides China).

ABSTRACT

This study addresses the case of three emerging countries which have followed opening up policies in different regional environments. Ten years ago, the specialization patterns of China, India and Turkey were similar but they have diverged since. Their participation in the international division of labor has far-reaching effects on their imports of high-technology. China is an assembly country for Asian firms and most of its high-tech imports consist of parts and components. Turkey's foreign trade structure reflects traditional complementarities with Europe and its technology transfers are incorporated in capital goods. India's foreign trade is geographically balanced, and its import structure conveys limited technology transfer.

Keywords: China, India, Turkey, trade policy, economic integration, specialization, international production sharing, technology transfer

JEL Classification: F13, F14, F15, 057

INSERTION INTERNATIONALE ET TRANSFERT DE TECHNOLOGIES : LES CAS COMPARÉS DE LA TURQUIE, DE L'INDE ET DE LA CHINE

RÉSUMÉ

Cette étude s'inscrit dans la tradition des travaux du CEPII sur les liens entre l'ouverture, la spécialisation internationale et la croissance économique. La Chine, l'Inde et la Turquie ont depuis vingt ans mené des politiques d'ouverture aux échanges internationaux dans des environnements régionaux différents. Il y a une décennie, les structures sectorielles de spécialisation internationale des trois pays étaient fortement similaires. Depuis, il s'est produit une divergence significative entre la Chine et les deux autres pays, qui apparaît liée à des différences dans leur participation à la division internationale du travail et dans leur mode d'acquisition technologique :

- La Chine, est devenue un pays d'assemblage, fortement inséré dans la segmentation internationale des processus productifs en Asie ; elle importe la majeure partie des produits de haute technologie (HT) sous forme de pièces et composants. Ses importations de HT ne servent pas principalement à la modernisation de ses capacités de production, mais sont incorporées dans des production destinées en grande partie à l'exportation. Les exportations chinoises ont ainsi un contenu en haute technologie exceptionnellement élevé pour un pays de ce niveau de développement.

- Au contraire, les importations de HT par la Turquie sont en majorité des biens d'équipement, et correspondent donc à une forme classique de transferts de technologies, visant à la modernisation des capacités de production industrielle. Les complémentarités traditionnelles qui structurent les échanges extérieurs de la Turquie correspondent à des échanges fortement centrés sur l'Europe.

- L'Inde se distingue par une participation très limitée à la division internationale des processus productifs et de faibles importations de produits de haute technologie. Celles-ci se répartissent assez également entre stades de production et entre secteurs, alors que les exportations de haute technologie se concentrent dans le secteur chimique. Par sa situation géographique, l'Inde se trouve relativement éloignée des grands pôles du commerce mondial et son ouverture au commerce international ne bénéficie donc pas d'une insertion régionale forte.

L'ouverture de ces économies s'est accompagnée de changements dans la structure de leurs productions manufacturières. On observe un recul relatif du secteur textile dans les trois pays, une avancée des industries électriques et électroniques en Chine et en Turquie, et de l'industrie chimique en Inde.

Dans le cas spécifique de ces trois pays on constate qu'il n'y a pas eu de coïncidence entre le degré d'ouverture économique et la croissance depuis vingt ans: la Turquie est l'économie la plus ouverte selon la plupart des indicateurs et c'est aussi celle dont le PIB a progressé le moins vite au cours de cette période ; la Chine qui a mené une politique de

libéralisation commerciale sélective a enregistré une croissance record. L'économie indienne demeure relativement fermée mais a maintenu depuis le milieu des années quatre-vingt-dix un rythme de croissance supérieur à celui de la plupart des économies asiatiques (après la Chine).

RÉSUMÉ COURT

Cette étude de cas illustre les différences de parcours entre trois pays émergents qui ont mené des politiques d'ouverture dans des environnements régionaux différents. Initialement similaires, les spécialisations de la Chine, de l'Inde et de la Turquie ont divergé depuis dix ans. Leur participation à la division internationale du travail joue un rôle déterminant dans leurs modes d'acquisition de technologies. La Chine est un pays d'assemblage pour les firmes asiatiques et importe des hautes technologies sous forme de pièces et composants. Les échanges de la Turquie sont structurés par des complémentarités traditionnelles avec l'Europe et des importations de technologie sous forme de biens d'investissement. L'Inde se distingue par l'absence de polarisation géographique de ses échanges, et par une structure d'importations peu porteuse de haute technologie.

Mots-clefs : Chine, Inde, Turquie, politique commerciale, intégration économique, spécialisation, division internationale des processus productifs, transferts de technologie

Classification JEL : F13, F14, F15, 057

TRADE AND TECHNOLOGY TRANSFERS: A COMPARATIVE STUDY OF TURKEY, INDIA AND CHINA

Françoise Lemoine and Deniz Ünal-Kesenci [1]

INTRODUCTION

The successive waves of new industrialized economies in Asia ("dragons" and "tigers") have raised the question of the relationship between economic opening and growth. These countries, which have rapidly increased their share in world trade, are also among the small number of countries which have entered a catching up process and totally or partly filled their income gap compared to the group rich countries. This study analyzes the pattern of international integration of three emergent countries: China, Turkey and India. It shows that their manufacturing specializations which were very similar only one decade ago, have noticeably diverged since.

Traditional theories of international trade show that opening up is a source of economic gains for a country, if it specializes according to its comparative advantages. The neo-technological theory and more recently the new theories of international trade have taken into account the nature of specialization and its dynamics, and have thus shown that specialization is not a neutral process. When a country has a comparative disadvantage in sectors which are driving economic growth (due to their technological content or demand effects), it risks to lag behind its competitors.

There are relatively few empirical studies analyzing the effect of specialization on economic growth. Young (1991) considers that certain specializations are more favorable to growth than others since they promote trade of products having a strong potential of *learning by doing*. In the same way, Grossman and Helpman (1991) stress the importance of quality level or high technology content of traded products. Busson and Villa (1997) show that the opening up of an economy contributes to growth in two cases: first, when the country succeeds in taking strong positions in sectors where the world demand is dynamic. This *inter*-branch trade specialization promotes growth and later, as the country's level of economic development raises, it will lead to an increase in *intra*-branch trade. Second, when a country develops *intra*-branch trade, because this provides more diversified intermediate and capital goods, which is favorable to total productivity and technological transfer. Lastly, other studies argued that specialization in sectors in which international demand is strong contributes to accelerate growth (Lafay, 1979; Bensidoun and Ünal-Kesenci 1998; Bensidoun, *et alii*, 2001).

An appropriate specialization is a factor of economic growth in developing countries. The evolution of specialization of developing countries depends on technological changes

[1] Françoise Lemoine is senior economist (f.lemoine@cepii.fr) and Deniz Ünal-Kesenci is economist (d.unal.kesenci@cepii.fr) at CEPII.

which take place in industries at a world level. The product cycle theory (Vernon) shows how the life cycle of a product determines the localization of its production. The production of a new product requires large R&D expenditure, and is located in developed countries. As the product becomes mature, the inputs necessary for its production change. In the phase of standardized production, it requires mainly unqualified labor and it tends to move into countries which have large endowments in low-cost labor.

The dynamic of developing countries' specialization depends also on the international division of production processes (IDPP, see Lassudrie-Duchêne, 1985). International production sharing has intensified with the globalization process, *i.e.* the reorganization of production on a worldwide basis. As production processes have become internationally fragmented, firms located in different countries take part in the production of a commodity but at different stages of the value-added chain. The different stages of production correspond to different functions of production. Developing countries can rapidly diversify their exports of manufactured products if they specialize in the stages of production in which they have a comparative advantage. This vertical division of labor leads to an increased weight of intermediate products in world trade. Imports of intermediate goods are a source of efficiency as the producer can benefit from a larger variety of inputs. Differentiated intermediate products increase the number of productive combinations and improve the entire production process. Theoretical and empirical analyses suggest that trade in intermediate goods is an important channel of technology transfer and plays a major role in economic catching-up (Coe and Helpman, 1995; Coe, *et alii*, 1995; Keller, 2001).

Participation in the IDPP also makes it possible for developing countries to improve the technological level of their exports (by incorporating imported high-tech products). However, the technological level of these exports can rise under the sole effect of their import content, while the country remains confined in stages of production intensive in low qualified labor (UNCTAD, 2002). The effect on growth of imported technologies depends on the capacity of the country to assimilate and disseminate them.

This study presents a comparison between China, India and Turkey. It first examines their respective levels of openness (section 1). Then it shows how the evolution of their sectoral specialization during the last ten years has been determined by their involvement in the international division of production processes (section 2). The decomposition of their trade flows by stages of production makes it possible to analyze and compare their respective positions in the value-added chain of different products. Section 3 analyzes the role of foreign trade in the acquisition of high technology, which is one of the conditions of long-term growth and international competitiveness. In this section, we use a product classification by technological content, and we analyze trade in high-tech products. We identify the sectors and the stages of production, which are the main channels for technology transfers and the countries/regions which are the major suppliers of high technologies to these three countries. Lastly, section 4 shows the changes in the structure of industrial production and employment which have accompanied the opening up of these economies.

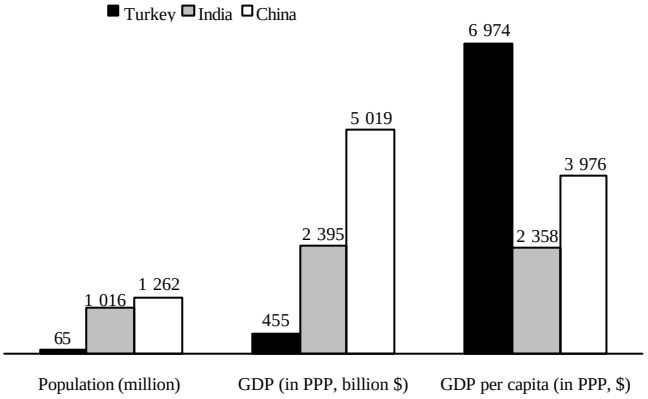
1. SIMILAR OPENING PROCESSES, DIFFERENT OUTCOME

1.1 Degree of Openness

China, India and Turkey present similarities and differences which are reflected in the pattern of their international trade.

China and India are demographic giants, with respectively 21% and 17% of the world population in 2000 (figure 1). The population of Turkey is definitely smaller (1% of the world population), but still quite big for an European country. Having vast domestic markets, the three countries have followed inward-looking development strategies for a long period before they decided to open up.

Figure 1. Size of the Domestic Markets, 2000



Source: World Bank-World Development Report, 2000-2001.

For about twenty years China, India and Turkey have pursued opening up economic policies: they have lowered their customs duties, their non tariff barriers, and have authorized foreign direct investment. These processes of opening up has been accompanied by domestic economic liberalization, and resulted in an accelerated growth. The three countries have recorded a fast rise of their foreign trade as well as of foreign direct investment inflows.

In China as well as in Turkey, economic opening has led to a strong rise of foreign trade with developed neighbor countries; by contrast, due to geography, India, has not taken part in any successful regional integration process. This contrast highlights how regional integration influences specialization pattern and the opening up processes.

The three countries differ by their income levels (figure 1). China and India have an income per capita (in PPP) which is respectively one half and one third of Turkey's income. To what extent their specialization patterns and the technological content of their trade

flows reflect these differences in their levels of development is discussed below. In the three countries, most of the manufacturing sector has been opened to foreign direct investment (FDI), but this opening has been selective, and limitations has been imposed on foreign participation in certain industries. FDI flows in China have been huge, but an important proportion (half) of capital inflows is coming from Hong-Kong (which funnels funds from the mainland). In spite of this statistical uncertainty, China's territory appears definitely more attractive for foreign investors than Turkey and India: in 2000 the stock of FDI amounted to 33,3% of GDP in China against only 12% in Turkey and 4,6% in India (table 1) The figures provided by OECD investing countries, which are subject to less inconsistencies, confirm the attractiveness of China[2].

Table 1. Foreign direct investment, 2001 (%)

	FDI stock / GDP	FDI flows / GFCF
China	33.2	10.5
India	4.6	3.2
Turkey	11.9	12.4

Source : UNCTAD, WIR 2003.

There are several methods to evaluate the degree of trade openness. Table 2 presents three indicators of openness. The results of the three measures coincide. In the nineties, Turkey appears to be the most open of the three countries. Actually it is also the country, which has liberalized the access to its domestic market the most rapidly since 1980. China comes next, while India comes in the last position. The openness of the Turkish economy and the progress of its trade liberalization stem from its entry into a custom union with the EU in 1996 (for manufactured goods).

When openness is measured according to the weight of foreign trade in the economy, then the “exports/GDP” ratio is definitely higher in China than that in the two other countries: 23% in 2000, against 14% for Turkey and 9% for India (figure 2). This gap is partly explained by differences in production structures: the size of the industrial sector in India and Turkey is relatively small compared to that of agriculture and services which generate less foreign trade. The ratio “manufactured exports/ manufacturing value added” reduce the differences in the degrees of openness of the three countries. The Indian industry is the least export-oriented. By contrast, exports account for 66% of the manufacturing value added in Turkey.

[2] In 2000, the stock of FDI originated from OECD countries amounts to 32 billion dollars in China against 8 billion in India and 7 billion in Turkey (see table 4).

Table 2. Three Measures of Trade Liberalization

	Freedom to Trade (1)		Trade Discrimination (2)		MAcMaps (3)
	2001	Variat. 2001-80	1997	Variation 1997-80	2001
Turkey	7.2	+3.5	37.4	-27.4	7.0%
China	7.0	+3.2	49.7	-24.5	18.3%
India	5.7	+1.5	50.7	-14.2	25.8%

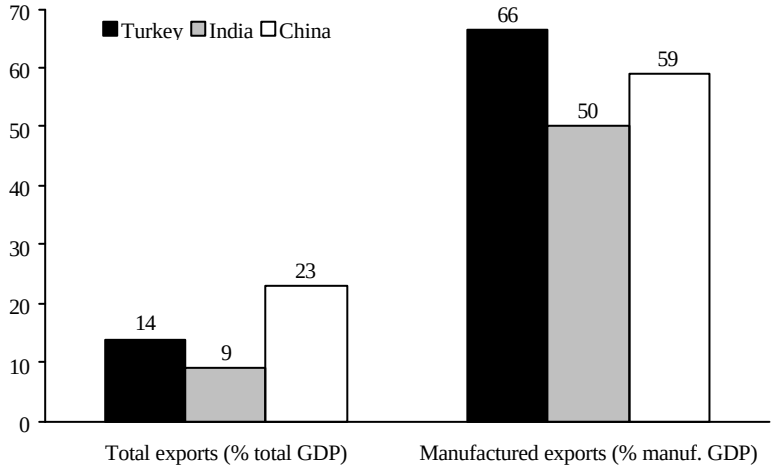
(1) Based on an econometric analysis, Freedom to Trade with Foreigners of Fraser Institute ranks the countries (with scores varying between 0 and 10) according to several criteria: average rates of customs tariff, tariff' standard deviation, weight of the incomes from the taxes on imports, difference between the black market and official exchange rates, restrictions imposed to citizens engaged in capital transactions with foreigners, observed foreign trade size compared to its estimated size. The indicator varies between 0 (completely closed economy) and 10 (completely open).

(2) The indicator of trade discrimination of the CEPII estimates the distortions in the geographical distribution of imports which reveals the restrictive character of the trade policy (tariff and non tariff barriers), and more largely access difficulties to a given market. The indicator varies between 0 (null discrimination) and 100 (total discrimination).

(3) Developed by the CEPII and the International Trade Center (Geneva), MAcMaps synthesizes the information on the major protection instruments (*ad valorem* and specific tariffs, anti-dumping duties, tariff quotas, standards) at the most detailed level (tariff headings) and by taking into account all the preferential treatments. The MAcMaps results presented in this table correspond to the average rates of protection for each country. The higher this rate is, the more is the protection level.

Source : Gwartney, Lawson *et alii* (2002) ; G. Gaulier (2001) ; Bouët *et alii* (2001).

Figure 2. Share of Exports in Production, 2000

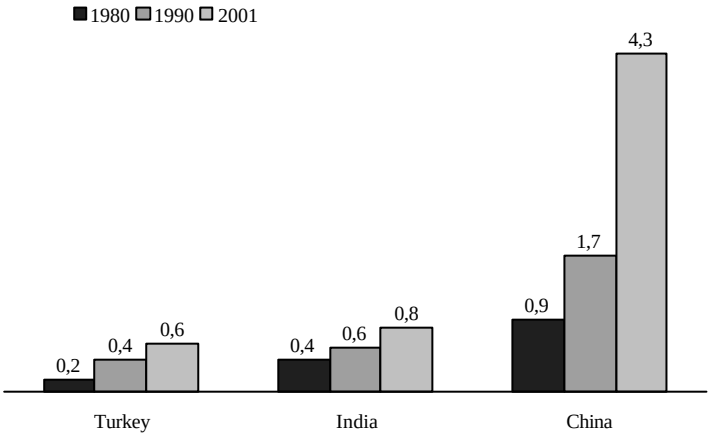


Source: World Bank-WDI, national statistical sources, authors' calculations.

1.2 Trends in Foreign Trade

In the three countries, the opening up policy has led to an acceleration of foreign trade, which has enlarged their share in world trade (figure 3). This acceleration was particularly marked in the case of China, whose share in world trade quadrupled in twenty years (from 0,9% to 4,3%), but also in the case of Turkey, whose weight tripled (from 0,2% to 0,6%). The progression was less important in the case of India (from 0,4% to 0,8%).

Figure 3. Share in World Trade
(in % of exports and imports)



Source: CEPII-CHELEM data base.

Export growth was driven by the manufacturing sector (table 3). In the case of China and India, manufacturing exports recorded a growth rate which remained stable over two decades. However, Chinese exports increased at a rate twice higher than Indian exports. Turkish manufacturing exports recorded a very strong progression in the eighties, but slowed down in the nineties following the deep financial crises in 1994 and 2001.

Table 3. Growth of manufacturing exports
(in %, annual average)

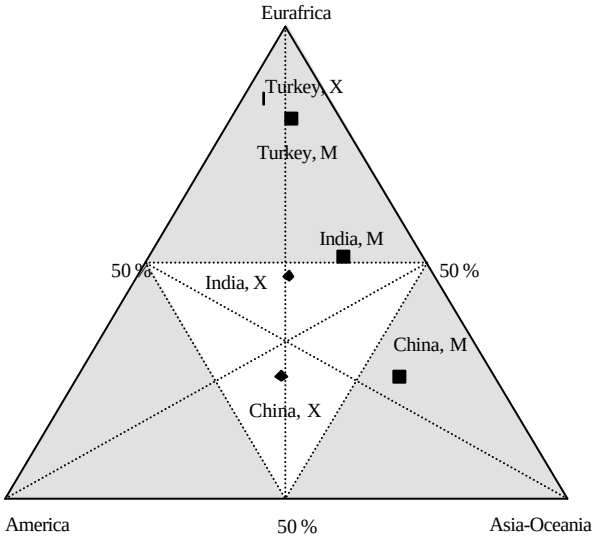
	1981-1991	1991-2001	1981-2001
China	18	17	18
Turkey	17	10	13
India	9	10	10
World	8	6	7

Note : Exports are in current US dollars. Manufacturing sector includes food products.

Source: CEPII-CHELEM data base, authors' calculations.

The integration of China and Turkey in world trade relies on a strong regional integration, which is not the case for India. Figure 4 presents the geographical distribution of exports and imports of the three countries according to three major regions: America, Eurafrica[3] and Asia-Oceania. In this triangular distribution, the closer a point is to one partner zone (summit), the heaviest is the weight of this partner zone in the corresponding country trade flows. Turkish exports and imports are highly concentrated on Eurafrica. In 2001, 85% of Turkish exports went to this area (58% to Western Europe) against only 12% to America and 4% to Asia-Oceania. The configuration is almost identical for imports.

Figure 4. Regional Breakdown of Trade Flows, 2001



Source: CEPII-CHELEM data base, authors' calculations.

The geographical breakdown of Chinese trade differs. China's imports come mainly from its neighbors, and 57% of its imports come from Asia-Oceania, against 26% from Eurafrica and 17% from America. On the other hand, China's exports are more evenly distributed across the three regions in 2001: 38% of its exports went to America, 36% to Asia-Oceania and 26% to Eurafrica. The asymmetry in China's export and import patterns reflects micro-economic strategies, as Asian firms (and in particular firms from Hong Kong and Taiwan) have used the mainland as a platform for exports to America and Europe.

The geographical polarization of trade flows is less pronounced in the case of India for which Asia (27% of exports and 35% of the imports) is as important as Western Europe (respectively 26% and 32%) and much more important than America (respectively 12% and 14%). Because of its geographical location between Europe and Asia, India is apart from the regional integration processes going on in these areas. India is committed in a project

[3] Western and Eastern Europe and former Soviet Union, Africa and the Middle East.

of regional co-operation with countries of South Asia (SAARC[4]), which associates low income countries and in which trade liberalization has not made much progress. Whereas geographic proximity to dynamic partners plays an important part in the globalization[5] process, the opening up of India has not been benefited from a stimulating regional environment.

Geography matters also for foreign direct investment. The origin of FDI flows in China and Turkey confirms the importance of regional integration in the opening of the two countries. Table 4 records FDI coming only from OECD countries, it shows that the overwhelming share of investment in Turkey comes from European countries (66%) and the major part of FDI in China comes from Asian countries (41%), and this weight would be twice higher if FDI from Hong Kong and Taiwan were included. The geographical origin of FDI in India confirms its intermediate position: 59% of the stock of direct investment come from European OECD countries. The preponderance of European FDI in India is less strong than in Turkey, but twice stronger than in China.

Table 4. Breakdown of FDI stock from OECD countries, 2000

	China		India		Turkey	
	Billion $	%	Billion $	%	Billion $	%
Total OCDE	32.3	100	7.5	100	6.7	100
of which						
Asia-Oceania	13.3	41	1.6	22	0.9	14
NAFTA	10.1	31	1.4	19	1.4	21
Europe	8.9	28	4.4	59	4.4	66

Note: The Member States of OECD classified in Asia-Oceania are Japan, South Korea, Australia and New Zealand.

Source: OECD, statistical Directory of foreign direct investments, 2001.

1.3 Economic Growth and Catch-Up

Figure 5 presents the evolution of income per capita (in PPP, base 1995) in the three countries and in the rest of the world, compared to the average income of the group of rich countries. The latter is composed by countries whose income was higher than 8 000 dollars in 1980 and who remained "rich" during all the period[6]. The decline in the relative level of income in the "rest of the world" over the period shows that there was no catching-up for poor countries and that on the contrary the gap widened.

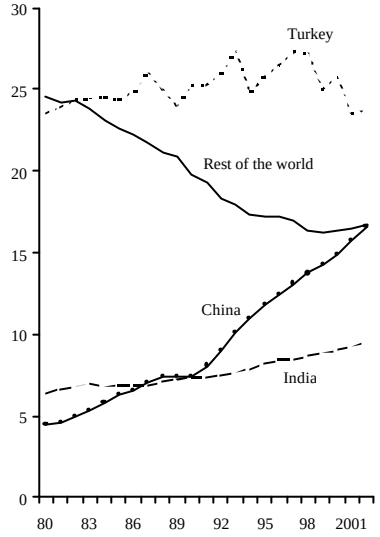
[4] South Asian Association for Regional Co-operation which gathers Bhutan, Bangladesh, India, Nepal, Pakistan and Sri Lanka.

[5] See Fontagné et alii (1996), Redding and Venables (2002).

[6] Threshold>11 000 $ in 2000.

The income growth of our three countries was faster than average. Indeed, Turkey, in spite of two deep financial crises, maintained the same income level compared to the rich countries (24% in 2002). India and China did better: they are among the developing countries which caught-up. The phenomenon is spectacular in China's case: the Chinese income per capita amounted to 17% of that of rich countries in 2002 against 4% in 1980. Catch-up was particularly fast in the nineties, and coincided with the acceleration of China's foreign trade. India also progressed, especially in the nineties: its income raised from 6% of that of rich countries in 1980, to 10% in 2002.

Figure 5. Evolution of GDP per Capita Relative to Rich Countries 1980-2002 (Group of rich countries = 100)



Note : The "Rest of the world" includes all countries excluding the group of "rich" countries, as well as Turkey, China and India.

Source: CEPII-CHELEM data base, authors' calculations.

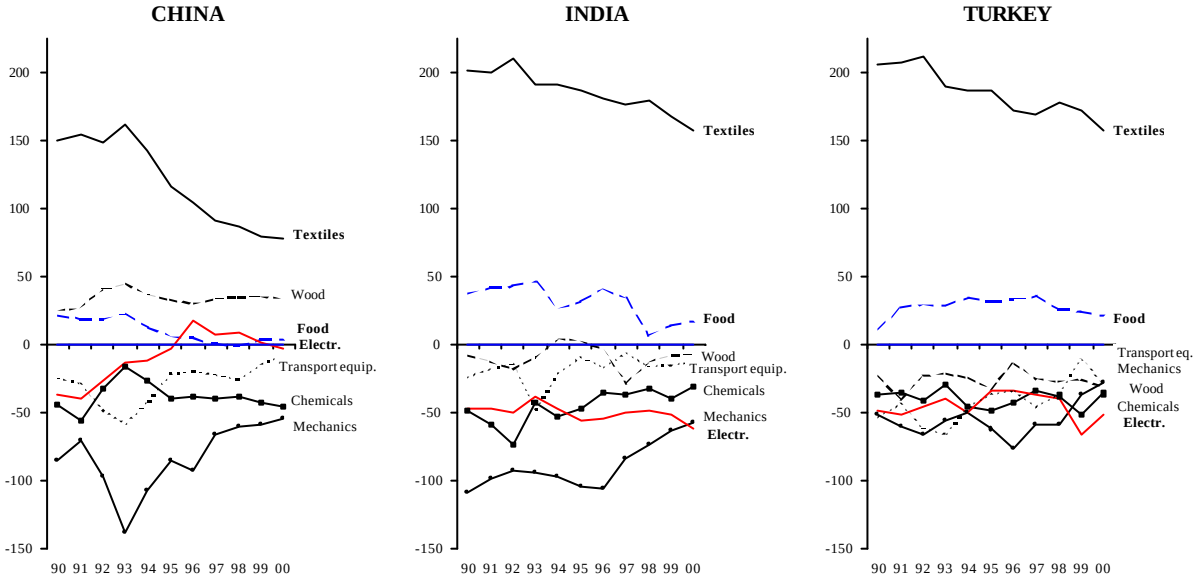
2. DIVERGING PATTERNS OF INTERNATIONAL INTEGRATION

2.1 Specialization Patterns

Industrial specializations of China, India and Turkey show important similarities. Appendix 3 presents for each country, the ten partners which have the most similar structures of comparative advantages and disadvantages. In 1999, for Turkey, India ranked second among the countries having the most similar industrial specialization, and China ranked 10th. For India, Turkey also ranked second and China ranked 6th. For China, Turkey and India ranked respectively seventh and eighth among the countries having the most similar specialization.

In 1999, the comparative advantages of the three countries were concentrated in textile consumption goods. India and Turkey had also strong points in food products. The comparative disadvantages of the three countries were located mainly in metallurgy, machinery and transport equipment (appendix 4).

Figure 6. Specialization in international trade by manufacturing branches



Note: International specialization is measured here by the indicator of contribution to trade balance of the CEPII (in thousands of manufacturing trade of the country, see appendix 2).

Source: CEPII-CHELEM data base, authors' calculations.

A decade ago, international specialization of China, India and Turkey were even more similar. During the nineties, Chinese specialization clearly moved away from that of the two other countries. China not only has reduced its large deficit in electric and electronic products (figure 6) but also acquired significant comparative advantages in consumer goods within this branch (appendix 4).

Electric and electronic products are those for which international trade increased the most rapidly during the last ten years: between 1990 and 2000, their weight in world trade rose from 15 to 21%. This rapid growth is explained not only by the final demand for this type of products but also by the acceleration of trade in intermediate goods: the production of these goods has relied more and more extensively on the international splitting-up of the value added chain and on the location of production segments in different countries (UNCTAD, 2002). The strengthening of China's position in international trade of electric and electronic goods is directly related to its participation in the international segmentation of the production processes.

2.2 Vertical *Versus* Horizontal Specialization

The analysis of foreign trade by branch and production stage makes it possible to define the position of a country in the international splitting-up of the value-added chain and to highlight the nature of its specialization. Indeed, different stages of production correspond to different functions of production. Along the production process of a given final good, a country may have comparative advantages in some stages of production, and comparative disadvantages in other stages. Two types of specialization can thus be distinguished: an "horizontal" specialization, when a country has a comparative advantage in the whole process of production of a given product, from upstream to downstream stages; a "vertical" specialization[7] when a country has a comparative advantage only in some stages of production, and a disadvantage in others. Vertical specialization reflects a country participation in the international segmentation of the production processes (Fontagné *et alii*, 1996). Trade in intermediate products[8], which results from the interruption of the domestic production processes, has taken on a growing importance, and assembly trade has become a crucial element in the international segmentation of production process. Late-comers generally specialize in the assembly of final products, the most labor-intensive segment of production, while more advanced countries supply capital- and technology-intensive intermediate goods.

The analysis by stage of production is carried out here only for manufactured trade flows.

China's and Turkey's *exports* differ from India's exports by the heavy weight of consumer goods (respectively 56% and 47% in 1999, table 5), and also by the higher share of capital goods. The importance of final goods is thus particularly marked in these two countries' exports (more than 60%). The two countries have also in common the importance of intermediate goods in their exports (respectively 33% and 36%), although the nature of these intermediate goods differ significantly: Turkey exports mainly semi-finished products, China exports a higher proportion of parts and components.

Indian exports of manufactured goods are evenly distributed between intermediate goods (especially of the semi-finished products) and final goods (especially consumer goods).

[7] Note that the notions "horizontal" and "vertical" have a different meaning when they refer to product differentiation: the former concerns similar products, *i.e.* different varieties, and the latter different qualities.

[8] The term "intermediate good" is used for any manufactured goods which are reintroduced into the production cycle and disappear during that cycle.

Table 5. Breakdown of manufactured trade flows by production stage, 1999

	in % of total exports			in % of total imports		
	China	Turkey	India	China	Turkey	India
Intermediate goods	**33**	**36**	**51**	**69**	**57**	**80**
Semi-finished pr.	*22*	*30*	*46*	*44*	*39*	*65*
Components	*11*	*7*	*5*	*25*	*17*	*15*
Final goods	**67**	**64**	**49**	**31**	**43**	**20**
Capital goods	*11*	*8*	*2*	*17*	*23*	*11*
Consumption goods	*56*	*56*	*47*	*14*	*20*	*9*

Note: The stages of production are classified according to nomenclature BEC of the United Nations (see appendix 1).

Source: United Nations – Comtrade data base, authors' calculations.

Intermediate goods have a predominant share in the three countries' *imports*. Chinese imports are characterized by the importance of parts and components. The weight of final goods in imports varies from 20% in India to 43% in Turkey. The share of capital goods is largest in Turkish imports (23%), and the smallest in Indian imports (9%).

India differs from the two other countries by the importance of trade in intermediate products, especially in semi-finished product.

The analysis of their comparative advantages by stage of production and branch shows that the three countries have very different degrees of involvement in international production sharing. India has developed a vertical specialization (reversal of comparative advantages along the product chain) in only five manufacturing branches (out of a total of 23); Turkey has engaged in a vertical specialization in 9 sectors, whereas China displays a vertical specialization in a majority of sectors (14 out of 23, see appendix 5).

In the sectors where they have developed a vertical specialization, the countries generally record structural deficits in intermediate stages of production (or in primary goods) associated with structural surpluses in final products (generally consumer goods). Generally, surpluses in downstream stages more than compensate deficits in upstream stages: vertical specialization thus contributes positively to their trade balances. This type of specialization has enabled China to acquire strong positions on the international market of new technological final products (office equipment, telecommunications, electronics).

The pattern of comparative advantages of a country vis-à-vis the world may mask different specialization patterns in its bilateral trade flows. In some sectors, it may have a vertical specialization with some partners, which does not show in its overall trade. Conversely, in other cases, overall trade may show a vertical specialization, which results from opposite horizontal specialization with different partners (comparative advantages along the whole chain of production with some partners and comparative disadvantages with others). A country participation in the IDPP may have a strong regional dimension.

China's strong integration in the IDPP results from production sharing first with Asian countries, and mainly with Japan; second with the United States, and more rarely with European countries. Turkey has developed a vertical division of labor first with its European neighbors, second with the former-USSR. India has a vertical specialization either with countries of Asia-Oceania, or with European countries, and more rarely with the United States.

The nature of specialization and regional integration thus closely dependent. Thanks to its insertion in Asian production networks, China has developed comparative advantages in electric and electronic industry where there is a strong world demand. This fact explains an important part of China's progression in world markets (Lemoine and Ünal-Kesenci, 2001). Moreover, these sectors are characterized by a high technological level and large potential productivity gains.

3. TRADE IN HIGH-TECH PRODUCTS

Imports of foreign technologies is an important instrument of economic catch-up for emerging countries. Importing foreign technologies helps saving domestic resources (as long as the cost of the imports is lower than the cost of corresponding domestic R&D) and accelerating the development process, as imported advanced technologies improve productivity.

3.1 International Labor Sharing and Trade in High-Tech Products

The level of economic development of China, India and Turkey explains the fact that they all are net importers of high-tech (HT) products. In 1997-1999, Chinese deficit in high-tech products amounted to 6 billion dollars per year, and corresponded to 15% of its total trade surplus; Turkish deficit in high-tech products reached $ 4 billion and contributes for 22% to its total trade deficit; Indian deficit of HT products of $0,6 billion contributed for 10% to its total trade deficit.

By the end of the nineties, China trade had the largest content in high-tech goods (14% of imports and 8% of exports, see tables 6 and 7). Turkey was not far behind as far as imports were concerned (10% of its imports were high-tech), but the technological content of its exports were very low (2%). The weight of high-tech products in Indian imports was only 5% (4% in exports).

Table 6. Share of high-tech products in imports by production stage (in %, 1997-1999 average)

	China			India			Turkey		
	High-tech	Other	Total	High-tech	Other	Total	High-tech	Other	Total
Primary products	0	13	13	0	28	28	0	18	18
Semi-finished prod.	1	40	40	1	47	48	2	31	33
Parts & components	8	12	20	2	7	9	2	11	14
Capital goods	5	10	16	2	6	8	5	15	20
Consumption goods	0	10	11	0	7	7	1	15	15
Total	14	86	100	5	95	100	10	90	100

Source : United Nations – Comtrade data base, authors' calculations.

Table 7. Share of high-tech products in exports by production stage (in %, 1997-1999 average)

	China			India			Turkey		
	High-tech	Other	Total	High-tech	Other	Total	High-tech	Other	Total
Primary products	0	5	5	0	6	6	0	8	8
Semi-finished prod.	1	21	23	2	40	43	0	27	27
Parts & components	3	6	9	0	4	4	1	5	5
Capital goods	3	7	9	0	2	3	1	4	5
Consumption goods	0	53	54	1	43	44	0	54	54
Total	8	92	100	4	96	100	2	98	100

Source : United Nations – Comtrade data base, authors' calculations.

The importance of high-tech products in China's trade is directly related to production sharing with Asia: China is the assembly country in this area. The major part of its high-tech imports are parts and components (57%, see table 8). Thus the major part of imported high-tech goods is not aimed at the modernization of Chinese production structures, but are reincorporated in production processes. The large share of high technology in Chinese exports comes from their content in high-tech components imported from advanced countries. Exports and imports of high technologies are concentrated in the same sectors: telecommunication and computer equipment represent almost two thirds of Chinese imports and exports of high technology (appendix 6, table A). China's trade in high-tech products is largely disconnected from domestic-based production activity and most assembly operations are carried out by foreign affiliates established in China (Lemoine and Ünal-Kesenci, 2002).

Table 8. Breakdown of trade in high-tech products by production stage (in %, 1997-1999 average)

	China		India		Turkey	
	Imports	Exports	Imports	Exports	Imports	Exports
Semi-finished prod.	6	19	22	63	20	14
Parts & components	57	42	38	13	22	25
Capital goods	37	33	38	9	52	56
Consumption goods	1	5	2	15	5	5
Total HT	100	100	100	100	100	100

Source : United Nations – Comtrade data base, authors' calculations.

By contrast, Turkey's imports of high technology consist mainly in capital goods of (52%), and correspond to a traditional form of technology transfer, aimed at the modernization of industrial capacities. Telecommunication equipment constitutes the most significant part of imports of high technology (30%) followed by chemicals (22%). The structure of exports of high technology is quite different from that of imports, indicating that imported technology is more directed to domestic use than to export manufacturing[9].

India is an intermediate position with a more balanced distribution of high tech imports by stage of production: 38% are components, 38% capital goods, and 22% semi-finished goods. At the branch level, Indian *imports* of HT are distributed between chemicals, office equipment, telecommunication equipment and precision instruments. HT *exports* are heavily concentrated in chemicals (78%), reflecting the performance of Indian pharmaceutical industry. This industry is based on powerful local firms with strong assimilation capacities of foreign technologies (generic drugs).

This comparison highlights the important impact of international production sharing on the size and the nature of high-tech flows. The different channels for high-tech imports may have different impacts on economic growth. Which channel is the most favorable to technological catch-up: intermediate product imported to be incorporated in exports, or capital good imports intended to modernize the domestic productive structures? The question remains open, as the analysis which attempted to measure the impact of technology transfers through international trade have not focused on the distinction between these two channels.

3.2 Direction of Trade in High-Tech Products

The geographical distribution of high-tech imports of the three countries follows that of their total imports. Chinese and Turkish high-tech imports come mainly from Asia and Europe respectively, while Indian imports of HT are distributed in a balanced way between

[9] There are of course some exports of HT in chemicals and telecommunication equipment but the most important item is the "other transport equipment" (motor vehicles excluded): 54%, for the average 1997-99. These exports concern the products of the aircraft industry. Thanks to an American technology transfer, Turkey produces fighter planes.

Asia, Europe and America (appendix 6, table B.1). On the export side, the United States is the first market for Chinese high-tech products, ahead of Japan and the European Union; for India and for Turkey, the European Union represents the major market (appendix 6, table C.1).

It is to be noted that in Asia, the "dragons" taken together tend to catch up with Japan as supplier of HT to the three countries. Western Europe (UE) is with Japan the principal supplier of technology to China but is by far the first supplier of HT to India as to Turkey.

Trade in high-tech products does not seem to be sensitive to transport costs. The three countries purchase relatively more high-tech products from partners located far away than from their own region (appendix 6, table B.2). Actually, China imports relatively more high-tech products from Europe (a fifth of the European products imported by China are HT goods). For India, as for Turkey, imports from America show the most important high-tech content: the share of high-tech products in their imports from America is twice higher than in their whole imports. Thus, trade with geographically close countries is not the most intensive in high-technology; proximity facilitates "ordinary" imports more than HT imports.

The analysis of trade flows by production stages reveals that European and Asian supplies of high tech goods are different (table 9). Most European exports of high technology consist of capital goods (from 40 to 70% according to countries). By contrast, Asia exports of HT goods consist mainly of parts and components. There is a relation between the importance of Asia as supplier of HT components and the importance of parts and components as vector of HT imports. International production sharing is associated with transfers of HT through components.

In the case of Turkey, this type of technology transfers plays a marginal role. For Turkey, Europe is the main source of high technology. Technological transfer takes place mainly through imports of European capital goods: they make up 34% of the Turkish HT imports, much more than American capital goods (12%).

India stays in a median position: HT imports consist first of parts and components coming from Asia (18%), followed by capital goods from Western Europe. It is to be noted that imports of HT coming from Europe include an important share of parts and components, suggesting that European firms tend to develop production units in India.

Table 9. Composition of high-tech imports by stage of production and origin (in %, 1997-1999 average)

China					
	Semi-finished	Components	Capital	Consump.	Total
Asia-Oceania	4	42	9	0	55
Western Europe	1	6	16	0	23
Western Europe Periphery	0	1	1	0	2
America	1	8	11	0	20
World	6	57	37	1	100
India					
	Semi-finished	Components	Capital	Consump.	Total
Asia-Oceania	9	18	13	0	40
Western Europe	9	10	14	1	34
Western Europe Periphery	1	0	1	0	2
America	3	10	11	0	24
World	22	38	38	2	100
Turkey					
	Semi-finished	Components	Capital	Consump.	Total
Asia-Oceania	4	4	5	0	13
Western Europe	14	12	34	4	64
Western Europe Periphery	0	0	0	0	1
America	2	6	12	1	21
World	21	22	52	5	100

Source: United Nations – Comtrade data base, authors' calculations.

4. CHANGES IN PRODUCTION STRUCTURES

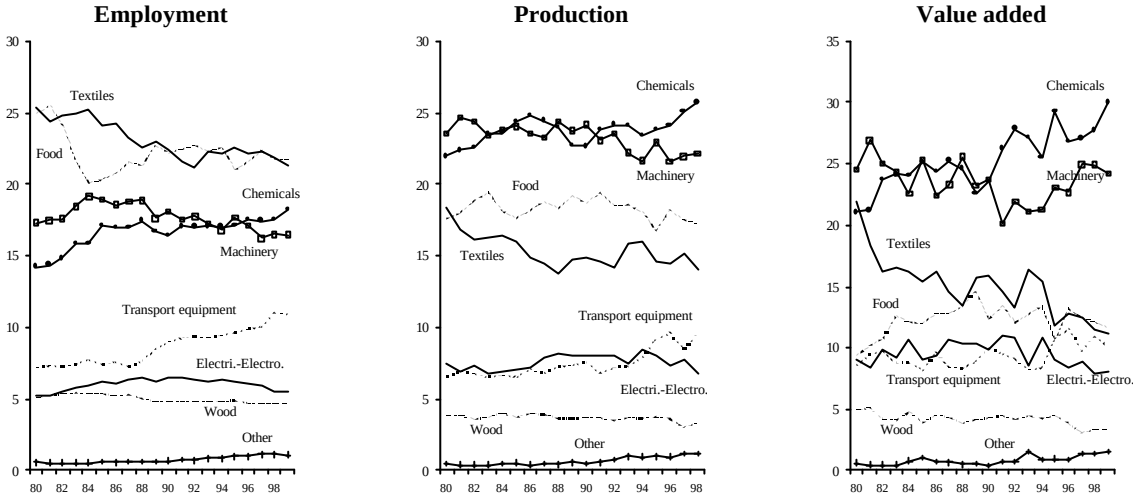
An important question is in to what extent the opening up of the three countries has been accompanied by a reallocation of domestic resources and a reorganization of production structures?

Since the early eighties, trends in employment and output by manufacturing branches have been quite different in the three countries.

In India, the share of textile in manufacturing employment has noticeably decreased (figure 7). Employment in downstream stages (clothing) has actually grown but the increase has been more than compensated by a drop in upstream stages of production process (fibbers and fabrics). The relative decline of textiles is even more important in production and value added. By contrast, the share of chemicals has increased in Indian manufacturing output and value-added. Chemical industry has become the most important manufacturing branch. As chemical industry is the main recipient of imported high technology, and by far the principal exporter of high-tech products, the strengthening of its position in production and employment reflects a qualitative improvement of Indian industry. This reorganization of domestic production contrasts however with the relative inertia of Indian international specialization which remains mainly concentrated on textiles (see section 2.1 as well as Chauvin and Lemoine, 2003). The changes in manufacturing

structures appear more marked than those observed in Indian foreign trade structures. This disconnection highlights the major importance of the domestic market.

Figure 7. India, evolution of production structures by manufacturing branch

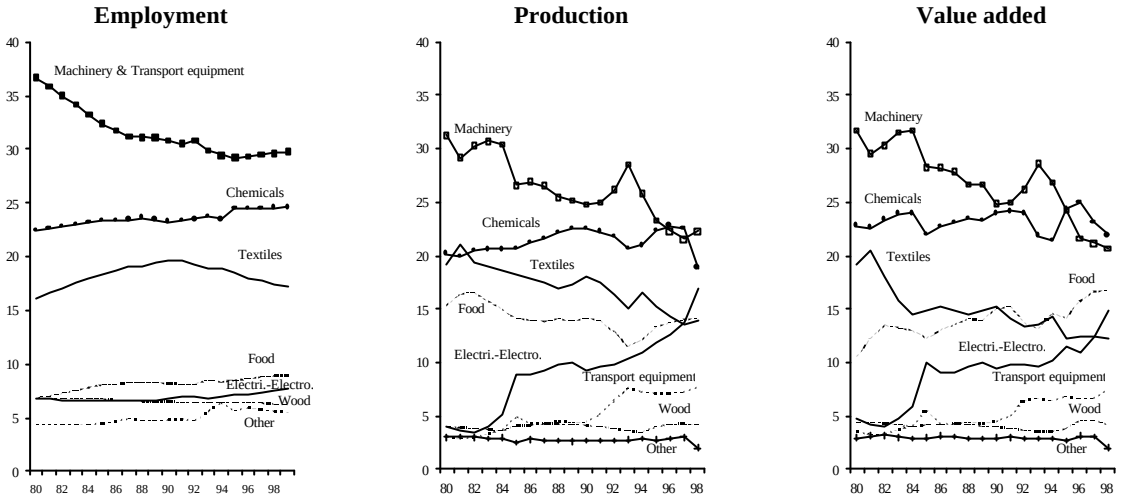


Note: The output and added value are expressed in national currency at current prices.

Source: ONUDI.

In China, textile industry kept its share in industrial employment but its share of manufacturing production and value added declined (figure 8). On the other hand, electrical and electronic industry has taken the lead in output and employment. It is now the third industrial branch of Chinese manufacturing with more than 15% of output (less than 5% in 1980). This progression has been largely supported by firms with foreign capital who are responsible for half of its value added in 1999. This explains that this branch ranks first for trade in high-tech products (both imports and exports). Electric and electronic industries emerged in the nineties as source of new comparative advantages of China international trade (see section 2.1 as well as Lemoine and Ünal-Kesenci, 2002). The structural changes in manufacturing employment and output thus appear, like foreign trade, very dependent on foreign capital and technologies.

Figure 8. China, evolution of production structures by manufacturing branch

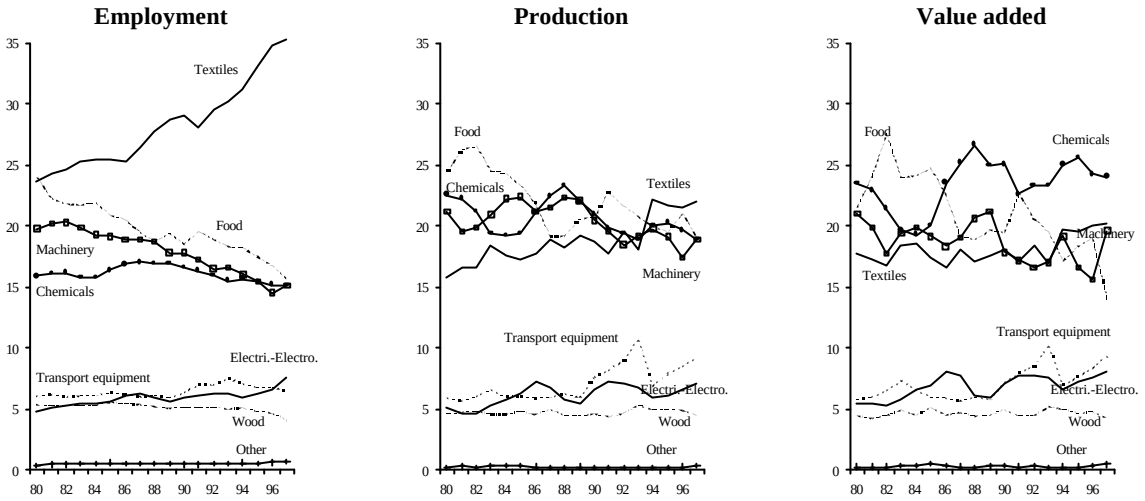


Note: The output and added value are expressed in national currency at current prices.

Source: ONUDI, Szirmai *et alii*, 2002.

Turkey differs from the other two countries by the growing role of textile industry (see figure 9): this branch has enlarged its share in manufacturing employment and production. In consequence, labor productivity in this sector declined and wages remained very low (Chevallier and Ünal-Kesenci, 2001). However the structure of the value added has shifted in favor of three other sectors: chemical industry which has become the major branch in manufacturing value added, electric-electronics branch and transport equipment. These three branches benefited also from high technology imports. In the case of Turkey, the structural changes in value added tended to diverge from those observed in employment, and this in the long run may have a negative impact on the country's economic catch-up.

Figure 9. Turkey, evolution of production structures by manufacturing branch



Note: The production is the added value are expressed in national currency at current prices.

Source: SIS.

CONCLUSION

This study of the integration of three emerging economies in international trade during twenty last years shows that, starting from rather similar initial situations, their profiles of specialization have diverged.

China developed its foreign trade very quickly thanks to a vertical specialization which enabled it to acquire comparative advantages in new products characterized by a dynamic international demand and significant high technology content (electric and electronics). Turkey and India kept their traditional specialization (textile sector).

The regional environment plays an important role in opening processes. China became a country of assembly of the parts and components supplied by the Asian industrialized countries. Turkish trade is structured by its integration in the European region: it has traditional complementarities with industrialized European countries and technology transfers take place mainly through capital good imports. Lastly, the geographic location of India may explain at least partially that its opening up has lagged behind.

The case of these three countries suggests that there is no systematic coincidence between opening-up and growth: Turkey is the most open economy and its GDP growth was the slowest over this period. China which followed a very selective trade policy, recorded the strongest growth rates.

China recorded the best performance in terms of GDP growth, foreign trade expansion, technological level of exports. Its case illustrates the benefits of a vertical specialization based on assembly activities but it involves also the risk of a durable dichotomy between outward-oriented industries and the rest of the economy (Lemoine and Ünal-Kesenci, 2002).

Finally, the structures of production in these three countries are characterized by the shift away from textile industry towards electric and electronics in China and Turkey, chemical industry in India.

REFERENCES

BENSIDOUN I. et D. ÜNAL-KESENCI (1998), "La concurrence internationale : vingt ans après, *La Lettre du CEPII*, N°171, septembre, www.cepii.fr.

BENSIDOUN I., G. GAULIER et D. ÜNAL-KESENCI (2001), "The Nature of Specialization Matters for Growth: an Empirical Investigation", *Document de travail CEPII*, n°13, décembre, www.cepii.fr.

BOND E.W. (2001), "Commercial Policy in a Fragmented World", *The American Economic Review*, May.

BOUET A., L. FONTAGNÉ, M. MIMOUNI et X. PICHOT (2001), "Market Access Maps: A bilateral and Disaggregated Measure of Market Access", *Document de travail CEPII*, n°18, décembre.

BUSSON F. et P. VILLA (1997), « Croissance et spécialisation », *Revue Economique*, 1457-1483.

CHAUVIN S. et F. LEMOINE (2003), "India in the Worls Economy: Traditionnal Specializations and Technology Niches", CEPII Working paper, n°2003-09 August.

CHEVALLIER A. et D. ÜNAL-KESENCI (2001), « La productivité des industries méditerranéennes », *Document de travail CEPII*, n°16, décembre, www.cepii.fr.

UNCTAD (2002), *Trade and Development Report-2002*, Publication des Nations Unies.

UNCTAD, WIR (World Investment Report) (2002).

COE D.T. et E. HELPMAN (1995), "International R&D Spillovers", *European Economic Review*, 39, (5).

COE D.T., E. HELPMAN et A.W. HOFFMAISTER (1995), "North-South R&D Spillovers", *NBER Working Paper*, 5048.

FONTAGNÉ L. (1991), *Biens intermédiaires et division internationale du travail*, Economica, Paris.

FONTAGNÉ L., M. FREUDENBERG et D. ÜNAL-KESENCI (1996), "Statistical Analysis of EC Trade in Intermediate Products", *External Trade Series - Studies and Research*, 6D, Eurostat.

FONTAGNÉ L., M. FREUDENBERG et D. ÜNAL-KESENCI (1996), "Les échanges de biens intermédiaires de la Triade", *Economie Internationale*, n°65n, 1er trimestre.

FONTAGNÉ L., M. FREUDENBERG et D. ÜNAL-KESENCI (1999), "Trade in Technology and Quality Ladders: Where do EU Countries Stand?", *International Journal of Development Planning Literature*, Vol. 14, Number 4, October-December.

GAULIER G. (2001), "Discrimination commerciale: une mesure à partir des flux bilatéraux", *Document de travail du CEPII*, 2001-04, mars, www.cepii.fr.

GAULIER G. et S. ZIGNAGO (2002), "La discrimination commerciale révélée comme mesure désagrégée de l'accès aux marchés", *Economie Internationale*, No 89-90, 1er-2ème trimestre.

GRUBEL H.G. et H. JOHNSON (1971), *Effective Tariff Protection*, GATT, Geneva.

GROSSMAN G. M. et E. HELPMAN (1991), *Innovation and Growth in the Global Economy*, Cambridge, Mass.: MIT Press.

GWARTNEY J. et R. LAWSON avec W. PARK, S. WAGH, C. EDWARDS et V. DE RUGY (2002), *Economic Freedom of the World: 2002 Annual Report*, Vancouver: The Fraser Institute (http://www.freetheworld.com).

IANCHOVICHINA E., W. MARTIN et E. FUKASE (2000), "Comparative Study of Trade Liberalisation 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.

JONES R.W. et S. MARJIT (2001), "The Role Of International Fragmentation In the Development Process, *The American Economic Review*, May.

KELLER W. (2001), "The Geography and Channels of Diffusion At the World's Technology Frontier", *NBER Working Paper*, 8150, March.

KELLER W. (2002), "Trade and the Transmission of Technology", *Journal of Economic Growth*, 7, 5-24.

LAFAY G. (1979), *Dynamique de la spécialisation internationale*, Economica.

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

LASSUDRIE-DUCHENE B. (1985), "L'échange international avec segmentation des produits", in *Le Protectionisme*, B.Lassudrie-Duchêne and J.L. Reiffers (eds), Economica, Paris.

LEMOINE F. et D. ÜNAL-KESENCI (2002), "China In The International Segmentation of Production Processes", *Document de travail CEPII*, N°2002-02, mars 2002, www.cepii.fr.

LEMOINE F. (1999), "Les délocalisations au cœur de l'expansion du commerce extérieur chinois", *Économie et statistique*, n° 326-327 1999-6/7

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

MUMCU A. et Ü. ZENGINOBUZ (2002), "Competition Policy in Turkey", Paper prepared for the ERF 8th Annual Meeting in Cairo, 15-17 January.

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

NAVARETTI G B., M. GALEOTTI et A. MATTOZI (2000), "Moving Skills from Hands to Heads: Import of Technology and Export Performance", *Nota Di Lavoro Fondazione Eni Enrico Mattei*, 54.2000.

ÖZÇELIK E. et E. TAYMAZ (2002), "Does Technology Matter for International Competitiveness in Developing Countries? The Case of Turkish Manufacturing Industries", Paper presented in the *8th ERF Conference*, Cairo.

REDDING et VENABLES (2002), "Explaining Cross-Country Export Performance: International Linkages and Internal Geography", Discussion Paper, 549, *Center for Economic Performance*, September.

SZIRMAI A., M. BAI. et R. REN (2001), "Labour productivity trends in Chinese manufacturing, 1980-1999", *Ecis Working Paper*, n°01/10.

YOUNG A. (1991), "Learning by Doing and the Dynamic Effects of International Trade", *Quaterly Journal of Economics* 106, 369-405.

APPENDICES

1. Product Classification and Groupings

The trade data used in this study come from two sources: the CHELEM data base of CEPII and the Comtrade database of the United Nations. Comtrade data were available at the six-digit level of HS classification. Using this most-detailed classification, three types of groupings were made:

- Products have been grouped in branches of NACE classification (2 digits). Some tables and figures present results at a more aggregated level. These major branches are following:

Major branches	NACE content
Food industries	15, 16
Textiles	17, 18, 19
Wood, paper, publishing	20, 21, 22
Chemicals	24, 25, 26
Metal products & Mechanics	27, 28, 29
Electrical & electronics	30, 31, 32, 33
Transport equipment	34, 35
Manufacturing n.e.c.	36

- Products have been reclassified by stage of production, using a correspondence table based on a revised version of the Broad Economic Categories (BEC) of the United nations. The BEC has been elaborated by the UN, and it was derived from the SITC, rev.3 (standard International Trade Classification). SITC items are reclassified according to the principal use of products. More specifically, foreign trade data has been reclassified into categories corresponding to the final or intermediate use of the products, in accordance with the system of National Accounts. In this study, BEC categories have been reclassified as indicated in the following table.

- Products have been defined as high-technology products following the classification proposed in the study by Fontagné, Freudenberg and Ünal-Kesenci (1999). The classification derives from a joint list elaborated by the OECD and Eurostat. It includes 252 high-technology products identified at the six-digit level of the HS classification. They belong to nine production sectors: 1) aeronautics, 2) office machinery and computers, 3) electronics and telecommunications equipment, 4) pharmaceuticals, 5) precision instruments, 6) electrical machinery, 7) chemicals, 8) non-electrical machinery, 9) arms.

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

2. The Measure of International Specialization

The international specialization of a country is measured by the "contribution to the trade balance" (CTB) indicator (Lafay, 1990). Unlike other indicators of specialization, the CTB is a symmetrical indicator in the sense that it focuses not only on exports but also on imports. CTB compares the observed trade balance for a product to a theoretical trade balance corresponding to an absence of specialization. The latter is calculated so as to spread the global trade balance on the different products, according to their respective weights in the country's total trade.

$$CTB_i^k = \left(\frac{1000}{Y_i}\right)\left[\left(X_i^k - M_i^k\right) - \sum_k\left(X_i^k - M_i^k\right)\left(\frac{X_i^k + M_i^k}{\sum_k\left(X_i^k + M_i^k\right)}\right)\right]$$

where *i* is the country, *k* the product, *Y* the GDP, *X* are the exports and *M* the imports.

A positive contribution is interpreted as a revealed comparative advantage. By definition, the sum over all products is zero.

The "contribution to the trade balance" (CTB) indicator is used to evaluate the similarity of specialization patterns between pairs of countries. Two steps are needed to transform the CTB indicator into a similarity index:

- First adjusted CTB, ($\widetilde{CTB}$), is calculated in order to get rid of size effects (degree of specialization) included in the CTB: *CTB*s are multiplied by a coefficient so that the sum of adjusted values equals 100 for positive contributions and –100 for negative contributions;

- then, for each pair of countries, absolute differences of adjusted CTB are added up. If the two countries have the same specialization pattern then the similarity index will equal 100. If each comparative advantage for country *i* is matched by an equal disadvantage for country *j* then similarity will be 0.

The distance in specialization patterns between country *i* and *j*, Sim_{ij} , is defined as follow:

$$Sim_{ij} = 100 - \frac{1}{4}\sum_{k}\left|\tilde{CTB}_{ik} - \tilde{CTB}_{jk}\right|$$

3. Similarity of Specialization Structures in Manufacturing

CHINA

1990		1999	
India	65	Indochina	58
Other Asia-Oceania	62	Thailand	54
Philippines	60	Indonesia	54
Turkey	60	Portugal	51
Pakistan	58	Philippines	51
Thailand	56	Mexico	50
Morocco	56	Turkey	49
Portugal	56	India	48
Colombia	54	Central Europe	46
South Korea	53	Ex-Yugoslavia	45

INDIA

1990		1999	
China	65	Pakistan	61
Other Asia-Oceania	62	Turkey	57
Pakistan	60	Egypt	55
Colombia	60	Colombia	50
Turkey	58	Indochina	50
South Korea	57	China	48
Thailand	57	Other Asia-Oceania	48
Indonesia	53	Portugal	47
Philippines	51	Morocco	44
Taiwan	50	Indonesia	43

TURKEY

1990		1999	
Colombia	64	Egypt	63
Portugal	64	India	57
Other Asia-Oceania	62	Colombia	55
Greece	60	Pakistan	54
China	60	Other Asia-Oceania	53
India	58	Portugal	52
Pakistan	56	Greece	52
Indonesia	55	Central Europe	51
Philippines	55	Hong Kong	50
Thailand	55	China	49

Note: Similarity of the specialization structures is calculated according to the methodology presented in appendix 2.

Source: CEPII-CHELEM data base, authors' calculations.

4. Specialization by Branch and Production Stage, 1999

CHINA

		Semi-finished products	Parts & components	Capital goods	Consumption goods	All stages
	Total manufacturing	**-107**	**-68**	**-32**	**207**	**0**
	Food & tobacco	**-7**			**14**	**8**
15	Food industries	-7			14	7
16	Tobacco				0	0
	Textiles	**-14**			**117**	**103**
17	Spinning and weaving	-8			20	12
18	Wearing apparel	-0			65	65
19	Leather products	-6			32	26
	Wood, paper, publish.	**-15**	**0**	**0**	**29**	**13**
20	Wood & wood products	-1			0	-1
21	Paper & paperboard	-17			0	-17
22	Publishing	0	0		-10	-10
36	Manufacturing n.e.c.	2	0	0	39	41
	Chemicals	**-60**	**2**		**9**	**-49**
24	Chemicals	-58			-1	-59
25	Rubber & plastic prod.	-3	2		6	5
26	Non met. mineral prod.	2			4	5
	Metal pr. & Machinery	**-12**	**-19**	**-30**	**22**	**-38**
27	Basic metals	-17				-17
28	Metal products	5	-3	1	4	8
29	Machinery & equipment	0	-16	-32	19	-29
	Electric. pr., electronics	**0**	**-44**	**-2**	**16**	**-30**
30	Office mach., computers		-3	2	0	-1
31	Electrical machinery	4	-7	3	1	1
32	Radio, TV & com. Equip.	0	-33	-2	7	-28
33	Med., precision & optical	-4	-1	-5	7	-3
	Transport equipment		**-7**	**-0**	**1**	**-6**
34	Motor vehicles		-5	3	-2	-3
35	Other transport equipment		-2	-3	2	-3

Source: United Nations – Comtrade data base, authors' calculations.

INDIA

		Semi-finished products	Parts & components	Capital goods	Consumption goods	All stages
	Total manufacturing	**-98**	**-50**	**-45**	**192**	**0**
	Food & tobacco	**-2**			**55**	**53**
15	Food industries	-2			55	52
16	Tobacco				1	1
	Textiles	**47**	**1**	**0**	**124**	**173**
17	Spinning and weaving	44			31	74
18	Wearing apparel				78	78
19	Leather products	3	1	0	16	21
	Wood, paper, publish.	**65**	**-0**	**0**	**6**	**71**
20	Wood & wood products	-0			-2	-2
21	Paper & paperboard	-11			0	-11
22	Publishing	-1	-0		-8	-9
36	Manufacturing n.e.c.	77	-0	0	15	92
	Chemicals	**-69**	**4**		**10**	**-55**
24	Chemicals	-73			11	-62
25	Rubber & plastic prod.	1	3		-1	4
26	Non met. mineral prod.	2			0	3
	Metal pr. & Machinery	**-136**	**-28**	**-29**	**-7**	**-200**
27	Basic metals	-139				-139
28	Metal products	4	-2	1	1	5
29	Machinery & equipment	-0	-26	-30	-8	-65
	Electric. pr., electronics	**-3**	**-20**	**-17**	**-1**	**-40**
30	Office mach., computers		-4	-1		-5
31	Electrical machinery	-2	-4	-2	-0	-8
32	Radio, TV & com. Equip.	0	-9	-3	-0	-12
33	Med., precision & optical	-1	-3	-11	-0	-14
	Transport equipment		**-6**	**1**	**4**	**-1**
34	Motor vehicles		-4	1	2	-1
35	Other transport equipment		-2	-0	2	-0

Source: United Nations – Comtrade data base, authors' calculations.

TURKEY

		Semi-finished products	Parts & components	Capital goods	Consumption goods	All stages
	Total manufacturing	**-47**	**-52**	**-77**	**176**	**0**
	Food & tobacco	**-4**			**34**	**30**
15	Food industries	-4			33	29
16	Tobacco				1	1
	Textiles	**22**			**159**	**182**
17	Spinning and weaving	23			49	72
18	Wearing apparel	-0			110	109
19	Leather products	-1			1	1
	Wood, paper, publish.	**-12**	**1**	**-0**	**6**	**-6**
20	Wood & wood products	-0			-1	-1
21	Paper & paperboard	-11			0	-11
22	Publishing	-0	-0		2	2
36	Manufacturing n.e.c.	-1	1	-0	4	3
	Chemicals	**-66**	**3**		**-5**	**-69**
24	Chemicals	-75			-8	-83
25	Rubber & plastic prod.	-1	3		-1	0
26	Non met. mineral prod.	10			4	14
	Metal pr. & Machinery	**9**	**-18**	**-36**	**-6**	**-51**
27	Basic metals	7				7
28	Metal products	2	-1	-1	1	1
29	Machinery & equipment	-0	-17	-35	-7	-60
	Electric. pr., electronics	**4**	**-24**	**-43**	**-5**	**-69**
30	Office mach., computers		-4	-3	0	-8
31	Electrical machinery	5	-7	-4	-1	-7
32	Radio, TV & com. Equip.	0	-13	-25	-1	-39
33	Med., precision & optical	-0	-1	-11	-3	-15
	Transport equipment		**-13**	**2**	**-6**	**-16**
34	Motor vehicles		-10	-2	-6	-18
35	Other transport equipment		-3	5	-0	2

Source: United Nations – Comtrade data base, authors' calculations.

5. "Vertical" specialization by branch and production stage, 1999

Note: Only NACE branches for which the country has a vertical specialization (reversal of comparative advantages [disadvantages] along the stages) are presented.

CHINA

NACE		Primary	Semi-finish.	Components	Capital	Consump	Total
15	Food industries		-5,5			13,5	8,0
17	Spinning and weaving		-1,5	-0,1		18,8	17,1
19	Leather products		-4,9	0,0		30,2	25,3
20	Wood & wood products		-0,6			0,4	-0,2
21	Paper & paperboard		-14,3			0,1	-14,2
22	Publishing		0,4	-0,0		-7,0	-6,6
25	Rubber & plastic products		-2,4	1,9		6,4	5,9
28	Metal products		5,7	-2,2	1,3	3,8	8,6
29	Machinery & equipment		0,2	-13,1	-26,2	19,2	-19,9
30	Office mach. & computers			-1,3	2,3		1,0
31	Electrical machinery		4,1	-4,8	5,0	1,0	5,3
32	Radio, TV & comm. equip.			-24,4	-0,3	6,9	-17,9
33	Med., precision & optical		-2,8	-0,6	-4,1	7,1	-0,4
34	Motor vehicles			-3,7	2,9	-1,3	-2,1
35	Other transport equipment	-0,4		-1,8	-2,5	2,4	-2,3
36	Manufacturing n.e.c.	0,1	2,2	-0,0	-0,0	36,7	39,0

Source: United Nations – Comtrade data base, authors' calculations.

INDIA

NACE		Primary	Semi-finish.	Components	Capital	Consump	Total
17	Spinning and weaving	-0,8	41,3	-0,2		27,7	68,0
28	Metal products		4,1	-1,0	1,5	1,5	6,1
24	Chemical products	-0,1	-37,6		10,7		-27,0
34	Motor vehicles			-1,3	1,2	2,0	1,9
35	Other transport equipment	-0,1		-0,5	-0,3	1,5	0,7

Source: United Nations – Comtrade data base, authors' calculations.

TURKEY

NACE		Primary	Semi-finish.	Components	Capital	Consump	Total
15	Food industries	-0,3	-2,8			27,4	24,3
19	Leather products	0,0	-0,3	-0,0		1,1	0,8
21	Paper & paperboard	-0,1	-8,6			0,2	-8,5
25	Rubber & plastic products	-0,0	-1,2	2,6		-0,9	0,5
27	Basic metals	-7,5	7,9				0,4
28	Metal products	2,1		-0,9	-0,5	0,7	1,4
31	Electrical machinery		3,8	-5,5	-2,7	-0,6	-5,0
35	Other transport equipment	-0,1		-2,2	4,6	-0,0	-0,6
36	Manufacturing n.e.c.	-0,0	-0,9	0,5	-0,2	3,6	-1,7

Source: United Nations – Comtrade data base, authors' calculations.

6. Sectoral and Geographical Breakdown of Trade in High-Tech Products (1997-1999 average)

A. Breakdown by manufacturing branch of high-tech imports and exports

NACE	Imports			Exports		
	China	India	Turkey	China	India	Turkey
24 Chemical products	5	22	22	19	78	15
28 Metal products	1	0	0	0	0	0
29 Machinery & equipment	5	12	12	1	3	7
30 Office mach. & computers	17	15	6	25	6	1
31 Electrical machinery	4	3	3	3	0	5
32 Radio, TV & comm. equip.	46	21	30	42	9	12
33 Med., precision & optical	9	20	10	9	3	5
35 Other transport equipment	13	7	15	1	1	54
Total high-tech	100	100	100	100	100	100

Source: United Nations – Comtrade data base, authors' calculations.

B. Geographical breakdown of high-tech imports

1. High-tech imports

	China	India	Turkey
World	100	100	100
Asia-Oceania	55	40	14
Japan	*23*	*10*	*5*
Hong Kong, South Korea, Taiwan	*21*	*9*	*5*
ASEAN	*10*	*13*	*1*
Western Europe	23	34	64
EU15	*22*	*32*	*60*
America	20	24	21
USA	*19*	*24*	*20*
Other regions	2	2	2

2. High-tech imports/ Total imports

	Chine	India	Turkey
World	14	5	10
Asia-Oceania	12	7	11
Japan	*15*	*9*	*12*
Hong Kong, South Korea, Taiwan	*11*	*9*	*15*
ASEAN	*16*	*7*	*6*
Western Europe	20	5	12
EU15	*21*	*6*	*11*
America	17	11	19
USA	*20*	*12*	*22*
Other regions	4	0	1

Source: United Nations – Comtrade data base, authors' calculations.

C. Geographical breakdown of high-tech exports

1. High-tech exports

	China	India	Turkey
World	100	100	100
Asia-Oceania	54	28	4
Japan	*17*	*1*	*0*
Hong Kong, South Korea, Taiwan	*27*	*10*	*3*
ASEAN	*6*	*13*	*1*
Western Europe	15	28	54
EU15	*15*	*28*	*35*
America	24	24	10
USA	*22*	*15*	*28*
Other regions	7	21	32

2. High-tech exports/ Total exports

	China	India	Turkey
World	8	4	2
Asia-Oceania	8	4	3
Japan	*5*	*1*	*0*
Hong Kong, South Korea, Taiwan	*9*	*5*	*6*
ASEAN	*13*	*8*	*1*
Western Europe	8	4	1
EU15	*8*	*4*	*1*
America	8	3	6
USA	*8*	*3*	*6*
Other regions	5	3	2

Source: United Nations – Comtrade data base, authors' calculations.

7. Distribution by branch and production stage of high-tech trade, 1999

CHINA

NACE		IMPORTS					EXPORTS				
		Semi-fin.	Compon.	Capital	Consump	**Total**	Semi-fin.	Compon.	Capital	Consump	**Total**
24	Chemical products	4			1	**5**	15			0	**16**
28	Metal products		2	0		**2**		0	0		**0**
29	Machinery & equip.		1	3	0	**4**		1	0	0	**1**
30	Off. mach. & comput.		15	0		**16**		22	3		**25**
31	Electrical machinery	0	2	2		**3**	0	1	2		**3**
32	Radio, TV & comm.		38	12	0	**50**		20	21	4	**45**
33	Med., prec. & optical	1	1	7	0	**9**	1	1	6	1	**9**
35	Other transport equip.		1	10	0	**11**		0	1	0	**2**
Total		**5**	**59**	**35**	**1**	**100**	**16**	**44**	**35**	**5**	**100**

Source: United Nations – Comtrade data base, authors' calculations.

TURKEY

NACE		IMPORTS					EXPORTS				
		Semi-fin.	Compon.	Capital	Consump	**Total**	Semi-fin.	Compon.	Capital	Consump	**Total**
24	Chemical products	17			4	**21**	7			2	**10**
28	Metal products		0			**0**		0			**0**
29	Machinery & equip.		2	2	0	**5**		1	1	1	**3**
30	Off. mach. & comput.		5	3		**8**		1	0		**1**
31	Electrical machinery	0	2	1		**3**	1	2	0		**4**
32	Radio, TV & comm.		7	36	0	**43**		4	4	0	**9**
33	Med., prec. & optical	0	1	8	2	**10**	0	1	3	0	**4**
35	Other transport equip.		2	8	0	**10**		8	62	0	**70**
Total		**18**	**19**	**57**	**6**	**100**	**9**	**16**	**71**	**4**	**100**

Source : United Nations – Comtrade data base, authors' calculations.

INDIA

NACE		IMPORTS					EXPORTS				
		Semi-fin.	Compon.	Capital	Consump	**Total**	Semi-fin.	Compon.	Capital	Consump	**Total**
24	Chemical products	23			0	**23**	64			16	**79**
28	Metal products		0			**0**		0			**0**
29	Machinery & equip.		6	5		**11**		2	0		**2**
30	Off. mach. & comput.		16	1		**18**		8	0		**8**
31	Electrical machinery	0	2	1		**3**	0	0	0		**0**
32	Radio, TV & comm.		12	11	0	**23**		5	4	0	**9**
33	Med., prec. & optical	0	7	14	1	**21**	0	0	2	0	**2**
35	Other transport equip.		0	1		**1**		0	0		**0**
Total		**24**	**43**	**33**	**1**	**100**	**64**	**15**	**6**	**16**	**100**

Source : United Nations – Comtrade data base, authors' calculations.

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