



THE IMPACT OF EU ENLARGEMENT ON THE LOCATION OF PRODUCTION IN EUROPE

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Abstract

This paper studies the impact of EU enlargement, focusing on the evolution of corporate strategies and their influence on the location of production within the EU-25.

Part 1 examines the evolution of trade and FDI between the EU-15 and accession countries over the last decade. Beyond increasing flows, it shows that European firms have been implementing vertical specialization within the regional area. It compares Germany and France in particular in this respect. It finally sets intra-EU-25 trade in perspective by emphasizing the dynamism of trade with China. Increasing trade with China and the development of both European and global production networks are discussed in more details in part 2.

Part 2 focuses on three sectors: the automobile industry, information and communication industries, and textile and clothing. These sectoral studies allow for a more detailed examination of the determinants and consequences of firms' location decisions. All three studies do show a shift of production facilities eastward, but each is also specific.

The conclusion deals with the current debates in France and Europe about the relocation of production in new members and the relevance of the policies that have been considered by some countries.

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Introduction

A fundamental objective of the latest wave of enlargement was to help the accession countries to complete the transition to democracy and market economy. These countries are numerous, but also poor compared with the EU-15. This results in a paradox: the EU wants to help contribute to their development, but the Western members often fear that they may represent too much of a burden for their own economies and the European budget. This paradox first surfaced during the negotiation phase, in particular with regard to the Common Agricultural Policy and the issue of net transfers to the future members. Since enlargement on the 1st of May 2004, the debate has shifted to the issue of wage and tax competition, which could be used by accession countries to lure production facilities and jobs away from the EU-15. Current debates on migration are less important than on trade, FDI and the potential relocation of economic activities in the new Member States.

The adjustment process has already taken place to a large extent, in particular through increased trade and foreign direct investment. First, since the 1990s, trade agreements with accession countries had already reduced the cost of trade with the EU-15. Second, as with previous waves of enlargement, commitment to accession was a major step and led companies to integrate the future members into their regional and global strategies. Despite increased trade with accession countries, flows remain modest. This is partly due to the small size of the accession countries, which represent a mere 5% of the Union's GDP. In 1986, Spain and Portugal represented 8.4% of the European Community's GDP. It is possible to belittle the consequences of enlargement, as adjustment has already partly taken place and the new members are small economies. This paper nevertheless suggests that enlargement can have an important impact on EU-15 countries as it takes place at the same time as the emergence of other new competitors on global markets. These developments combine to lead companies to reorganize their global production and supply networks in order to benefit both from cost-efficient locations and easy access to growing markets.

The paper argues that some division of labor has developed between EU-15 and accession countries since the 1990s. It nevertheless stresses that enlargement should be analyzed as part of the context of globalization, in which competitive pressures from (extra-EU) emerging countries will continue to grow on both old and new members. As a result, the EU-15 should keep moving up the value chain and specialize more in high tech sectors in order to develop greater complementarity with new members and extra-EU emerging countries. Such a move should ease the problem of relocation and allow EU-15 countries to export more to emerging countries and benefit from their fast-growing economies. The analysis is based first on the examination of EU trade and FDI patterns and second on sectoral studies of the automobile industry, the information and communication technologies (ICT) and the textile and clothing industry. The conclusion comes back on the debate on relocation and its economic policy implications.

1. Trade and the location of production

Since the 1960s, increasing intra-European trade has been largely intra-industry trade. It has thus promoted intra-industry specialization within Europe. Regional integration has enabled companies to reap greater economies of scale and has helped Europe to remain competitive in a number of mass production sectors, such as the automobile industry. Increasing trade with accession countries should lead to more inter-industry and vertical trade. Trade with accession countries should thus generate vertical specialization, as is more generally the case in world trade between countries of different levels of development (Sachwald 2004).

In order to check the characteristics of trade with the new members, this part first examines the general evolution of trade and FDI with accession countries. It then analyzes more precisely the specialization of accession countries in relation with firms' strategies.

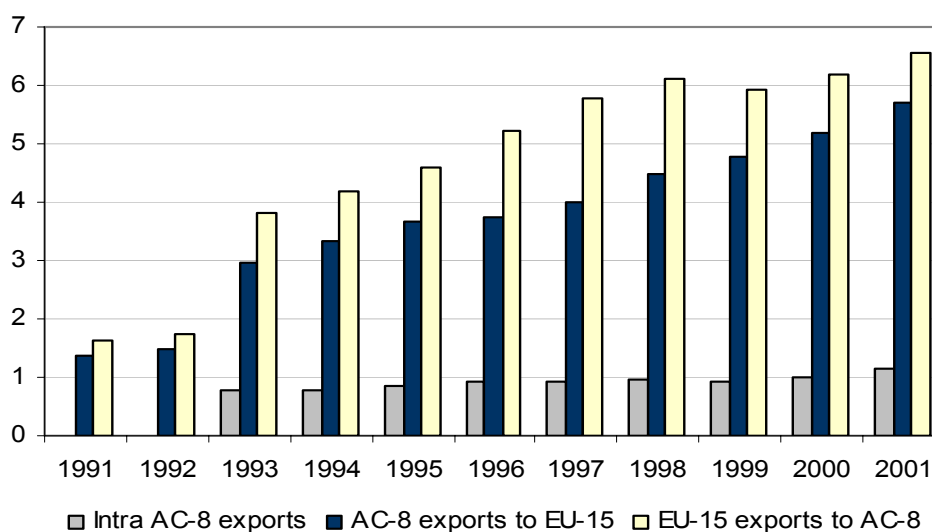
1.1 Evolution of Trade with Accession Countries

Trade between EU-15 and accession countries has been increasing steadily since the 1990s, but the overall flows remain modest. Besides, trade with other regions has also been very dynamic.

Increasing trade between EU-15 and AC-8

Trade between the accession countries (Acs) and the EU has increased rapidly from the early 1990s on. CEECs have massively shifted their trade flows towards the EU (figure 1). This remarkable evolution may simply be interpreted as catching up with previously constrained trade flows between two geographically, culturally and historically close regions.

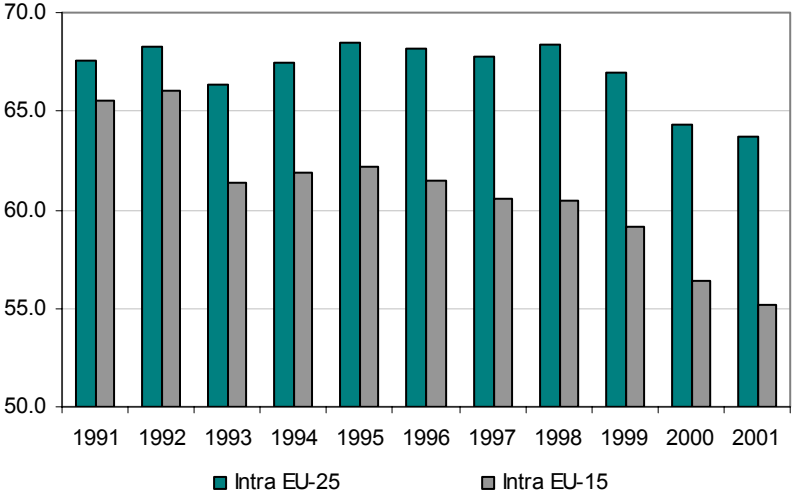
Figure 1. Share in EU-25 exports, in % of total, 1991-2001



Source: Calculation from CHELEM (CEPII)

Increasing trade between the EU and accession countries has made up for the decrease in intra-EU15 trade during the 1990s (figure 2). Notwithstanding, intra-European trade is not dynamic enough to maintain its share of EU-25 trade. Figure 2 shows that the share of intra-EU-15 has been decreasing since the late 1990s. Moreover, exports from ACs to EU-15 have been stagnating in recent years. This may be due to the insufficient adaptation to the local demand by EU-15 exports (Aussiloux and Pajot 2003). The declining share of intra-EU-25 trade is nevertheless strongly influenced by the dynamism of trade with extra-European countries, and in particular with China.

Figure 2. Share of intra-EU exports, in % of total exports by EU-15 and EU-25



Source: calculation from CHELEM (CEPII)

Figure 3a shows that China’s share of EU-15 trade is smaller than the share of the accession countries, but has become more dynamic since the late 1990s. Imports from China have been particularly dynamic since the mid-1990s. Figure 3a also shows that Germany is the main EU trade partner with the accession countries. Their share of German exports and imports reached 8% in 2002. This is much higher than their share of French trade, with 3% of exports and 2% of imports. The accession countries’ share of EU-15 exports is 4.7% and 4.1% for EU imports.

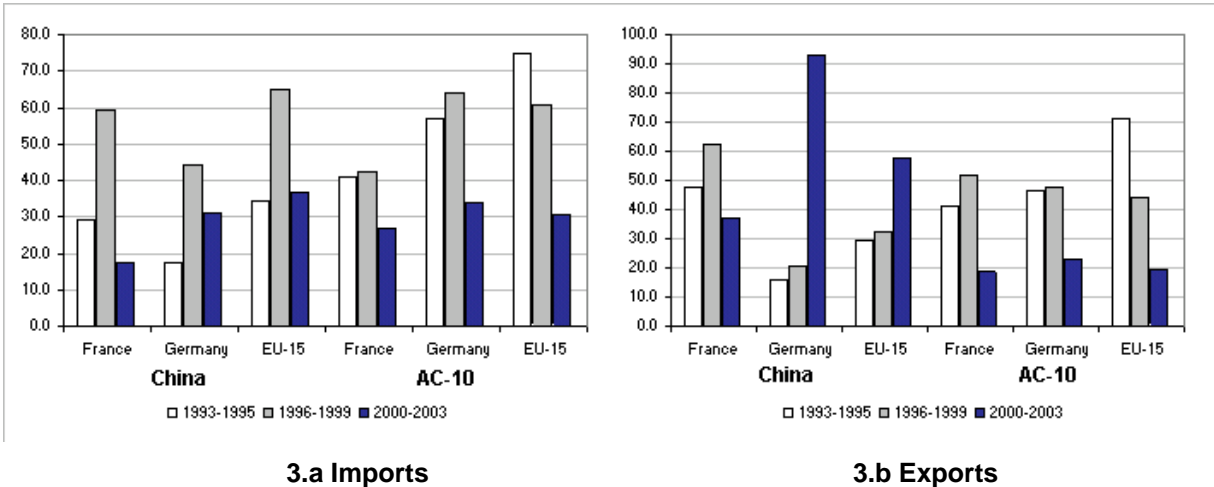
European trade is appreciably more important with ACs than with China (table 1). Within the EU, Germany is one of the first partners of ACs and China, while French trade with these countries is rather limited. ACs accounted for 8% of German imports and 9% of exports over the period 2000-2003, whereas their share of French exports was 3% and 2% respectively (table 1). The share of the ACs and China in EU trade has strongly increased since the early 1990s. Nevertheless trade flows with China have been much more dynamic since the end of 1990s (table 1 and figure 3). Figure 3b shows that over the last period, German exports to China increased very rapidly. French exports have on the contrary grown more slowly than exports from Germany, and have slowed down in comparison with the end of the 1990s. Figure 3a suggests that imports from China and ACs have been quite sensitive to the European macroeconomic situation since 2000. Furthermore over the last period, French imports from ACs have been more dynamic than imports from China.

Table 1. EU trade with AC-10 and China, 1993-2003
(Share, in % of world total)

		Imports		Exports	
		1993-1995	2000-2003	1993-1995	2000-2003
AC-10	France	1.2	2.0	1.5	3.1
	Germany	5.1	9.2	5.0	8.0
	EU-15	2.4	4.1	2.9	4.6
China	France	1.3	2.4	0.8	1.1
	Germany	2.3	3.6	1.5	2.1
	EU-15	1.8	3.2	1.0	1.3

Source: Calculation from COMEXT

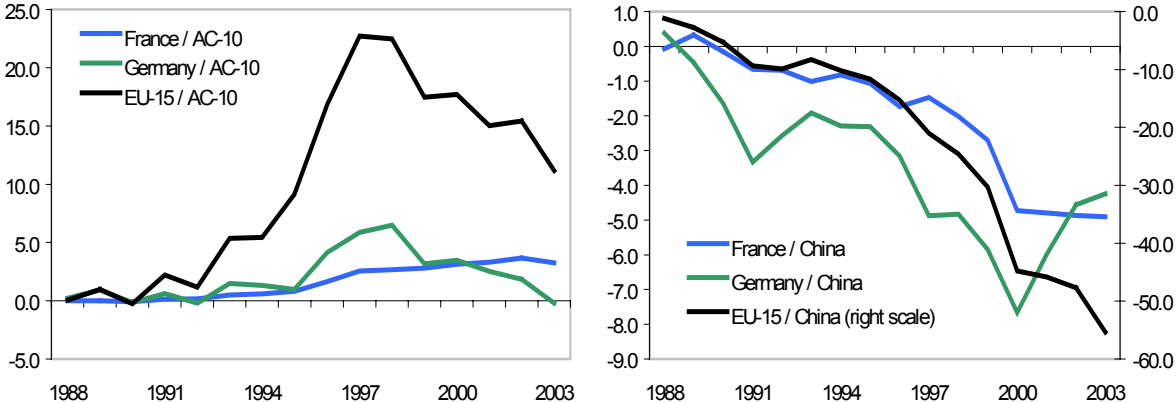
Figure 3. Trade growth with AC-10 and China, 1993-2003
(Overall growth in % by period)



Source: Calculation from COMEXT

Figure 4 further shows that EU trade balance is positive with the accession countries, while it is increasingly negative with China. The figure nevertheless shows that the excess of exports over imports with AC-8 has been decreasing since the peak in 1997-98. The drop in Germany's trade surplus partially explains this trend. In 2003, Germany had a trade deficit with AC-8. It is interesting to notice that since 2003, Germany has on the contrary substantially reduced its trade deficit with China. The difference in the dynamics of German trade between AC-8 on the one hand and China on the other hand is due to rapidly increasing exports to China. Over the last few years, exports to AC-8 have been somewhat less dynamic than imports.

Figure 4. Trade Balance with AC-8 and China, 1993-2003
(€ billions)



Source: calculation from COMEXT

Product composition of trade with accession countries

Despite their small share of total EU-15 trade, accession countries represent a substantial share of imports in specific sectors, with strongly increasing shares between 1993 and 2003. Table 2 shows that this is the case in two types of sectors: traditional sectors for which AC-10 have favorable factor endowments (labor- and resource-intensive sectors) and sectors for which multinational companies have been integrating the accession countries into their European division of labor. Most of these imports represent limited value, but some nevertheless comprise substantial trade flows. They are indicated in bold characters in table 2.

Table 2 also shows that Germany and France do not intensively import the same products from accession countries. This is probably due to the generally stronger trade relationships between Germany and AC-10, but also to firms' strategies. French imports of TV sets for example is related to the organization of production on a European scale.

Table 2. Strong AC-10 market positions in EU imports, 1993 and 2003
(In % of total EU-15 imports)

EU-15	1993	2003	€000
245 Fuel wood (excluding wood waste) and wood charcoal	20.4	36.2	87 938
246 Wood in chips or particles and wood waste	2.3	34.8	163 959
711 Vapour generating boilers, auxiliary plant; parts	6.8	31.5	159 794
322 Briquettes, lignites and peat	24.3	30.4	134 845
811 Prefabricated buildings	20.8	28.4	315 806
325 Coke & semi-cokes of coal, lign., peat; retort carbon	20.6	28.1	496 755
773 Equipment for distributing electricity, n.e.s.	6.5	23.4	3 247 242
635 Wood manufacture, n.e.s.	12.6	23.3	1 503 253
247 Wood in the rough or roughly squared	5.5	20.5	599 853
821 Furniture & parts; bedding & similar stuffed furni.	8.6	20.3	5 857 758
Total imports from AC-10	2.0	4.6	
Germany	1993	2003	€000
322 Briquettes, lignites and peat	83.3	79.3	40 964
711 Vapor generating boilers, auxiliary plant; parts	21.6	65.6	45 685
811 Prefabricated buildings	32.1	54.8	203 039
325 Coke & semi-cokes of coal, lign., peat; retort carbon	47.6	53.6	326 442
269 Worn clothing and other worn textile articles; rags	10.5	50.5	19 791
245 Fuel wood (excluding wood waste) and wood charcoal	35.1	48.4	20 751
635 Wood manufacture, n.e.s.	22.5	46.2	759 990
773 Equipment for distributing electricity, n.e.s.	16.3	45.3	1 924 846
791 Railway vehicles & associated equipment	13.2	44.0	405 631
691 Structures & parts, n.e.s., of iron, steel, aluminium	16.5	44.0	632 712
Total imports from AC-10	4.4	10.6	
France	1993	2003	€000
711 Vapor generating boilers, auxiliary plant; parts	2.7	37.7	18 743
245 Fuel wood (excluding wood waste) and wood charcoal	2.9	25.8	4 761
761 Television receivers, whether or not combined	0.0	17.5	249 854
345 Coal gas, water gas & similar gases (excluding hydrocar.)	0.0	15.8	3
044 Maize (not including sweet corn), unmilled	3.9	14.6	17 544
322 Briquettes, lignites and peat	3.1	13.2	9 688
881 Photographic apparatus & equipment, n.e.s.	0.2	13.0	55 215
629 Articles of rubber, n.e.s.	0.8	11.7	87 429
289 Ores & concentrates of precious metals; waste, scrap	0.6	11.7	8 288
635 Wood manufacture, n.e.s.	3.2	11.6	80 447
Total imports from AC-10	1.0	2.3	

Source: Calculation from COMEXT

The product composition of trade with AC-8 has substantially changed over the last decade. Table 3a shows the change in the structure of imports from AC-8. It shows that only two products belong to the main imports list in 1993 and 2003: motor vehicle and furniture (indicated in bold characters). Furniture belong to AC-8 traditional exports and also represent a strong market position in EU-15 imports (table 2). The fact that motor vehicles and parts account for an increasing share of AC-8 exports reflects on the contrary the evolution of CEECs trade specialization. Indeed, the initial dominance of labor-intensive final goods in their exports has diminished as the share of technology and skilled-labor intensive products has increased (Kaminski and Ng 2001). Moreover, the 10 main imports represent a substantially larger share of total imports from AC-8 in 2003. As a result, imports by EU-15 from AC-8 are now relatively more concentrated in skilled-labor and scale-intensive products.

Table 3a. Main products imported by EU-15 from AC-8, 1993 and 2003
(as a % of total imports from AC-8)

Main products in 2003	1993	2003	Change	Main products in 1993	1993	2003	Change
Motor vehicles for the transport of persons	4.0	8.1	4.1	Women's clothing, of textile fabrics	5.4	1.3	-4.1
Parts & accessories of vehicles (722, 781, 782, 783)	0.9	5.8	4.9	Furniture & parts; bedding & similar stuffed furniture	4.2	5.1	0.9
Furniture & parts; bedding & similar stuffed furniture	4.2	5.1	0.9	Men's clothing of textile fabrics, not knitted	4.0	1.2	-2.9
Internal combustion piston engines, parts, n.e.s.	0.7	5.0	4.3	Motor vehicles for the transport of persons	4.0	8.1	4.1
Telecommunication equipment, n.e.s.; & parts, n.e.s.	0.3	4.3	3.9	Petroleum oils or bituminous minerals > 70 % oil	3.3	1.4	-1.9
Equipment for distributing electricity, n.e.s.	1.4	2.8	1.4	Footwear	2.3	0.8	-1.5
Automatic data processing machines, n.e.s.	0.2	2.7	2.5	Articles of apparel, of textile fabrics, n.e.s.	2.0	1.0	-1.0
Apparatus for electrical circuits; board, panels	0.8	2.2	1.3	Cathode valves & tubes; diodes; integrated circuits	1.9	0.7	-1.3
Electrical machinery & apparatus, n.e.s.	1.3	2.1	0.9	Coal, whether or not pulverized, not agglomerated	1.8	0.7	-1.1
Manufactures of base metal, n.e.s.	1.7	2.1	0.5	Copper	1.7	0.5	-1.2
Share of the 10 main products	11.5	35.2		Share of the 10 main products	20.6	19.8	

Source: Calculation from COMEXT

The product composition of exports to AC-8 has changed much less over the last decade: 5 product categories have remained part of the top 10 main exports (indicated in bold in table 3b). The EU-15 have actually tended to increase their main exports to AC-8. As a result, in 2003, the main exports accounted for a larger share of total exports to AC-8 and focused more on EU-15 strong points. This is the case in particular for the automobile sector, with a strong increase in the share of components including engines and a slight decrease in the share of motor vehicles. As a result, the automobile sector's share of exports to AC-8 has grown from 9 to 14%. The share of electrical and telecommunication equipment as well as pharmaceuticals has also increased over the last decade.

Taken together, tables 3a and 3b indicate that there is increasing intra-industry trade between the EU-15 and the AC-8.¹ Six out of ten products belong on both the main import list and main export list. This is the case for cars and car components, as well as telecommunication equipment, apparatus for electrical circuits and manufactures of base metals. This observation suggests that there is increasing vertical specialization between the EU-15 and the AC-8. In order to further explore this issue, we first examine the evolution of FDI to the AC-8, before examining intra-industry trade in detail and its impact on the specialization of accession countries.

Table 3b. Main products exported by EU-15 to AC-8, in 1993 and 2003
(as a % of total exports to AC-8)

Main products in 2003	1993	2003	Change	Main products in 1993	1993	2003	change
Parts & accessories of vehicles (722, 781, 782, 783)	2.6	7.2	4.6	Motor vehicles for the transport of persons	5.7	4.8	-0.9
Motor vehicles for the transport of persons	5.7	4.8	-0.9	Parts & accessories of vehicles (722, 781, 782, 783)	2.6	7.2	4.6
Apparatus for electrical circuits; board, panels	1.5	2.9	1.4	Other machinery for particular industries, n.e.s.	2.5	1.8	-0.7
Telecommunication equipment, n.e.s.; & parts, n.e.s.	1.9	2.7	0.8	Fabrics, woven, of man-made fabrics	2.5	0.8	-1.7
Cathode valves & tubes; diodes; integrated circuits	2.1	2.5	0.4	Cathode valves & tubes; diodes; integrated circuits	2.1	2.5	0.4
Medicaments (incl. veterinary)	1.8	2.5	0.7	Telecommunication equipment, n.e.s.; & parts, n.e.s.	1.9	2.7	0.8
Manufactures of base metal, n.e.s.	1.1	2.4	1.2	Medicaments (incl. veterinary)	1.8	2.5	0.7
Paper and paperboard	1.0	2.0	1.0	Heating & cooling equipment & parts thereof, n.e.s.	1.5	1.2	0.7
Internal combustion piston engines, parts, n.e.s.	0.7	2.0	1.3	Petroleum oils or bituminous minerals > 70 % oil	1.5	1.3	-0.3
Articles of plastics of base metal, n.e.s.	1.3	1.9	0.5	Apparatus for electrical circuits; board, panels	1.5	2.9	1.4
Share of the 10 main products	18.7	26.9		Share of the 10 main products	23.6	27.7	

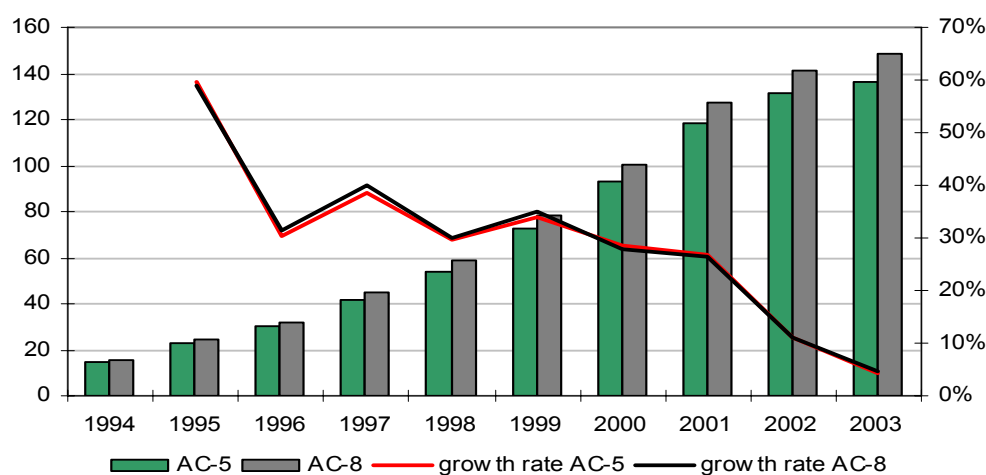
Source: Calculation from COMEXT

¹ This trend has already been underscored by Aturapane et al. (1999) and Dupuch et al. (2004).

1.2 FDI in Accession Countries

FDI to the CEECs has been strongly increasing during the second half of the 1990s. Figure 5 shows that the rate of increase has been slowing over the last couple of years. FDI to the AC-8 actually fell sharply in 2003 before increasing again in 2004.² This trend corresponds both to the overall decline in FDI worldwide and to the specific situation of the CEECs. In the CEECs, a substantial part of FDI flows has resulted from large acquisitions, which have been part and parcel of the privatization process, including in particular in services. As the privatization process subsides, there is naturally less scope for this foreign acquisitions. For industry, FDI which has been attracted by free access to the EU market and developing local markets also took place before 2004.

Figure 5. FDI stock in the accession countries
(Stock in € billions left scale and rate of growth right scale)

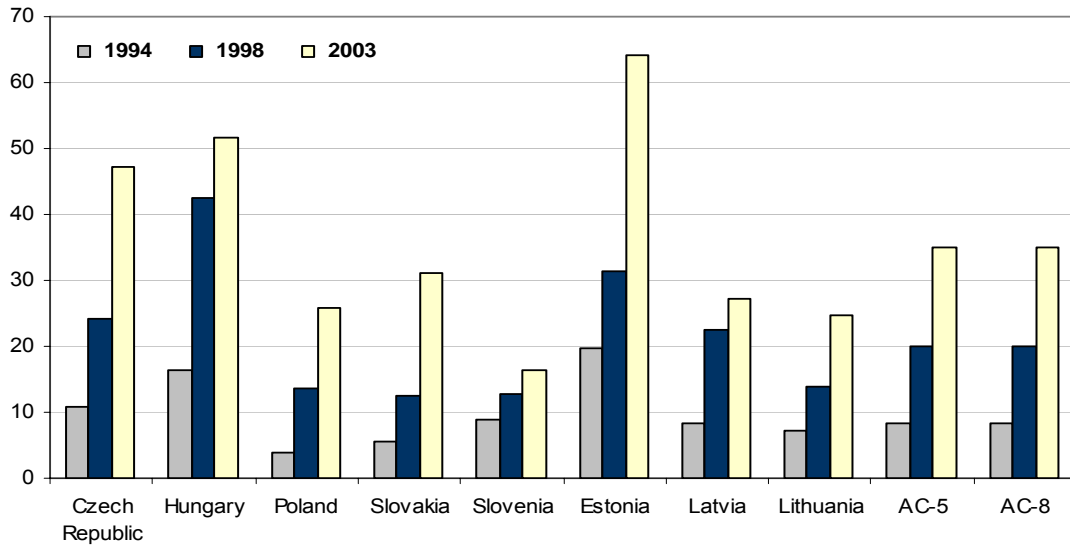


Source: calculation from WIIW

Slovenia is in a specific position. It is a richer country, which had introduced restrictive regulations against FDI. As a result, Slovenia received relatively little FDI during the 1990s (Picciotto 2003). In 2000, Slovenia launched a program to lift obstacles to FDI and has been receiving increasing flows of foreign investment since then. Figure 6 nevertheless shows that FDI intensity remains lower in Slovenia than in other accession countries. Hungary's attractiveness has been increasing too, including for greenfield operations when the privatization process has been completed. As a result, Hungary's FDI intensity is second only to Estonia.

² According to (Hunya and Stankovsky 2004), it could reach the 1998-99 level in 2004.

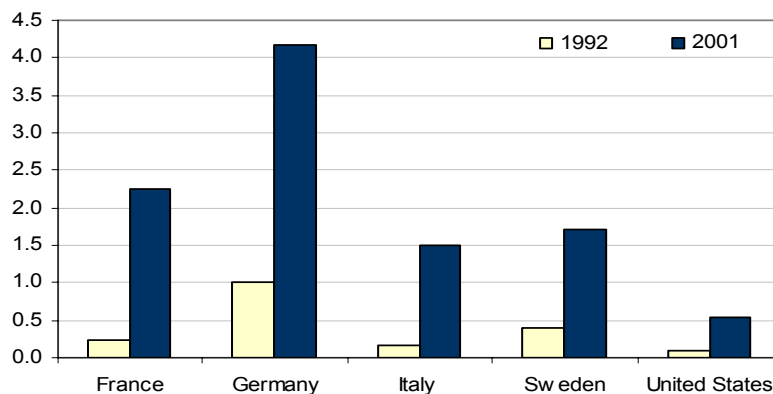
Figure 6. FDI intensity in accession countries
(FDI stock as a % of GDP)



Source: Based on data from Hunya and Stankovsky (2004)

Germany is by far the biggest investor in the accession countries, with 21% of FDI stocks in AC-8. The Netherlands come in second, but their share is artificially inflated by the foreign holding companies investing from the Netherlands. Due to the presence of numerous holding companies in the Netherlands, the share of Dutch FDI is overestimated. The two next main EU investors are Austria and France, each with about 8% of total stocks of FDI in AC-8. Next is the US, with 7% of FDI stocks. Figure 7 shows that the developed countries' share of FDI to the accession countries increased substantially during the 1990s. It further reveals that Germany is the country where accession countries account for the highest share of outward FDI worldwide. A comparison with table 1 suggests a correlation between the accession countries' share of total FDI and their share of total trade.

Figure 7. Share of FDI Stock in AC-5*, by country of origin
(as a % of world FDI Stock)

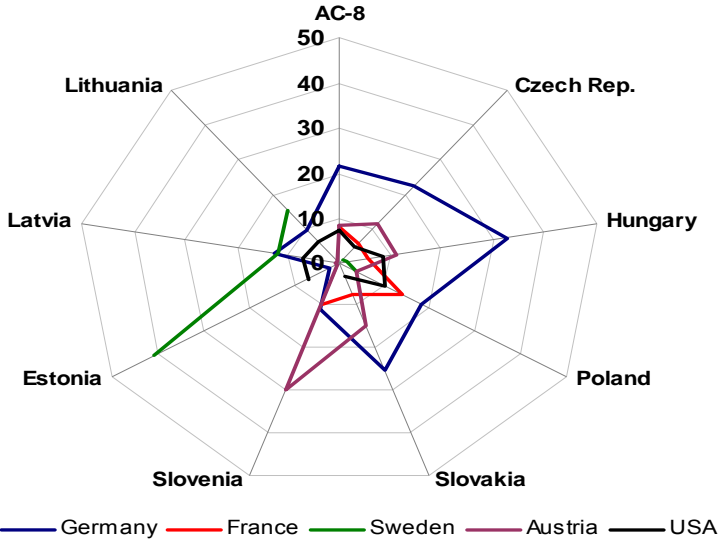


*Hungary, Poland, Czech Republic, Slovakia and Slovenia.

Source: OECD calculation

Figure 8 shows that these shares vary greatly from one accession country to another. Germany is the leading investor in Hungary and Slovakia, while Austria is the primary investor in Slovenia and Sweden is the No. 1 investor in Estonia. These patterns are closely related to the location strategies of firms from countries of origin, which will be explored more thoroughly in the second section with sectoral case studies.

Figure 8. Main investors in AC-8 in 2002
(FDI stock as a % of total in host countries)



Source: Based on data from Hunya and Stankovsky (2004)

In a survey conducted in 2000 by the ERBD, 50% of the 400 firms surveyed considered market access as the primary reason for their investment in the CEECs (Picciotto 2003). Some 50% of FDI is in manufacturing sectors, including 30% of horizontal type and 20% in labor-intensive industries of vertical type (EU 2001). Vertical FDI responding to the relative factor endowments should stimulate FDI further in clothing, leather, metalworking and household equipment. Horizontal FDI will interact with growth, and the expectation that chances for long-run catch-up growth are good will act as a major stimulus for FDI, which in turn should contribute to growth. Business has generally viewed actual EU membership as a credible enforcer and stabilizer of regime change in the CEECs, so actual entry should further stimulate both types of FDI (ERT 1999, 2001). Membership could also stimulate extra FDI in the EU, in particular from Japanese and Korean firms. In the 1990s, Japanese multinationals established production units in the CEECs in order to supply intermediary goods to their Western affiliates.³ More recently, Japanese and Korean firms have also invested in the CEECs, in the electronic and automobile industries.

³ Sachwald (2004) has documented the case of consumer and professional electronics, based on survey data on French intra-firm trade.

1.3 Evolution of the Specialization of the Accession Countries

Traditionally, the European peripheral countries tend to attract labor-intensive and low-tech activities, whereas high-tech, high-skill labor or scale-intensive activities tend to agglomerate in core regions (Midelfart-Knarvik et al. 2002). As we have seen above, this traditional pattern is only partly true in the case of accession countries as their specialization tended to evolve towards more high-skilled and scale-intensive products during the 1990s. The structure of trade between EU-15 and accession countries has been strongly influenced by the specialization of the EU-15 through FDI.

In 1999, 74% of Hungarian exports, 71% of imports and 41% of the trade deficit originated with foreign firms. The same data were respectively 52, 56 and 62% for Poland (Picciotto 2003). The general trend of increasing vertical intra-industry and intra-firm trade with CEECs has been documented in particular in the case of France (Sachwald 2004) and Germany (Marin 2004). Table 3 above also shows that a number of products appear simultaneously as the main exports and main imports in trade between the EU-15 and the accession countries. The same pattern can be observed in trade between the accession countries and France or Germany. The coincidence between main imports and exports is also stronger in 2003 than it was in 1993.

Accordingly, intra-industry trade also has an increasing impact on the trade balance between the EU-15 and the accession countries. Table 4 shows the main products having either a positive or a negative impact on the trade balance with AC-10. The main positive impact is due to pharmaceuticals, which reflects the specialization of EU-15 in this industry. The next two sectors generating trade surpluses with the accession countries are car components and electronic components. These surpluses result from intra-industry vertical trade with the accession countries. Intra-industry vertical trade in the automobile industry now results in a substantial trade deficit in cars; the second largest deficit after furniture. Table 4 shows that most of this deficit comes from imports of vehicles by Germany. Trade in completed vehicles still generates a surplus for France. Vertical specialization in consumer electronics also results in a deficit for television sets. In this case, both Germany and France exhibit a deficit. France also has a deficit in professional electronics, which is due to vertical trade (Sachwald 2004).

Telecommunication equipment also exhibits a significant trade deficit with the accession countries. Table 4 shows that this deficit does not come mainly from Germany or France; it probably comes from Scandinavian countries specialized in telecommunications. This hypothesis will be examined below with the case study devoted to mobile phones. Finally,

the development between 1993 and 2003 (not shown in table 4) indicates that computer imports from accession countries have been growing rapidly and have had a negative impact on the trade balance, even though as of 2003, the EU did not have a major deficit for computers. The case of computers will also be examined in more depth in the next section.

Table 4. Sectoral distribution of the trade balance with AC-10,
(Main positive and negative contributions to trade balance in 2003, € billions)

EU-15			
Positive impact on trade balance	2003	Negative impact on trade balance	2003
542 Medicaments (incl. veterinary)	2.9	821 Furniture & parts; bedding & similar stuffed furni.	-4.5
776 Cathode valves & tubes; diodes; integrated circuits	2.4	781 Motor vehicles for the transport of persons	-3.4
784 Parts & accessories of vehicles (722, 781, 782, 783)	2.2	713 Internal combustion piston engines, parts, n.e.s.	-3.2
728 Other machinery for particular industries	1.4	761 Television receivers, whether or not combined	-1.7
782 Motor vehic. for transport of goods, special purpo.	1.4	764 Telecommunication equipment & parts	-1.6
533 Pigments, paints, varnishes and related materials	1.4	773 Equipment for distributing electricity, n.e.s.	-1.5
582 Plates, sheets, films, foil & strip, of plastics	1.3	635 Wood manufacture, n.e.s.	-1.3
641 Paper and paperboard	1.3	248 Wood simply worked and wooden railway sleepers	-1.2
759 Parts, accessories for machines of groups 751, 752	1.1	842 Women's clothing, of textile fabrics	-1.1
772 Apparatus for electrical circuits; board, panels	1.1	841 Men's clothing of textile fabrics, not knitted	-1.1

Germany			
Positive impact on trade balance	2003	Negative impact on trade balance	2003
784 Parts & accessories of vehicles (722, 781, 782, 783)	1.7	821 Furniture & parts; bedding & similar stuffed furni.	-2.7
776 Cathode valves & tubes; diodes; integrated circuits	0.9	781 Motor vehicles for the transport of persons	-2.6
542 Medicaments (incl. Veterinary)	0.7	713 Internal combustion piston engines, parts	-1.9
582 Plates, sheets, films, foil & strip, of plastics	0.7	773 Equipment for distributing electricity	-1.0
533 Pigments, paints, varnishes and related materials	0.6	752 Automatic data processing machines	-0.8
728 Other machinery for particular industries	0.6	635 Wood manufacture, n.e.s.	-0.7
641 Paper and paperboard	0.5	761 Television receivers, whether or not combined	-0.6
772 Apparatus for electrical circuits; board, panels	0.5	842 Women's clothing, of textile fabrics	-0.5
657 Special yarn, special textile fabrics & related	0.5	841 Men's clothing of textile fabrics, not knitted	-0.5
598 Miscellaneous chemical products, n.e.s.	0.4	716 Rotating electric plant & parts thereof,	-0.4
France			
Positive impact on trade balance	2003	Negative impact on trade balance	2003
781 Motor vehicles for the transport of persons	0.8	821 Furniture & parts; bedding & similar stuffed furni.	-0.3
542 Medicaments (incl. Veterinary)	0.6	761 Television receivers, whether or not combined	-0.2
776 Cathode valves & tubes; diodes; integrated circuits	0.3	682 Copper	-0.1
591 Insecticides & similar products, for retail sale	0.2	763 Sound recorders or reproducers; television record.	-0.1
553 Perfumery, cosmetics or toilet prepar. (ex. soaps)	0.2	842 Women's clothing, of textile fabrics	-0.1
784 Parts & accessories of vehicles (722, 781, 782, 783)	0.2	562 Fertilizers (other than those of group 272)	-0.1
782 Motor vehic. for transport of goods, special purpo.	0.2	775 Household type equipment, electrical or not	-0.1
741 Heating & cooling equipment & parts thereof, n.e.s.	0.1	334 Petroleum oils or bituminous minerals > 70 % oil	-0.1
598 Miscellaneous chemical products, n.e.s.	0.1	778 Electrical machinery & apparatus, n.e.s.	-0.1
772 Apparatus for electrical circuits; board, panels	0.1	635 Wood manufacture, n.e.s.	-0.1

Source: calculation from COMEXT

Trade deficits with the accession countries also result from imports of traditional products, such as wood manufacture or clothing. It is interesting to note, however, that the deficit in women's clothing decreased between 1993 and 2003. For Germany, this is also the case for men's clothing.

The evolution of revealed comparative advantages (RCA) confirms these observations. The upper part of table 5 shows that furniture is the strongest RCA of the accession countries in their trade with the EU-15. But it also shows that accession countries have specialized in the automobile industry over the last decade, transforming a comparative disadvantage into a comparative advantage. The same pattern may be observed with telecommunication and data processing equipment. Specialization in traditional labor-intensive manufactures has on the contrary decreased.

Table 5. Evolution of the specialization* patterns of AC-10 in their trade with EU and the world

Products	1993	2003	Change
821 Furniture & parts; bedding & similar stuffed furni.	3.1	4.0	0.9
781 Motor vehicles for the transport of persons	-1.7	3.3	5.0
713 Internal combustion piston engines, parts, n.e.s.	0.0	3.0	3.0
764 Telecommunication equipment, n.e.s.; & parts, n.e.s.	-1.6	1.6	3.1
761 Television receivers, whether or not combined	0.0	1.5	1.4
773 Equipment for distributing electricity, n.e.s.	0.4	1.4	1.1
635 Wood manufacture, n.e.s.	1.5	1.1	-0.4
752 Automatic data processing machines, n.e.s.	-1.2	1.0	2.2
248 Wood simply worked, and railway sleepers of wood	1.3	1.0	-0.3
842 Women's clothing, of textile fabrics	5.0	1.0	-4.0

Products	1992	2002	Change
821 Furniture and parts thereof	1.9	3.3	1.4
781 Passengr motor vehicl, exc bus	-0.6	2.5	3.1
713 Intern combust piston engines	-0.1	1.7	1.8
761 Television receivers	-0.1	1.2	1.3
784 Motor vehicl parts, acces nes	0.0	1.1	1.1
773 Electricity distributing equip	0.2	1.0	0.8
635 Wood manufactures nes	1.2	1.0	-0.3
764 Telecom equip, parts, acces	-1.2	0.9	2.1
793 Ships, boats, etc	1.3	0.8	-0.5
843 Women's outwear non-knit	2.8	0.8	-2.0

*See appendix 2 for the definition of the specialization indicator.

Source: calculation from COMEXT data for trade with EU-15 and UNCTAD data for trade with world.

The lower part of table 5 further shows that the overall specialization of accession countries is strongly influenced by their trade with the EU – which is logical given its weight in their international exchanges. One exception is computers, where specialization seems to be focused on trade within the EU-25. Another one is shipbuilding, for which trade on the contrary takes place with extra-EU partners.

These different evolutions in trade patterns suggest that accession countries have indeed shifted their specialization towards rather up-market and medium-to-high technology industries. Moreover, these evolutions are clearer in their trade with the EU, which suggests that the process of enlargement and the related increasing trade and FDI flows have contributed to the upgrading of the accession countries' specialization. This seems to exclude the scenario in which lower trade barriers would lock accession countries into specialization in traditional sectors.⁴ Upgrading in skilled-labor-intensive sectors is probably sustained by the level of training in accession countries since a relatively large share of the population between 25 and 34 has an upper secondary education (Artus 2004, Picciotto 2003)

Overall, actual enlargement will not generate an upsurge in FDI in the new Member States. Rather, multinationals are adjusting their structure to the new requirements of the enlarged European economic space. They specialize, close down or expand production at various sites in the new Member States and also transfer production to them. Labor cost advantage in comparison with EU15 will remain for quite some time after enlargement and attract further FDI from Western Europe, in particular in the skilled-labor-intensive sectors we have identified in this section. At the same time, the new members will lose low-tech labor-intensive manufacturing to countries further east or to Asian competitors, which also constitutes the continuation of the specialization trends that emerged in the late 1990s.

Beyond overall patterns, it is clear that industrial specialization varies among the EU 15 and among the CEECs. The next section explores these differences by studying specific sectors.

2. Sectoral Patterns

This second part explores in more detail the case of three industrial sectors: the automobile industry, ICT and the textile and clothing industry. In each case it analyses the interactions between firms' strategies and trade patterns. It also discusses the respective role of market seeking and cost efficiency motivations in firms' location decisions.

⁴ Dupuch et al. (2004) discuss this scenario as one hypothesis suggested by some economic geography models, but conclude that for most accession countries it is less probable than the upgrading scenario, which involves more intra-industry trade.

2.1 The Automobile Industry

The automobile sector is a major European industry and any impact that enlargement has on it will be of considerable importance. Moreover, the automobile industry has been at the forefront of European integration since the 1960s, and again with the most recent enlargement as the accession States have already been integrated into the pan-European activities of the carmakers and component suppliers.

The Western European car market is the world's largest, with some 15.5 million units a year. The accession countries will add a little less than a million to this total. Since the 1990s, the automobile industry has maintained its importance within the EU economy, with relatively dynamic sales and fairly successful international expansion. Over the last decade, the location of new investment by European carmakers has nevertheless clearly shifted towards accession countries. The latter have also been chosen to site new factories by a number of Asian carmakers, which are increasing their investments and market share in Europe.

European integration

The European automobile industry has gradually become more integrated since the 1960s and each enlargement has extended the geographical scope of this integration. Investment in greenfield sites and purchase of local operations in CEEC countries started in the early 1990s and much of the entry effects have been anticipated. As CEEC countries signed various agreements with the EU during the 1990s⁵, the integration process was further facilitated. Table 6 shows that since the 1990s, most new car plants have been located in Eastern Europe, including East Germany in the case of Volkswagen and GM. Besides, Western European carmakers have also acquired local brands, such as Skoda and Dacia. Both Volkswagen and Renault have invested heavily in their new affiliates in order to modernize production facilities and train workforces. Skoda now has an annual production capacity of about 500,000 cars. In 2003, Dacia produced some 70,000 cars and Renault has increased the production capacity of the Pitesti factory to produce 200,000 units of the Logan, aimed at emerging markets. As a result of these substantial investments, local production now stands at 1.3 million cars a year. If the announced capacity expansion (table 6) effectively comes on stream, automobile production in the AC-5 (Poland, Czech Republic, Slovakia, Slovenia and Hungary) will double by 2007 to 2.6 million cars (Heymann 2004).

⁵ Starting in 1995, a zero tariff regime has been applied to EU imports.

Table 6. New car plants in Europe 1990-2006

Company of production	Starting date	Location	Nature and annual capacity
VW	1990	Zwischau, East Germany	Cars : 250,000
VW	1990	Chemnitz, East Germany	Engines : 400,000
VW	1993	Poznan, Poland	Cars, vans : 150,000
VW Seat	1993	Matorell, Spain	Cars : 50,000 (in 2001)
VW	1993	Bratislava, Slovakia	Cars : 250,000
VW	1999	Polkowice, Poland	Engines : 540,000
VW	2002	Dresden, East Germany	Cars : 50,000
GM	1992	Eisenbach, East Germany	Cars : 550,000
GM	1992	Szentgotthárd, Hungary	Mainly engines : 1,220,000
GM	1998	Gliwice, Poland	Cars : 100,000 (in 2001)
Ford	1990	Hungary	Components
Ford	1992	Plonsk, Poland	Cars : 10,000 (in 2000)
BMW	2005	Leipzig, East Germany	Cars : 150,000
Fiat	1990	Tychy, Poland	Cars : 200,000
Hyundai-Kia	2006	Zilina, Slovakia	Cars : 200,000
Mercedes	1992	Rastatt, West Germany	Cars
Micro Compact Car Smart	1997	Hambach, France	Cars : 200,000
Porsche	2002	Leipzig, East Germany	Cars : 30,000
PSA Toyota	2005	Kolin, Czech Republic	Cars : 300,000
PSA	2006	Trnava, Slovakia	Cars : 300,000
Suzuki	1992	Esztergom, Hungary	Cars : 100,000
Toyota	2001	Onnaing, France	Cars : 210,000
Toyota	2004	Poland	Cars : 250,000

Sources: CCFA (2004), Rhys (2004)

Since the early 1990s, the accession countries have thus been progressively integrated into the “European motor industry” (Rhys 2004). German carmakers have been the first to locate new production capacities in Eastern Europe. This is due both to geographical proximity and to the major crisis experienced by the German car industry in the early 1990s. The German carmakers have been obliged to clamp down on costs to restore their international competitiveness, and relocation of production to Eastern Europe should be interpreted as part of this effort. Apart from geographical proximity, Eastern European countries are attractive because of a very good level of automobile-specific training and an increasingly stable political situation.

The types of cars and components being produced reflect the dual motivation for investing in CEECs: low costs and increasing local demand. Cost factors have been strongly emphasized, but the potential for demand growth in catching-up countries has also been an important factor of attraction for new investments. Cost and demand factors combine to explain why a number of production units in accession countries tend to specialize in small cars and low-cost cars. Demand for cars in these countries focuses on the small and lower middle-class segments, which accounts for 70 to 80% of total new vehicle registrations (Heymann 2004). Fiat has been using Poland to source its mini car and Renault will source the Logan from Romania. Major new investments by PSA and Toyota are also geared to making small cars. These cars correspond to the purchasing power of local customers. They also tend to be relatively labor-intensive as the labor content does not increase proportionately with the size and sophistication of cars. It thus seems logical to produce smaller models in low-wage countries. Consequently, the ability of a carmaker to locate production of a given model in CEECs also depends on its existing European organization of production. For example, VW and GM were already concentrating the production of their small models in Spain.

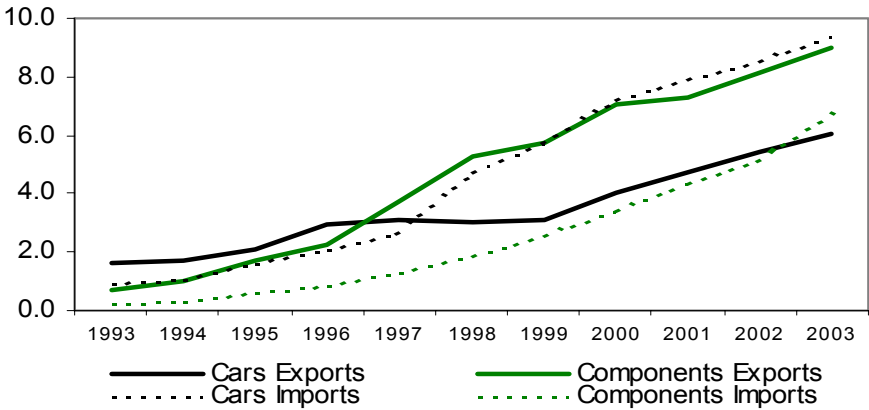
Rhys (2004) suggests that the labor cost argument may be overdone as labor content is relatively low in the car industry: 10% of assembly costs and 5 to 7% in the manufacture of engines. Labor cost may nevertheless remain a relevant factor as competition is tightening and the wage differential remains substantial between Eastern and Western Europe. Besides, in some cases, a large wage differential actually leads carmakers to reduce automation of assembly lines in low-wage countries. Some of the new plants in CEECs have similar capital-to-labor ratios as other EU factories, but Renault has limited automation at Dacia in Romania, where wages are 14 times lower than in France⁶. As a result of lower automation, the Pitesti factory has 13,000 employees in two shifts to produce 100,000 cars a year. This can be compared with Flins in France, where 5,000 employees produce 300,000 cars a year (Fainsilber 2004). Flexibility is a complementary factor that impacts on labor costs. French carmakers have implemented the 35-hour week but have negotiated more flexibility with the unions, which can constitute an advantage in comparison with German carmakers. In addition to very high wages in the West German car industry, this may partially explain the difference in attitudes that German and French carmakers have been showing recently about relocation of production in the accession countries.

⁶ 150 euros a month.

The intra-European automobile trade

The location of car factories in the CEECs has gradually attracted component manufacturers to supply local assembly lines. A large number of component suppliers now have locations in CEECs. Western European suppliers have a larger presence, but American and Japanese competitors also have a number of locations in the CEECs. Besides, since a number of Eastern Europe car factories are relatively small, carmakers have been concentrating the manufacture of some major components such as engines in a limited number of locations, in order to maximize economies of scale. The new geography of the car industry in Europe has thus generated increasing trade flows between the EU and accession countries, in both cars and components (Figure 9a).

Figure 9a. Automobile trade of the EU with the AC-10, 1993-2003, €bn



Source: COMEXT

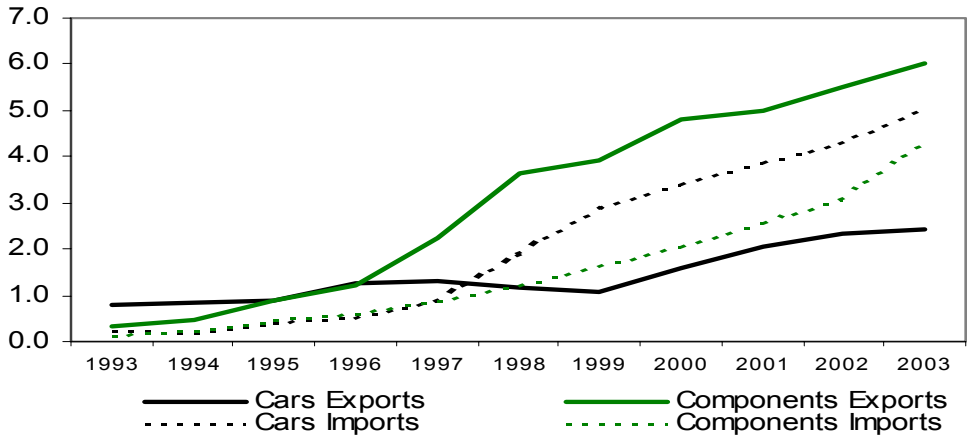
Figure 9a shows that car imports from the AC-10 have been much more dynamic than exports. The EU’s growing trade deficit with the accession countries results from the fact that a large share of production from new facilities in AC-10 is being exported. Exports of car components to the AC-10 have increased more quickly than imports, resulting on the contrary in a trade surplus. As a result of these changes, the EU has since 2001 run a trade deficit with the AC-10 in the automobile industry.

The EU trade deficit actually comes primarily from trade between Germany and the AC-10. The two main EU car producers, Germany and France, are in quite different situations. Germany, a global exporter of cars⁷, has a swelling trade deficit with the CEECs, while France has a surplus. Figure 9b shows that the location of German carmakers in Eastern Europe has resulted in a growing trade deficit in cars since the late 1990s. This trend has

⁷ Overall, in 2003, the German automotive sector generated a foreign trade surplus of € 72 bn, accounting for some 55% of the country’s total export surplus in manufacturing (Heymann 2004).

been offset by a trade surplus in components, but component imports are now increasing as well. As a result, in 2003 Germany had a deficit for its overall car trade with the AC-10.

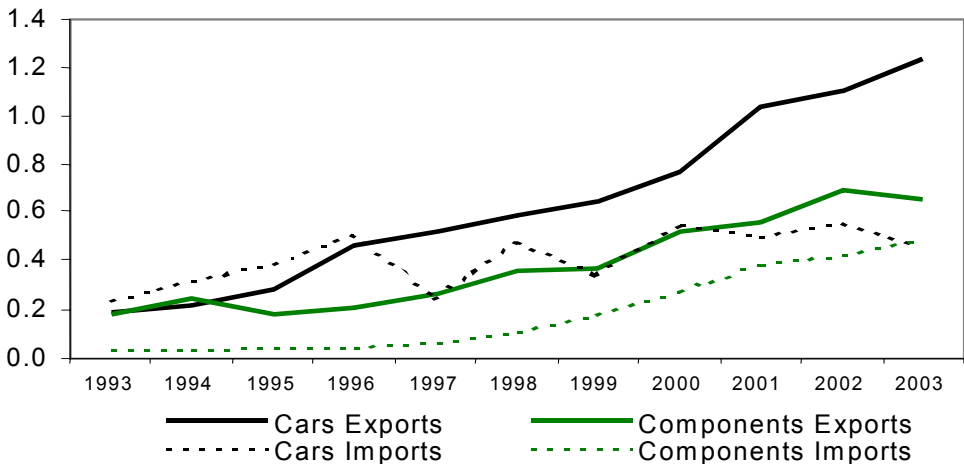
Figure 9b. Automobile trade between Germany and the AC-10, 1993-2003, € bn



Source: COMEXT

The new Eastern European factories of French carmakers have not yet come on stream, which is why France still has a trade surplus in cars with the AC-10 (figure 9c). This situation could change over the next few years as the new facilities from Renault, PSA and Toyota start producing new models for exports to France⁸.

Figure 9c. Automobile trade between France and the AC-10, 1993-2003, € bn



Source: COMEXT

⁸ Table XX includes the Romanian production capability of Renault.

Post-enlargement dynamics

The car markets of the accession countries should reach 1.4 million units in 2014. Despite vigorous growth, Eastern Europe will not be able to rise beyond its niche position with the EU-25. Production capacity is expected to grow even more dynamically and reach 3.5 million units by 2014.⁹ Few new sites will be built owing to prior investment since the 1990s and the fact that accession countries are not the only areas attractive to investors, but the factories coming on stream will progressively reach their optimum operational capacity utilization. Moreover, some units should enjoy productivity increases. The gap between local consumption and production means that a substantial share of production will be exported. Accession countries should thus become more tightly integrated into the trans-European car industry networks. At the same time, their specialization in automobiles should increase still further, both for cars and components (table 4 above). Progressively, related design and R&D activities should reinforce local capabilities, which may create strong centers of competence. The west of Slovakia could become such a center of competence.

The continuing expansion of car production in accession countries means that the relocation of production from Western to Eastern Europe will progress. Capacity reduction in the EU-15 should however set in only gradually. As a result, capacities will increase faster in Eastern Europe than they will be downscaled in the West. As a consequence, both Eastern and Western European production facilities will feel strong pressure to increase productivity. The experience of previous enlargements suggests that marginal facilities for which economies of scale are insufficient will have to close (Rhys 2004). Recent developments have shown that Portugal and even Spain have lost production volume to Eastern Europe. Heightened competition and tighter integration will also require productivity increases in the accession countries. The Czech Republic and Slovakia can draw on a tradition of automobile production to progress further. The challenge may be more difficult for Poland, where large improvements in applied technology and supplier networks will be necessary in order to keep up in terms of cost and quality.

⁹ This forecast is for AC-5 (Heymann 2004), and thus does not take Romania into account.

Overall, enlargement should expand and strengthen the EU car industry. The expansion of their production network to integrate lower-cost countries should enable carmakers to strengthen their competitiveness. European carmakers and component suppliers will nevertheless have to simultaneously face the challenge of deepening globalization. New production capacities in Eastern Europe and a number of large emerging countries will exacerbate the problem of global excess capacity, which is estimated at 25 to 30%. In Europe, EU producers will have to face increasing pressure from Japanese carmakers, which also invest in accessing countries. As a result, profitable operations will only result from continuous productivity improvements and good design capability. Cost pressures will also be passed on to component suppliers, where wage costs account for a higher share than at carmakers. In the medium to long range, both car and component production capabilities will shift eastward, but the process will be gradual and will enhance the competitiveness of the EU-25 car industry.

2.2 Information and Communication Technologies

Since the 1980s, ICT has rapidly globalized as an increasing number of countries have been involved in ever more complex international value chains. Outsourcing of production by American producers in particular has led to the relocation of activities to a number of emerging economies. In the 1990s, production has spread to yet other locations through relocation by American, Japanese and European firms. Some activities have also been shifted from emerging countries to lower-cost locations. As a result, ICT production, which belongs to high-tech industries, is now spread widely among emerging countries in Asia (China, Singapore...), Latin America (Mexico, Brazil) and Eastern Europe (Hungary, Czech Republic, Estonia, Poland). Most recently, the emergence of China as a major producer has attracted much attention, but it should be seen in this wider historical context. It has tended to both increase further the competitive pressure and refine the regional and international division of labor in ICT.

In 2002, China, Japan and the United States were the main exporters of ICT. China has become the leading exporter over the last decade, with a share of world exports increasing from 2 to 15% (table 7). Japan's share of ICT exports worldwide has on the contrary decreased substantially, from 23 to 11%. The share of some European countries have also increased remarkably. Among EU countries, this is the case for Ireland, and especially Finland. It is also the case for a number of CEECs, especially Hungary.

Table 7. Countries' exports and imports of ICT, 1992 and 2002

	Exports				Imports			
	<i>bn of dollars</i>		<i>% of world</i>		<i>bn of dollars</i>		<i>% of world</i>	
	1992	2002	1992	2002	1992	2002	1992	2002
China	5.0	68.2	1.9	15.4	4.6	31.2	1.6	5.9
Japan	61.4	50.3	23.2	11.3	9.5	34.0	3.3	6.5
United States	38.2	49.8	14.4	11.2	63.4	146.0	22.3	27.7
Korea, Republic of	9.6	36.5	3.6	8.2	3.3	10.3	1.2	2.0
United Kingdom	16.6	35.8	6.3	8.0	21.0	37.9	7.4	7.2
Singapore	20.3	33.5	7.7	7.5	11.0	20.3	3.9	3.9
Germany	17.7	33.0	6.7	7.4	29.0	42.9	10.2	8.2
Mexico	5.0	30.4	1.9	6.8	4.8	16.8	1.7	3.2
Ireland	4.9	18.9	1.8	4.2	2.7	10.2	1.0	1.9
France	11.2	17.6	4.2	4.0	15.7	22.6	5.5	4.3
Finland	1.5	8.6	0.6	1.9	1.4	3.2	0.5	0.6
Canada	5.3	8.2	2.0	1.8	9.9	17.5	3.5	3.3
Hungary	0.3	7.8	0.1	1.8	0.8	4.5	0.3	0.8
Sweden	3.9	7.3	1.5	1.7	4.1	6.2	1.4	1.2
Philippines	0.6	7.1	0.2	1.6	0.8	4.5	0.3	0.9
Italy	5.9	6.0	2.2	1.4	10.4	14.9	3.7	2.8
Denmark	1.4	4.4	0.5	1.0	2.5	5.5	0.9	1.1
Czech Republic	0.0	3.5	0.0	0.8	0.0	3.4	0.0	0.6
Israel	1.1	3.4	0.4	0.8	1.0	2.6	0.3	0.5
Austria	2.2	2.9	0.8	0.7	3.3	4.7	1.2	0.9
Poland	0.1	1.6	0.0	0.4	0.9	3.5	0.3	0.7
Turkey	0.2	1.6	0.1	0.4	0.9	2.1	0.3	0.4
Switzerland	1.3	1.3	0.5	0.3	4.2	5.9	1.5	1.1
Australia	0.6	1.3	0.2	0.3	4.5	8.0	1.6	1.5
Costa Rica	0.0	0.9	0.0	0.2	0.1	0.5	0.0	0.1
Norway	0.7	0.9	0.2	0.2	1.8	3.0	0.6	0.6
China, Hong Kong SAR	4.3	0.8	1.6	0.2	14.2	43.4	5.0	8.2
Estonia	0.0	0.6	0.0	0.1	0.0	0.4	0.0	0.1
Romania	0.0	0.5	0.0	0.1	0.3	1.0	0.1	0.2
Slovakia	0.0	0.4	0.0	0.1	0.0	0.8	0.0	0.2

Source : CNUCED

ICT in Europe

ICT is one important sector in European industry, but with wide differences in the degree of specialization between countries. Ireland, Finland and to a lesser extent Hungary have been increasing their specialization in ICT (table 8).

Table 8. Share of ICT value added in total business sector

	1995	2000
Ireland	14.8	16.5*
Finland	8.4	15.6
United States	9.4	11.1
Hungary	-	10.6*
Kingdom	9.4	10.4
Netherlands	9	10.3
Belgium	8.4	10.1
Japan	7.5	9.5
Czech Rep.	4.5	8.8
Norway	7.1	8.6
Denmark	7.9	8.5
France	8.0	8.4
Portugal	7.4	8.3
Austria	-	8.2
Spain	6.2	7.9
Italy	6.2	7.0
Germany	5.6	6.2
Slovakia	4.6	5.4

* value for 1999.

Source: OECD

Table 9 shows that different European countries specialize in different ICT products. Telecommunication equipment is the main sector for most European countries, but is particularly important in Finland and Austria. The share of computing is highest for Ireland, Hungary and the Netherlands. Instruments remain a strong sector, especially in Germany and the Netherlands.

Table 9. Share of different industries in ICT
(as a % of total ICT production)

	Office, accounting and computing machinery	Insulated wire cable	Radio, television and communication equipment and apparatus	Instruments and appliances for measuring, checking, testing, navigating
UE-15	15	5	60	20
UE-25	16	6	59	20
Germany	17	5	47	30
Austria	2	6	83	8
Denmark	17	5	55	23
Finland	2	2	94	2
France	16	5	54	18
Hungary	40	7	44	9
Ireland	45	2	50	3
Netherlands	34	14*	15	32
Poland	7	21	51	21
Czech Rep.	6	16	56	22
Kingdom	17	5	55	23

* Does not include sound and image recording.

Source: European Commission

These profiles are reflected by trade performances (table 10). Overall, telecommunication equipment is a strong sector for European countries. Finland, Hungary and Estonia have remarkably increased their market share and specialization in this sector. But larger, more traditional producers such as the UK, Germany and France have also strengthened their positions. The market share of the EU-15 has grown from 31 to 41% of world exports, while that of the accession countries has grown from less than 1% to nearly 4%.

European performance is much weaker in all other ICT sectors. TV and radio have become dominated by emerging countries over the last decade, including in particular Mexico and China. Japan is the only developed country that has held on a substantial market share, especially in TV. Japan has also retained a very high market share in sound recording, but here again, China has become a major competitor. In these three media equipment sectors, the CEECs, and especially Hungary, substantially increased their market share and specialization over the 1990s. In data processing equipment, China has remarkably increased its market position, partly to the detriment of Japan. The position of Europe has weakened, except for three countries which have become specialized in the production of personal computers: Ireland, Hungary and the Czech Republic.

Table 10. World market shares and country export share of ICT sectors

752 Automatic data processing equip	Share in world exports (in %)		Share in country exports (in %)		759 Office, adp machy parts, acces	Share in world exports (in %)		Share in country exports (in %)	
	1992	2002	1992	2002		1992	2002	1992	2002
	Philippines	0.2	3.6	1.8		12.8	Costa Rica	0.0	1.0
Singapore	12.4	12.3	15.4	12.4	Ireland	4.6	8.4	9.6	8.9
Ireland	2.2	6.7	6.1	9.6	Singapore	4.8	10.5	4.5	7.9
China	0.4	15.9	0.4	6.2	Korea, Republic of	1.4	8.5	1.1	4.9
Mexico	0.6	7.3	1.0	5.8	China	1.0	14.9	0.7	4.3
Hungary	0.0	1.5	0.1	5.4	Philippines	0.0	1.6	0.2	4.2
Korea, Republic of	2.7	6.5	2.8	5.1	Japan	18.4	14.9	3.2	3.3
Czech Republic		1.4		4.8	United Kingdom	6.7	7.2	2.1	2.3
United Kingdom	8.5	7.4	3.5	3.2	United States	18.7	14.1	2.6	2.1
Japan	20.2	8.8	4.7	2.7	Hong Kong	3.3	0.4	6.5	2.0
United States	19.2	13.2	3.5	2.6	Hungary	0.0	0.6	0.1	1.7
EU(25)	32.4	30.4	1.6	2.0	Mexico	0.9	2.9	1.1	1.7
European Union	32.3	27.3	1.6	1.9	European Union	33.2	26.6	1.2	1.4
Hong Kong	0.6	0.2	1.4	1.5	Czech Republic		0.6		1.4
Germany	6.6	7.2	1.2	1.5	Israel	0.2	0.4	0.7	1.4
France	4.7	3.5	1.6	1.4	EU(25)	33.3	27.9	1.2	1.4
Austria	0.4	0.7	0.7	1.2	Denmark	0.5	0.6	0.7	1.1
Sri Lanka	0.0	0.0	0.0	0.9	Germany	5.5	5.6	0.8	0.9
Denmark	0.4	0.4	0.7	0.8	Austria	0.6	0.6	0.8	0.8
Sweden	0.8	0.4	1.1	0.6	France	4.2	2.4	1.1	0.7

761 Television receivers	Share in world exports (in %)		Share in country exports (in %)		762 Radio-broadcast receivers	Share in world exports (in %)		Share in country exports (in %)	
	1992	2002	1992	2002		1992	2002	1992	2002
	Mexico	7.9	27.4	2.9		4.2	Mexico	6.9	18.8
Turkey	1.1	5.9	1.3	4.1	Israel	1.0	3.1	1.1	1.0
Poland	0.0	4.4	0.0	2.7	China	11.2	31.8	1.7	0.9
Hungary	0.1	2.2	0.2	1.6	Hungary	0.0	3.1	0.0	0.9
Korea, Republic of	9.1	8.5	2.0	1.3	Singapore	13.1	6.0	2.7	0.5
Czech Republic		1.8		1.2	Philippines	0.4	1.3	0.5	0.3
Japan	14.3	15.3	0.7	0.9	Andorra	0.0	0.0	0.0	0.3
Slovakia		0.5		0.8	Korea, Republic of	8.9	3.6	1.5	0.2
China	4.3	9.8	0.8	0.7	Japan	21.8	8.5	0.9	0.2
Belarus	0.1	0.2	0.3	0.7	Denmark	0.4	0.9	0.1	0.2
Romania	0.0	0.3	0.0	0.5	France	1.9	4.7	0.1	0.1
Denmark	0.6	1.1	0.2	0.5	Germany	3.6	7.8	0.1	0.1
Slovenia	0.1	0.2	0.2	0.5	United States	2.9	7.4	0.1	0.1
Singapore	7.8	2.4	2.1	0.5	South Africa		0.3		0.1
France	4.9	5.6	0.4	0.4	EU(25)	13.7	18.8	0.1	0.1
EU(25)	31.0	25.6	0.3	0.3	European Union	13.6	15.3	0.1	0.1
United Kingdom	5.9	3.8	0.5	0.3	Czech Republic		0.3		0.1
Sweden	0.3	1.0	0.1	0.3	Sweden	0.1	0.5	0.0	0.1
European Union	30.6	16.5	0.3	0.2	Latvia	0.0	0.0	0.1	0.0
Germany	6.0	3.4	0.2	0.1	United Kingdom	1.1	0.8	0.1	0.0

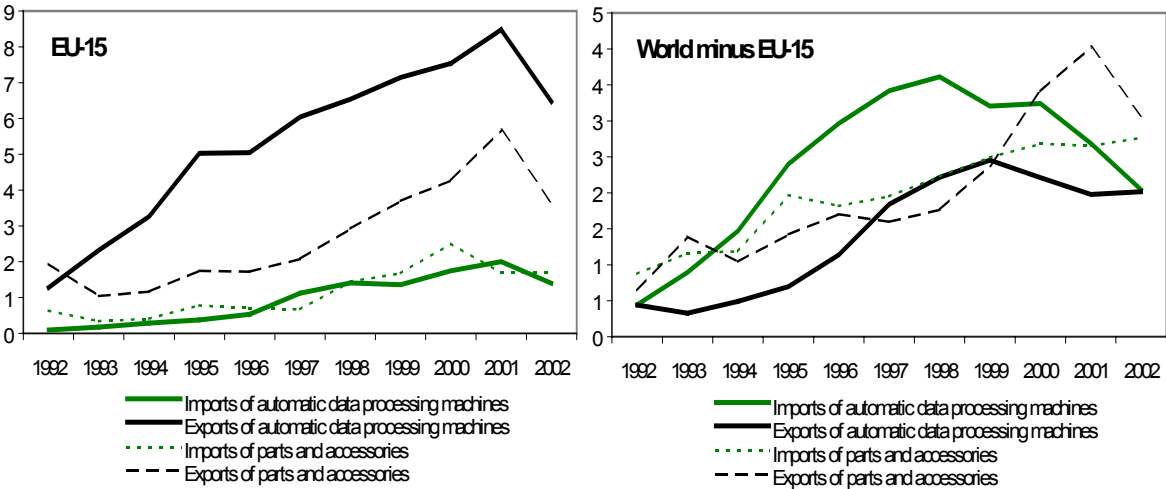
763 Sound recorders, phonographs	Share in world exports (in %)		Share in country exports (in %)		764 Telecom equip, parts, acces	Share in world exports (in %)		Share in country exports (in %)	
	1992	2002	1992	2002		1992	2002	1992	2002
	Japan	46.1	41.2	2.3		2.2	Finland	1.1	5.1
China	1.9	28.7	0.4	2.0	Estonia	0.0	0.3	0.2	12.4
Hungary	0.1	2.8	0.1	1.8	Hungary	0.3	2.4	2.0	11.3
Andorra	0.0	0.0	0.0	1.3	Korea, Republic of	3.4	9.8	3.0	9.8
Korea, Republic of	8.7	8.3	1.9	1.2	Israel	0.8	1.5	4.2	8.1
Singapore	8.0	5.1	2.2	0.9	Sweden	3.8	3.7	4.6	7.3
Slovakia		0.2		0.3	China	2.0	12.6	1.6	6.2
Mexico	0.8	1.7	0.3	0.2	United Kingdom	4.9	10.9	1.7	6.0
Denmark	0.3	0.5	0.1	0.2	Mexico	2.1	5.8	3.1	5.8
United Kingdom	3.2	2.1	0.3	0.2	Denmark	0.9	1.8	1.5	5.2
Sweden	0.1	0.5	0.0	0.1	Singapore	4.2	3.4	4.5	4.4
EU(25)	19.6	11.1	0.2	0.1	EU(25)	31.6	44.2	1.3	3.7
United States	2.8	3.1	0.1	0.1	European Union	30.9	40.6	1.3	3.6
Ireland	0.0	0.4	0.0	0.1	Romania	0.0	0.3	0.1	3.0
Germany	6.4	2.7	0.3	0.1	France	4.2	5.2	1.2	2.8
European Union	19.5	8.0	0.2	0.1	United States	14.2	10.7	2.3	2.7
France	2.7	1.2	0.2	0.1	Ireland	0.6	1.5	1.4	2.6
Austria	2.9	0.2	1.1	0.1	Japan	25.9	6.7	5.2	2.6
Czech Republic		0.1		0.1	Germany	8.0	9.6	1.3	2.5
Israel	0.0	0.1	0.0	0.1	Austria	0.7	1.1	0.8	1.9

* See appendix 1 for the precise definition of ICT based on UNCTAD data. Source: UNCTAD

The location of production of computer hardware in Europe

Ireland has specialized in the production of computers as a consequence of relocation of production, mainly by American multinationals.¹⁰ Ireland has attracted American and European multinationals because it accumulated a host of favorable factors: good infrastructures and integration into the EU, high qualification and productivity of the workforce, moderate wages and attractive company taxation. In 1999, Ireland manufactured 33 % of the PCs sold in Europe (Barry and Curran 2004). Since Ireland has become a location for computer production, though, the industry has kept moving along its life cycle and firms have looked for lower-skill locations. In this context, enlargement has meant new opportunities for firms to relocate assembly to CEECs (Dedrick and Kraemer 2002a). This section examines to what extent Ireland will suffer from enlargement through relocation of computer production to new members, especially Hungary, the most specialized in the sector.

Figure 10. Imports and exports of Ireland in data processing equipment
(\$ Billion)



Source: OECD

Figure 10 shows that Ireland has steadily increased its exports of computers to the EU over the 1990s and up until the recession of the early 2000s. Ireland has also stepped up its exports of components to the EU. Extra-EU exports of components have also been very dynamic, offsetting the slight decrease in computer exports at the beginning of the 2000s.

¹⁰ Almost 90% of computer hardware employment in Ireland is in foreign-owned firms, predominantly American (Barry and Curran 2004).

Extra-EU trade flows depend heavily on exchanges with the United-States: they have decreased as a destination of computers, but have increased their share of Irish exports of components since the late 1990s (table 11). Finally, extra-EU imports of components have grown steadily since the early 1990s. The bulk of components used to come from the United States, the UK and Japan, but their share has been falling to the benefit of China, Taiwan and France.

**Table 11. Main trade partners of Ireland in computers
(In % of total import or export)**

	75997 Parts, accessories of the machines of group 752			752 Automatic data processing machines, n.e.s.			
	Imports	Imports	Imports	Exports	Exports	Exports	
	1992	1997	2002	1992	1997	2001	
United States	31.7	26.2	18.3	United Kingdom	18.4	24.9	32.4
United Kingdom	22.5	14.1	16.8	Germany	14.5	16.0	15.1
France	3.8	6.8	11.9	France	15.6	10.3	9.6
China	0.1	0.9	9.9	Netherlands	6.8	12.8	8.6
Chinese Taipei	3.3	7.2	8.8	United States	14.1	4.6	2.2
Hong Kong China	2.0	0.8	5.6	Sweden	4.2	2.9	4.0
Korea	0.2	3.6	4.0	Spain	3.5	1.6	2.8
Japan	14.7	8.5	3.6	Italy	5.8	2.3	2.9
Netherlands	6.6	1.9	3.3	Belgium			2.4
Germany	5.7	1.8	2.7	Japan	1.5	0.4	3.2

Source: ITCS, OCDE

Overall, trade and production data suggest that Ireland has been moving up the value chain in computers. Ireland was first an assembly site and imported components from the United States and the UK. But as a number of Asian emerging countries have entered the market and cost competitiveness increased, especially after the crisis in the early 2000s, Ireland has shifted from computer assembly to producing components. Much of the production of peripherals has shifted to Asia, and a substantial share of computer assembly has moved to CEECs (Barry and Curran, 2004). As a consequence, the Irish authorities have been supporting an upgrading move by investing in tertiary education and keeping up the effort to attract foreign investment. Intel investment in a new microprocessor production unit in 2004 has received financial support from the Irish Development Authority.¹¹ So has Hewlett Packard's R&D center located at Leixlip (DREE 2004).

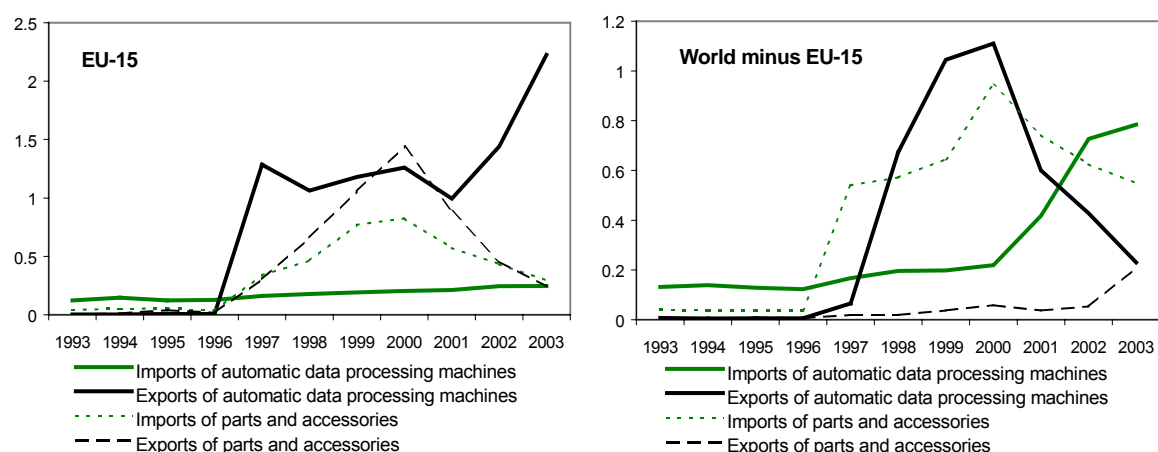
¹¹ « Intel investit 2 milliards de \$ en Irlande et ajoute une unité de fabrication 300 mm », <eetimes.fr>, 19 May 2004.

Dell's strategy illustrates the trajectory followed by firms in the computing sector. Increased global competition as well as emerging local demand has triggered the search for new locations in Eastern Europe. Dell has located factories in Hungary, Poland and the Czech Republic. It also has a commercial unit in Slovakia in charge of after sales service for Eastern Europe and Africa (Jerinte 2004). At the same time, Dell reduced its employment in Ireland by 600 in 2001. Dell's now has about 4,500 employees in Ireland. The Limerick site (3000 employees) is in charge of production, R&D and sales through a call center. Bray and Cherrywood (1500 employees) specialize in finance, administrative, commercial and technical services. Dell imports components such as CD-ROM peripherals and integrated circuits from Asia and has them assembled by contract manufacturers (Dedrick and Kraemer 2002b). In Hungary, for example, Flextronics has four assembly sites with 9,000 employees, representing 15 % of its world production capacity (Binder, 2001). Dell keeps control over the final assembly stage and testing.

Hungary has been a major beneficiary with regard to relocation of assembly operations from Ireland. As the CEECs started their transition to the market economy, Hungary became particularly attractive because of its lower wages¹² but also because of its past experience in the production of electronics within the COMECON. Early on, foreign companies such as Dell and IBM bought up several Hungarian production units (Minefi 2002). Figure 11 shows that Hungarian exports of computers to EU countries have been very dynamic since the late 1990s. The picture is quite different for extra-EU trade. Figure 11 and table 12 indicate that Hungary has stopped exporting computers to the United States. More and more imports come from China. As a result, extra-EU trade balance in computers is negative. The trade balance in components is also negative, but decreasingly so.

¹² In 2000, the average hourly wage in industry was 4 times lower than in Ireland (Commission européenne 2003).

**Figure 11. Hungary's imports and exports of data processing equipment
(USD bn)**



Source: ITCS, OECD

During the 1990s, China became by far the main source of computer components for Hungary, while the share of Germany, the United States and Mexico dropped (table 12). Hungary focuses on assembly of computers for which it has been a cost-competitive location (DREE 2001). Hungary, like other accession countries, has nevertheless experienced some relocation to China. For example, IBM has relocated its Hungarian manufacturing unit of hard disk drives (in Székesfehérvár) and has laid off 3700 employees.¹³ In 2002, Flextronics relocated its manufacturing of Microsoft Xbox set tops from Hungary and Mexico to China (DREE 2002), a move which has led to the elimination of 1,100 jobs in Hungarian facilities.¹⁴

**Table 12. Hungary's main trade partners for computers
(as a % of total imports or exports)**

	75997 Parts, accessories of the machines of group 752			752 Automatic data processing machines, n.e.s.			
	Imports		Imports	Exports		Exports	
	1993	1998	2003	1993	1998	2003	
China	0.5	94	25.7	Germany	12.9	14.0	33.1
Italy	1.3	6.8	18.7	Netherlands	0.8	22.3	17.9
Germany	18.7	32.0	6.6	Austria	3.5	0.4	17.1
Japan	2.0	4.5	5.5	United Kingdom	6.0	8.8	6.3
Malaysia	0.0	3.4	5.1	France	3.4	1.2	4.6
Indonesia	0.0	0.0	4.9	Spain	0.0	0.1	3.7
Mexico		10.3	4.5	United States	2.3	24.8	3.6
United States	20.4	11.0	4.5	Italy	0.7	0.6	3.3
Chinese Taipei	10.9	0.7	4.0	Belgium			1.1
Ukraine	0.0	0.0	2.7	Denmark	0.2	0.0	1.1

Source: ITCS, OCDE

¹³ DREE (2002), Ricard (2004).

¹⁴ « Flextronics supprime 1100 emplois en Hongrie », *L'Usine Nouvelle*, 16 mai 2002.

Fears of EU countries losing jobs to new members in ICT sectors may thus be misplaced. As illustrated by the case of Ireland, increased competition has led European countries to move up the value chain towards sophisticated components and R&D. Since 1995, assembly has been partly relocated in accession countries, but high-end production activities and related services have remained geographically more stable. As a result, during the 1990s, net job gains in the fabrication of microprocessors and other sophisticated components has more than made up for the loss of jobs in computer equipment (Barry et Curran, 2004). If the emerging division of labor between EU countries and accession countries is to be strengthened, the former should nevertheless keep their efforts up. The repositioning of Ireland for example has been possible because of the local availability of adequately trained engineers. Ireland has the highest proportion of graduates in mathematics, science and technology in Europe - 23.2 % as opposed to 3.7 % in Hungary (Dunne, 2001). This keeps productivity much higher than in the accession countries (CE, 2003). Ireland is now stepping up its R&D spending in order to boost productivity yet further and cope with a possible reduction in the availability of engineers (DREE 2004). Finally, the country also enjoys good infrastructures, which is key to speeding up communication and distributing products to Europe.

Moreover, wages tend to increase more rapidly in the accession countries than in the EU-15, thereby tending to erode the cost-competitiveness of production in new Member States. This convergence movement will nevertheless increase standards of living and stimulate local demand. Overall, Western and Eastern European producers may find complementary positions along the computer value chain. Trade data have nevertheless shown that the EU-25 is definitely not a closed regional market for computers. Both the US through its multinational companies and Asian manufacturers are major actors in the global supply chain. As a result, producers from EU-15 and from accession countries do not compete directly but the latter may be vying with Chinese manufacturers for some products. Both Western and Eastern European producers are included in global value chains and have to maintain their competitiveness as part of these chains. This may be particularly difficult as the main brands in this sector are either American or Asian. European firms should make the most of the persistent need to regionalize at least part of the value chain in order to tailor products to local market demand.

The production networks and trade in mobile phones

During the 1990s, European companies were leaders in the dynamic mobile phone market. The first part of table 13 shows that there are three European companies among the first five producers of mobile phone terminals.¹⁵ Tough competition and new entrants had led to very volatile market shares among the leaders: since the late 1990s, the share of Ericsson has been divided by three, while that of Samsung has more than doubled and that of Siemens has quadrupled. Mobile phones are a high-tech sector where innovation and new product generations offer windows of opportunity for new entrants. European companies have taken advantage of the second generation of mobile phones, but Samsung may be in a good position for the third generation and its company structure may be an advantage in an era when different technologies are converging. The Korean producer specializes in internet-enabled, color-screen camera phones.

Table 13. Leading mobile equipment manufacturers

a. Top five manufacturers in mobile phones (global market share as a %)

Firm	Country of origin	1998	2001	2003
Nokia	Finland	26	35	35
Motorola	USA	20	15	15
Samsung	Korea	5	7	11
Siemens	Germany	2	7	8
Sony Ericsson	Sweden	16	7	5

b. Top five manufacturers in mobile networks (global market share as a %)

Firm	Country of origin	1998	2001	2003
Sony Ericsson	Sweden	34	31	24
Nokia	Finland	8	11	14
Siemens	Germany	4	8	12
Lucent	USA	14	10	11
Nortel	Canada	10	12	11

Source: IDATE (2003) and Gartner (2004) for 2003.

¹⁵ Ericsson teamed up with Sony in 2001.

Table 13 shows that the European leadership is also strong in mobile network equipment, where the main competitors are from North America. This is because competitiveness depends relatively more on accumulated technological capabilities in telecommunication than in the handset segment.

In the handset segment, competition depends both on innovativeness and on costs. As a result, European leaders have progressively integrated CEECs into their production networks. Moreover, as in the rest of the electronic industry, they have increasingly outsourced manufacturing operations to contract manufacturers, which themselves have been developing rapidly in CEECs from the second half of the 1990s onwards (Radosevic 2002). In 2001, about a quarter of all mobile phones were produced by contract manufacturers, a share could rise to nearly 40% by 2007 (Strategy Analytics 2002). In a number of cases, contract manufacturers have acquired production facilities from leading brands. Alcatel, Ericsson, Nokia or Siemens for example have sold production units to contract manufacturers.

Ericsson has been largely outsourcing the manufacturing of its mobile phones in CEECs, so that its local subsidiaries are mainly involved in services. More generally, leading brands tend to outsource manufacturing in order to focus on R&D and the introduction of new generations of products as well as high-end manufacturing. Nokia for example still manufactures the majority of its mobile phones, including in Finland where it has not closed factories and in major markets such as the United States (table 14). The objective is to manufacture close to market. In Europe, it has three major production sites, Finland, Germany and Hungary, while the British site is dedicated to the high-end Vertu subsidiary. Nokia nevertheless focuses on the latest assembly stages and on the integration of software in phones (Collen, 2004).

Table 14. Production and R&D locations of Nokia

Country	Number of employee	% of total employment	Activity
Finland	22,300	49.7	Production, R&D
USA	6,600	14.7	Production, R&D
China	4,600	10.2	Production, R&D
Germany	3,500	7.8	Production, R&D
Hungary	2,600	5.8	Production, R&D
UK	1,900	4.2	R&D
Brazil	1,400	3.1	Production
Mexico	1,300	2.9	Production
South Korea	700	1.6	Production

Source: <www.nokia.com>

Outsourcing has stimulated the location of mobile production in the accession countries and in particular Hungary and Estonia. Elcoteq, the Finnish contract manufacturer, illustrates the changes in the production location of mobile phones. Its case is interesting first because it is from European origin and second because it focuses on telecommunications. Table 15 shows that in Europe Elcoteq concentrates high-volume production in its Estonian and Hungarian sites. Moreover, the production of the Finnish Espoo plant is being relocated to Estonia. Production in Western European countries focuses on new product introduction and low to medium volume. Table 15 also indicates that the recently opened sites in China specialize in high-volume production. Elcoteq is also opening a new site in India.

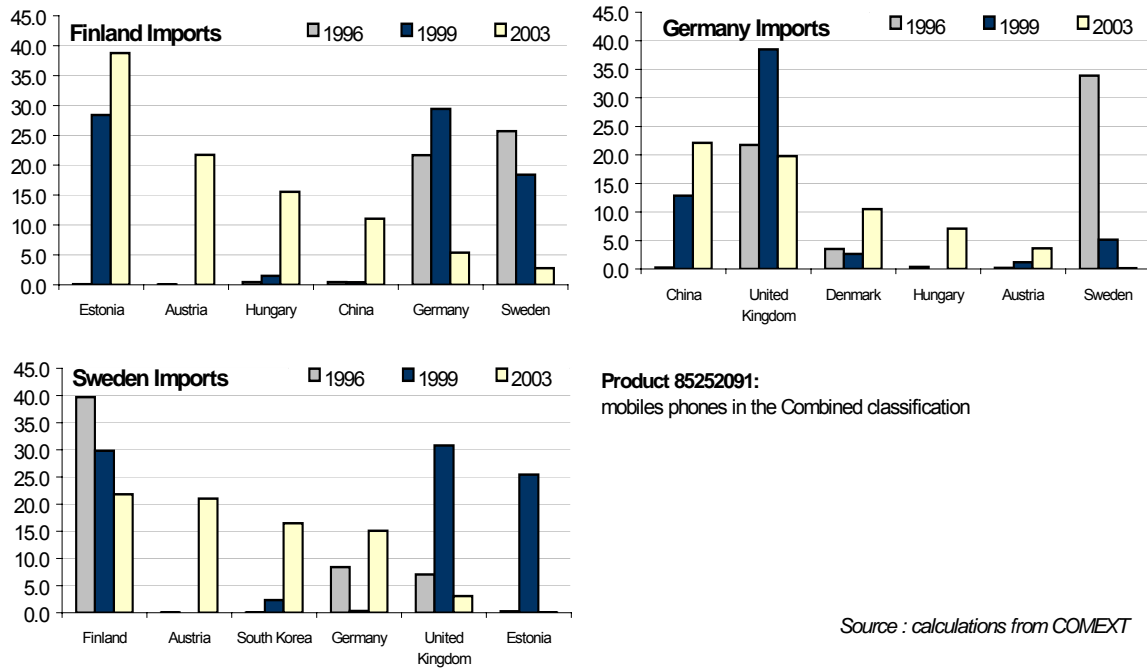
Table 15. Elcoteq production sites

Plant	Country	Founded/acquired	Arrea (m ²)	Staff	Services
Europe					
Espoo Plant	Finland	2004	4 000	156	Low to medium volume production
Lohja Plant	Finland	1991	8 700	269	NPI center, low to medium volume production
Tallinn	Estonia	1992	42 000	3 092	NPI center, high volume production
St.Petersbourg	Russia	1997	2 500	238	Medium to high volume production
Pécs	Hungary	1998	46 000	4 751	High volume production, after-sales services
Überlingen	Germany	2000	5 200	176	NPI center, low to medium volume production
Offenburg	Germany	2003	15 000	338	NPI center, low to medium volume production
Europe Total			122 900	9 020	
Asia-Pacific					
Dongguan	China	1999	13 000	1 618	High volume production
Beijing Plants	China	2000/2003	28 000	2 004	High volume production, NPI center
Shengzen	China	2003	8 800	1 314	High volume production
Asia-Pacific Total			49 800	4 936	
Americas					
Monterrey	Mexico	1999	18 300	1 563	High volume production, NPI center

Source: <www.elcoteq.com>

Trends with regard to the location of production have changed the trade patterns of the main EU producers of mobile phones. Figure 12 clearly shows that Estonia has quickly become the main exporter to Finland. The share of Hungary has also substantially increased in Finnish imports and less so in Swedish imports. It also increased substantially between 2000 and 2003. China's share of Finnish imports and Korea's share of Swedish ones have also increased recently. The volatility of import shares in all three countries suggest that competition is tough, both for finished phones (from Korea or Germany) and on outsourcing markets.

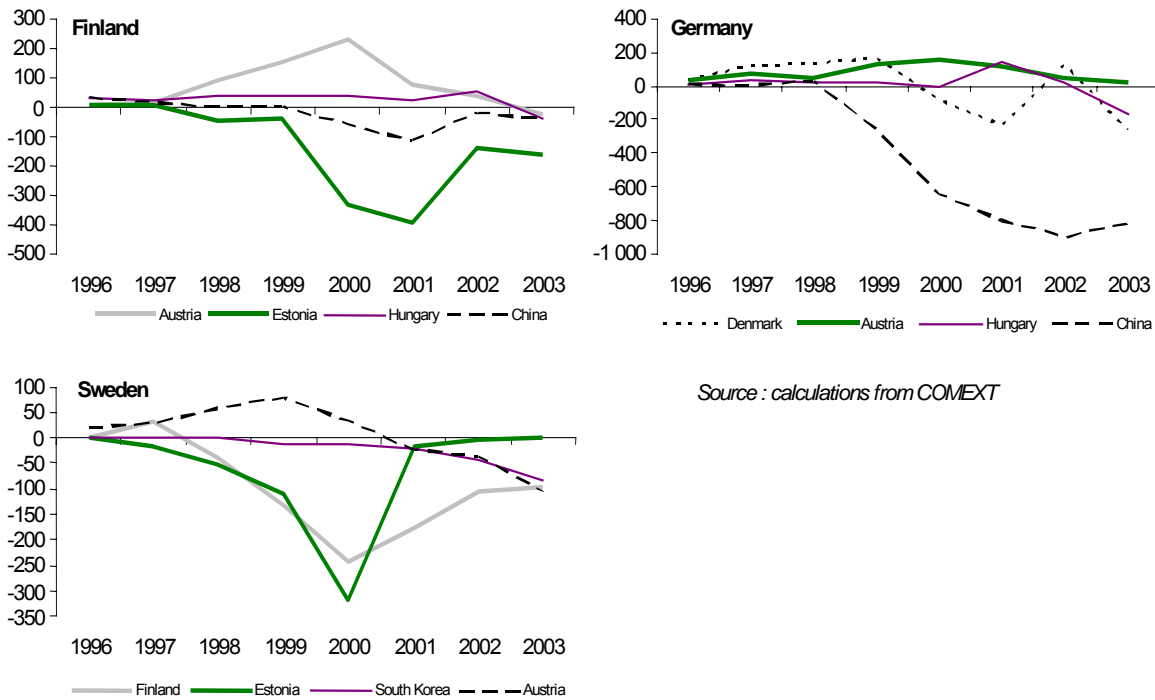
Figure 12. Origin of imports of mobile phones by Finland, Germany and Sweden
(as a % of world trade)



Austria's share of imports is on the rise, mainly in Finland and Austria. This may be due to both to location of contract manufacturers (Flextronics) in Austria and by exports of printed circuit boards by AT&S, a major European producer. The Austrian firm produces state-of-the-art circuit boards, in particular for telecommunication equipment. Its clients are both telecommunication leaders and contract manufacturers. Austria has managed to attract some foreign production capacity in telecommunication because of its expertise in the field, but also because of its favorable geographic situation at the center of the EU-25 coupled with good infrastructures. Austria also has an attractive fiscal policy.

The changes in the geography of production are also reflected by the trade balance of the major European producers of mobile phones. Finland has an increasing deficit with Estonia from which Nokia imports partly assembled phones. Sweden has reduced its deficit with Estonia while increasing its deficit with Austria and Korea. Finally, Germany's deficit with China is growing rapidly.

Figure 13. Trade balance in mobile phones for Finland, Germany and Sweden
(USD mn)



The trade balance with Eastern European countries not only flows from outsourcing by leading brands. Major producers also export phones to accession countries, where the market for mobile phone is quite dynamic (DREE 2003). Poland thus accounts for an increasing share of German exports of mobile phones and Hungary an increasing share of Swedish exports. The location of Nokia in Hungary (table 14 above) generates both exports and local sales. Nokia also controls 70% of the Estonian market for mobile handsets.¹⁶

Both cost and market access determinants explain the location of production facilities by leading mobile phone producers within Europe. Relocation to accession countries is primarily in the form of outsourcing to contract manufacturers, while leading firms tend to locate new production sites close to dynamic markets. Nevertheless, the possibility of relocation in accession countries represents a potential threat for workers in the EU-15 and was recently used by Siemens to renegotiate working conditions.¹⁷ This may actually be due to the global development of outsourcing networks, which increasingly include China and boost

¹⁶ 70 % in 2001 (DREE 2002).

¹⁷ In 2004, Siemens threatened to relocate production units in Hungary lest workers accept longer working hours in order to reduce unit labor costs. Negotiations have resulted in a 40-hour week (instead of 35) without compensation.

competitive pressure along the entire value chain. In 2004, Alcatel divested from mobile handset production through a joint venture with TCL, the second largest Chinese manufacturer. TCL will now sell Alcatel branded handsets in order to gain market share on international markets. The joint venture, TCL Communication, aims at becoming the fifth world producer in the next few years.

Overall, enlargement has positive consequences for the EU mobile phone market. It increases the size of the European market with rapidly growing new countries where the rate of equipment is still relatively low. Besides, it will allow leading firms and contract manufacturers to deepen the vertical division of labor, which has been implemented since the 1990s within Europe. The examples of Nokia, Elcoteq and AT&S illustrate the possibility of developing complementary production activities in the EU-15 and the accession countries. The EU-15 now specialize in R&D, prototypes, design, marketing and the final stages of production including testing and incorporation of software. Increasing wages in accession countries will nevertheless require constant efforts to maintain competitiveness, and relocations to lower-cost emerging countries will take place for some products or part of the value chain.

2.3 Textile and Clothing

The textile and clothing industry directly employed over two million in the EU in 2001, accounting for 7.4% of industrial employment (table 16). The industry represented a lower share of production (2.4%) as a result of relatively low labor productivity. Besides, the weight of the textile industry varies widely across Europe. Textiles still account for more than 25% of employment in Portugal, while their share of added value added is around 6% in Portugal and Italy. The comparison between Italy and Portugal indicates that labor productivity also varies widely between EU countries. Textile as a labor-intensive industry is more important in accession countries, and particularly in Baltic countries. Table 16 also suggests that productivity varies substantially among accession countries.

Table 16. The textile and clothing industry in Europe, 2001

	Turnover	Employment	Exports
	<i>% of GDP</i>	<i>% of industrial employment</i>	<i>% of total exports</i>
France	2.1	5.3	4.1
Germany	1.2	2.6	3.6
Spain	2.6	9.4	4.4
Italy	6.0	12.8	10.6
Portugal	6.6	27.1	18.2
EU-15	2.4	7.4	3.8
Czech Rep.	4.3	8.9	5.9
Estonia	8.5	19.8	11.3
Hungary	2.7	12.8	5.7
Lithuania	5.8	24.5	15.9
Latvia	4.6	16.5	5.9
Poland	2.5	11.8	7.6
Slovenia	7.0	12.6	7.7
Slovakia	2.2	11.8	7.2
EU-25	2.4	8.2	7.1

Source: Eurostat

EU trade in textile and clothing

At the beginning of the 1990s, textile and clothing was the biggest manufacturing sector of the candidate countries in EU imports. Table 17 above shows that in 1993 three clothing products were among the 10 largest imports from the AC-8, representing 11% of total EU-15 imports from the AC-8. Between 1993 and 2002, accession countries' imports increased by 100%, but their market share of total EU-15 imports grew by only 25% (table 17). This is due to the fact that imports from other emerging zones have been more dynamic. Imports from Bulgaria and Romania have increased by 34% and imports from China have risen by 73%. As a result, China's share of EU-15 textile imports has grown from 6 to 10%, while the Mediterranean countries' share has fallen from 14 to 10% and is now less than China's share. Over the last couple of years, imports from China have been particularly dynamic, including in comparison with imports from accession countries.

Table 17. EU-15 imports of textile and clothing

	1993		1998		2003	
	<i>bn \$</i>	Share of EU-15 imports from world	<i>bn \$</i>	Share of EU-15 imports from world	<i>bn \$</i>	Share of EU-15 imports from world
AC-10	3.9	4.9	7.0	6.0	7.9	6.1
Bulgaria	1.4	1.8	2.3	2.0	2.1	1.7
Romania	1.5	1.9	2.0	1.7	1.8	1.4
Med.countries	11.0	13.9	14.8	12.5	12.9	10.0
China	4.9	6.2	7.8	6.6	13.4	10.4
India	2.5	3.2	3.6	3.1	4.3	3.4
Bangladesh	0.7	0.9	1.7	1.5	3.2	2.5
Pakistan	1.2	1.5	1.7	1.4	2.2	1.7
Hong Kong	2.9	3.6	2.7	2.3	2.1	1.6
Indonesia	1.5	1.9	2.0	1.7	1.8	1.4
Thailand	1.0	1.2	1.1	0.9	1.2	0.9
USA	1.5	1.9	2.1	1.8	1.2	0.9
INTRA EU-15	39.3		60.9		58.2	
EXTRA EU-15	40.3		57.4		71.1	
World	79.5		118.2		129.3	

Note: The Mediteranean countries group includes the Association Agreement members : Algeria, Egypt, Israel, Jordan, Lebanon, Marocco, Syria, Tunisia and Turkey.

Source: Eurostat

This trend since the second half of the 1990s has to be related to increasing wages in accession countries. In the assembly stages of clothing, subcontracting with CEECs had intensified at the beginning of the transition process, especially under outward-processing trade. These operations, in clothing but also in footwear and electrical materials, played a key role in the growth of manufacturing exports of these countries to the EU. Increasing labor costs have nevertheless made such advantages transitory for the most advanced accession countries.

Vertical intra-European trade in textile and clothing

The textile industry has one of the longest and most fragmented value chains. The main operations in textile, such as spinning and weaving, are capital- and scale-intensive, while clothing is labor-intensive. As a consequence, textile still tends to be concentrated in advanced countries and clothing in developing countries. Nevertheless, the need to follow closely changes in demand and to be very reactive generates various sub-contracting strategies. European firms thus tend to sub-contract in Asia in order to minimize costs, but choose closer countries, around the Mediterranean or in Eastern Europe, whenever proximity and reactivity are important (Hanzl-Weiß, 2004).

Over the transition period, specific trade agreements between the EU and the CEECs have created incentives to generate a regional division of labor in the textile industry.¹⁸ EU countries exported textiles to the CEECs, which in turn re-exported clothing to the EU. As a result, the EU has experienced an increasing gap between its comparative advantage in textiles and its comparative disadvantage in clothing (Fouquin et al. 2002).

During the 1990s, German and Italian industries more particularly developed strategies for relocation and expansion in Central Europe as part of their restructuring strategies (Pelkmans 2002). This move was probably easier for German and Italian producers, which had a long-standing tradition of contracting with some Eastern countries (Hanzl-Weiß 2004). The trend was nevertheless quite general in European high-wage countries. Trade with CEECs by firms located in France for example clearly exhibits a vertical intra-firm specialization pattern (table 18). Intra-firm exports to CEECs are mostly aimed at further processing in textiles (91%), and to a lesser extent in clothing (75%). On the contrary, most imports from CEECs are for direct sale without further transformation. With textile and clothing, however, intra-firm trade is relatively low, as firms tend to out-source manufacturing directly to foreign firms.¹⁹

¹⁸ Trade regulation between the EU and accession countries were in favor of outward processing until 1997: special regulations exempted the value of processing components from import duties when they returned to the originating country in a further processed form. In 1997, tariffs on non-outward processing imports were also removed, which led to shrinkage of outward processing (Hanzl-Weiß 2004).

¹⁹ On the share of intra-firm trade in total trade in different industries, see Sachwald (2004).

Table 18. Intra-firm trade with AC-10 by firms located in France

		Imports from AC-10			Exports to AC-10		
		Intra firm intensity	Share of resale (in % of total IF)	Share of transformation (in % of total IF)	Intra firm intensity	Share of resale (in % of total IF)	Share of transformation (in % of total IF)
Preparation and spinning of textile fibres	171	4.3	100.0	0.0	1.9	0.0	100.0
Textile weaving	172	0.0			7.2	45.3	54.7
Finishing of textile	173						
Manufacture of made-up textile articles, except apparel	174	44.6	99.4	0.6	43.5	7.6	92.4
Manufacture of other textiles	175	14.8	100.0	0.0	48.6	4.9	95.1
Manufacture of knitted and crocheted fabrics	176	0.0			45.0	0.0	100.0
Manufacture of knitted and crocheted articles	177	0.0			4.7	100.0	0.0
Manufacture of leather clothes	181	0.0					
Manufacture of other wearing apparel and accessories	182	36.7	98.3	1.7	23.5	25.8	74.2
Dressing and dyeing of fur; manufacture of articles of fur	183						
Tanning and dressing of leather	191						
Manufacture of luggage, handbags and the like, saddlery and harness	192	7.9	98.0	2.0	45.8	97.1	2.9
Manufacture of footwear	193	5.5	100.0	0.0	2.5	100.0	0.0
Manufacture of textile	17	20.5	99.5	0.5	29.2	8.4	91.6
Manufacture of wearing apparel; dressing and dyeing for fur	18	36.6	98.3	1.7	23.4	25.8	74.2
Tanning, dressing of leather, luggage, handbags and footwear	19	5.7	99.7	0.3	5.2	98.2	1.8
Total Textile and Clothing	17+18	34.4	98.4	1.6	28.1	11.2	88.8

Source: Calculation based on SESSI data.

Trade with accession countries was dynamic during the 1990s. As a result, accession countries have increased their market share of EU imports of most textile and clothing products (table 19).

Table 19. AC-10's market Share of imports to EU-15 and France (as a %)

	France			EU-15		
	1993	2003	variation	1993	2003	variation
Textile						
651 Textile yarn	0.6	6.6	5.9	2.0	8.2	6.2
652 Cotton fabrics, woven	1.0	0.6	-0.4	2.9	6.4	3.5
653 Fabrics, woven, of man-made fabrics	1.0	2.1	1.0	1.5	4.3	2.9
654 Other textile fabrics, woven	0.9	6.9	5.9	2.2	9.9	7.7
655 Knitted or crocheted fabrics, n.e.s.	1.1	0.6	-0.6	2.1	2.9	0.8
656 Tullies, trimmings, lace, ribbons & other small wares	0.2	1.0	0.9	1.3	3.2	1.9
657 Special yarn, special textile fabrics & related	0.3	5.7	5.4	1.4	5.0	3.6
658 Made-up articles, of textile materials, n.e.s.	1.6	3.5	1.8	6.2	9.6	3.4
659 Floor coverings, etc.	0.1	0.6	0.4	0.4	3.2	2.8
Clothing						
841 Men's clothing of textile fabrics, not knitted	3.1	2.7	-0.4	8.3	8.3	0.0
842 Women's clothing, of textile fabrics	4.5	3.8	-0.7	11.3	7.4	-3.8
843 Men's or boy's clothing, of textile, knitted, croche.	0.9	1.8	0.9	2.7	3.6	0.9
844 Women's clothing, of textile, knitted or crocheted	3.1	3.1	0.0	4.8	5.9	1.1
845 Articles of apparel, of textile fabrics, n.e.s.	1.9	1.8	0.0	3.2	4.0	0.7
846 Clothing accessories, of textile fabrics	0.5	1.1	0.5	4.8	5.3	0.5
848 Articles of apparel, clothing access., excluding textile	0.9	1.2	0.3	2.8	3.6	0.8

Source: calculation from COMEXT.

Post-enlargement dynamics

The EU textile industry has been under increasing competitive pressure and enlargement is often perceived as yet another threat. Fears of enlargement may nevertheless be exaggerated, as most of the potential for increasing trade with the accession countries was already developed during the 1990s. One scenario would be that enlargement would create a “new EU periphery” specialized in textile and clothing comprising Portugal and Spain on the one hand and Romania, Bulgaria and Lithuania on the other (Hanzl-Weiß 2004). Such a scenario would however require specific efforts and investment to upgrade the quality of the products and the reactivity of firms in order to avoid the relocation of manufacturing to lower-cost countries.

Lower wages were a major attraction for textile manufacturing in the CEECs during the 1990s, but as wages have increased more rapidly than productivity, the cost competitiveness of most accession countries has been declining. As a result, location of outward processing activities has already been moving away from Slovenia, where wages are relatively high (table 20), and towards Poland and Romania. More generally, accession countries have experienced a decline in their revealed comparative advantage for textile products over the latter part of the 1990s (table 5 above). Competitiveness has eroded and production has been partially shifted to the next wave of accession countries, Romania and Bulgaria, to Mediterranean countries, and also to Asia. Wage increases have thus already triggered relocations from Eastern Europe to Asia (MINEFI 2003). As a result of increasing labor costs in accession countries, China has emerged as a major competitor. This trend will be reinforced by the liberalization of trade in textiles and clothing in 2005.

Table 20. Average monthly gross wages in textile and clothing
(as a % of EU-15, 2001)

Country	Share of EU-15 average
Bulgaria	6.0
Czech.Rep	22.1
Estonia	18.8
Hungary	18.4
Latvia	18.1
Lithuania	16.1
Poland	24.9
Romania	7.8
Slovak Rep.	15.4
Slovenia	46.0
Greece	72.3
Ireland	113.1
Portugal	41.6
Spain	77.0

Source: Hanzl-Weiß (2004)

New member countries can only remain attractive for clothing if they manage to increase productivity and quality. They would thus be able to be more competitive than Asian countries on specific types of products, for which geographical proximity is an asset. Zara, the successful Spanish clothing chain, has often been considered as exemplary from this perspective.²⁰ Yet such a strategy means significant restructuring and modernization efforts by accession countries. It also requires good transportation and communication infrastructure. But enlargement should precisely contribute to upgrading infrastructure in accession countries and their connection with the EU-15.

Overall, enlargement appears as a minor threat to the EU textile and clothing industry. It may on the contrary offer an opportunity in the increasingly competitive global textile industry. The objective for the European industry should be to refine and upgrade its integration process so as to continue its upgrading effort. In the 1990s, EU countries had turned to higher value-added products by restructuring, adopting new technologies (ITC, man-made fibers, technical textiles), and outsourcing labor-intensive processes to CEECs or Mediterranean countries. In the new context, this strategy is to be pushed further, which implies that accession countries would become more differentiated and that some would embark on an upgrading strategy themselves. As a result, more manufacturing will probably be relocating away from EU countries, but the latter may nevertheless keep some strategic functions. Furthermore, successful reorganization of the clothing industry on a European scale is important in order to maintain upstream production of textile in Europe.

²⁰ It would be necessary however to check whether the location of its production has not been shifting somewhat to Asia recently.

Conclusion

Race to the bottom vs. Race to the top

Increased exchanges between Western and Eastern Europe through trade and investment have opened up opportunities for accession countries to upgrade their production capabilities and become more specialized in medium- to high-tech products. Access to Western markets and FDI have contributed to the transition process and recent growth performance in Eastern countries. For the EU-15, increasing integration with accession countries has meant both exports to small but dynamic markets and imports as part of a process of regional vertical specialization. Both trends can help to strengthen the EU-15 economies, provided the latter adapt by further specializing in high-tech products and services. Enlargement thus represents both an opportunity to speed up structural change in European economies and an additional pressure to do so. The paper has emphasized the fact that enlargement occurs in a context where competitive pressures from emerging countries are gathering pace and call for structural evolutions of the European economies. From this global economic perspective, EU enlargement is not a major event. This latest wave of enlargement may actually correspond to the end of the EU's focus on integration itself, where increasing economies of scale in sectors of mass production played a major role in improving economic performance. Enlargement thus appears as a factor for accelerating change in a global context of change, which explains the increasingly complex political economy of European economic integration.

Some European countries, including in particular Germany and France, have seen their industrial structure evolve slowly over the last twenty years (Miotti and Sachwald 2004). As a consequence, the emergence of new competitors is seen as a threat to jobs in a number of low- to medium-tech sectors, which are still relatively important in the overall industry. The problem may actually be more acute for France, as it is less specialized in investment goods and thus cannot benefit as much as Germany from dynamic imports from China and accession countries (Artus 2004c). This may explain that French politicians, including those in the government, have been the most vocal critics of criticize wage and corporate tax “dumping” by accession countries. This is a sort of intra-European version of the race to the bottom, which was viewed as a major threat posed by globalization during the 1990s.

A number of studies, including official reports, have tried to assess the extent of relocation due to enlargement and its impact on home economies.²¹ They tend to consider that the threat of a race to the bottom, either through the pressure on wages or the pressure on taxes, is exaggerated. Yet public opinion is not convinced, as it is struck by the combination of persistently high unemployment, concrete examples of industrial sites being closed and new sites being opened in accession countries. Both in Germany and France, this gloomy atmosphere has been aggravated by pressure from some companies, which have been arguing that they will relocate unless they can increase working hours in order to reduce unit labor costs.

The French government has been announcing fiscal incentives to enhance France's attractiveness and thus "prevent relocation" or even reverse previous relocations. The French debate on the European Constitution is also influenced by this issue of relocation, as some politicians argue that the EU should include more social provisions and allow for a more level playing field within the EU-25. Unfortunately, this desire to prevent job destruction may distract France from promoting job creation in high-tech sectors and services. It also diverts attention from the fact that some R&D laboratories are also relocating to the United States, where access to high-quality public research is attracting a number of European companies (Sachwald 2003, 2005).

Overall, the perception that there are races to the bottom may actually trigger structural beggar-thy-neighbor policies. This would be particularly counter-productive as a race to the bottom in some spheres like taxes would not be compatible with a race to the top in areas such as public expenditure on infrastructure (Bellak 2004) or research. As far as the EU economies are concerned, it may be sounder to work at stimulating structural change so as to dissipate the perception of a race to the bottom. If European countries commit themselves more decisively to an innovation-based growth path, they will generate more jobs in new activities and will feel less threatened by relocation to lower-wage countries. Such an ambition is quite challenging for public policies, as it not only requires more public spending on education and research but also necessitates institutional changes in areas ranging from national innovation systems to labor markets and competition in markets for goods.²² Viewed from this perspective, enlargement should certainly not be seen as merely another opportunity to broaden the EU economic area. Rather, enlargement and its challenges should trigger the evolution of a number national features and a change in the role of the EU economic policies. In the case of research and innovation policy, this could mean both national reforms and a larger role for the EU in R&D funding.

²¹ See in particular Riess and Uppenberg (2004), Konings (2004). For France, Fontagné and Lorenzi (2004), Grignon (2004), Sachwald (2004b); for Germany, Marin (2004), Deutsche Bundesbank (2004), Brück et al. (2004).

²² In the case of France the required evolutions and proposals for reform have been discussed in a number of recent contributions, among which Camdessus (2004), Miotti and Sachwald (2004).

References

- Artus, P., 2004a, 'L'élargissement profite-t-il aux 15 pays actuels de l'EU ?', *Flash* 2004-76, CDC-IXIS.
- Artus, P., 2004b, 'Après l'élargissement réfléchir à quelques résultats de la littérature économique concernant les unions économiques et monétaires', *Flash* 2004-163, CDC-IXIS.
- Artus, P., 2004c, 'Quelle stratégie de spécialisation en Europe ?', *Futuribles* n°299, 23-30.
- Aussilloux, V. and M. Pajot, 2003, 'Enjeux commerciaux de l'élargissement de l'Union européenne', *Economie et Statistique*, n°363-365.
- Barry, F. and D. Curran, 2004, 'Enlargement and the European Geography of the Information Technology Sector', *The World Economy*, vol. 2, 901-9022.
- Bellak, C., 2004, 'The Impact of Enlargement on the Race for FDI', L. Oxelheim and P. Ghauri (eds.), *European Union and the Race for Foreign Direct Investment in Europe*, Elsevier.
- Boillot, J.J., Lepape, Y., 2002, Conference 'Innovation and Growth: New Challenges for the Regions', DREE. 18-20, 2002.
- Brück, T., H. Brückner, H. Engerer, C. von Hirschhausen, M. Schrooten, D. Schumacher, U. Thiessen and H. Trabold, 2004, 'The Eastern enlargement of the EU: Clear challenges, unjustified fears', *Economic Bulletin* 6, DIW Berlin.
- Camdessus, M. (ed.), 2004, 'Le sursaut- Vers une nouvelle croissance pour la France', Rapport officiel, *La Documentation française*, Oct.
- CCFA, 2004, *Répertoire mondial des activités de production et d'assemblage de véhicules automobiles*, Paris, Comité des Constructeurs Français d'Automobiles.
- CEPII, 2004, 'L'insertion de l'industrie européenne dans la Division Internationale du Travail: situation et perspectives', downloadable from trade-info.cec.eu.int/doclib/html/118033.htm
- Dedrick J., Kraemer, L., 2002a, 'Globalization of the Personal Computer Industry: Trends and Implications', *CRITO*.
- Dedrick J., Kraemer, L., 2002b, 'Dell Computer: Organization of a Global Production Network', *CRITO*.
- Deutsche Bundesbank, 2004, 'Effects of eastward enlargement of the EU on the German economy', *Monthly Report*, May.
- DREE, 2001, 'Le marché du matériel informatique dans les Peco', *Revue Elargissement* n°14.
- DREE 2002, 'Chronique des mouvements industriels', *Revue Elargissement* n°26.
- DREE 2003, 'L'informatique en Hongrie', Fiche de synthèse des missions économiques, downloadable from missioneco.org/hongrie/documents_new.asp?V=7_PDF_59717
- DREE 2004, 'Electronique et NTIC', Nouvelles d'Irlande n°123 downloadable from dree.org/ntic/documents.asp?Rub=3&F=PDF&Num=86023
- Dunne, M., 2001, 'L'éducation en Europe', *Statistiques en bref*, Eurostat.
- Dupuch, S., H. Jennequin and E.M. Mouhoud, 2004, 'EU enlargement: What does it change for the European economic geography?', *Revue de l'OFCE*, March.
- Fainsilber, D., 2004, "Renault réinvente la 'voiture du peuple'", *Les Echos*, 28 September.
- Fontagné, L., J-H. Lorenzi, 2005, *Désindustrialisation, délocalisations*, Rapport du CAE, La Documentation Française, Paris.

Fouquin, M. et al., 2002, *Mondialisation et régionalisation: le cas des industries du textile et de l'habillement*, Document de travail 2002-08, Paris: CEPII.

Freudenberg M., Lemoine F. 1999, 'Central and Eastern European Countries in the International Division of Labour in Europe', *Document de travail* 1999-05, Paris: CEPII.

Goldfiem, de F., 200, 'PSA se décide enfin à passer à l'Est', *L'usine nouvelle*, January 23.

Grignon, F., 2004, *Délocalisations: pour un néo-colbertisme européen*, Rapport d'information du Sénat n°374, Paris.

Grivolas J., 2004, 'Le marché mondial des équipements télécoms', IDATE, Sept. 9.

Grivolas J., Doineau J.C, 2003, 'Le marché mondial des équipements de telecommunications', IDATE, July 10.

Hanzl-Weiß, D., 2004, 'Enlargement and the Textile, Clothing and Footwear Industry', *The World Economy*, vol. 2, 923-945.

Hatem, F., 2004, '*Investissement international et politiques d'attractivité*', Economica, Paris.

Heymann, E., 2004, 'The automobile market in Eastern Europe', *Deutsche Bank Research*, July 7.

Hunya, G. and J. Stankovsky, 2004, 'Foreign direct investment in Central and Eastern Europe', WIIW, Vienna, July.

IDATE, 2003, 'The European way to think the Digital World', *DigiWorld*.

Jerinte L., 2004, 'Plusieurs entreprises High Tech envisagent prochainement de s'implanter en Slovaquie', *Regard sur l'Est*, August 24.

Kaminski, B. and B. Smarzynska, 2001, '*Foreign Direct Investment and Integration into Global Production and Distribution Networks: The Case of Poland*', Working paper 2646, *World Bank*, Washington DC.

Kaminski, B. and F. Ng, 2001, '*Trade and Production Fragmentation: Central European Economies in EU Networks of Production and Marketing*', Policy Research Working Paper 2616, *The World Bank*, Washington DC., June

Konings, J., 2004, "The employment effects of foreign direct investment", *EIB Papers*, Vol. 9, n°1, European Investment Bank.

KPMG, 2004, 'Corporate Tax Rate Continue to Fall Worldwide'.

Lepape Y., 2002, 'Demande en rattrapage mais encore assez marginale', *Revue Elargissement* n°30.

Marin, D., 2004, '*A Nation of Poets and Thinkers' – Less so with Eastern Enlargement? Austria and Germany*, Discussion paper 2004-06, University of Munich, April, downloadable from <epub.ub.uni-muenchen.de>

Meyer, K. and C. Jensen, 2003, 'Foreign Investor Strategies in View of EU enlargement', Stütting, Dorow, Classen and Blazjenski (eds.), *Change Management in Transition Economies*, Palgrave

Midelfart-Knarvik, K., H. Overman, S. Redding and A. Venables, 2002, "Integration and industrial specialisation in the EU", *Revue Economique*, May.

Minefi, 2002, 'Elargissement de l'Union européenne: quelles perspectives pour les entreprises industrielles', Analyses sectorielles.

Miotti, L. and F. Sachwald, 2004, *Growth in France 1950-2030: The Innovation Challenge*, downloadable at <ifri.org/files/Economie/SachwaldGB2.pdf>.

OCDE, 2002, *Politiques de l'information et des communications*, Paris.

Pelkmans, J., 2002, '*Economic implications of enlargement*', BEEP briefing n°1, College of Europe,

downloadable from <coleurop.be>

Price Waterhouse Coopers, 2004, 'The impact of EU Enlargement on the chemical industry'.

Radosevic S., 2002, 'The electronics industry in Central and Eastern Europe: an emerging production location in the alignment of networks perspective', Working paper *UCL*.

Rhys, G., 2004, 'The Motor Industry in an Enlarged EU', *The World Economy*, vol. 2, 877-900.

Ricard, M., 2004, 'La concurrence se durcit entre la Hongrie et ses voisins pour attirer les investisseurs étrangers', *Le Monde*, April 30.

Riess, A. and K. Upperberg, 2004, 'The internationalisation of production: moving plants, products, and people', *EIB Papers*, Vol. 9, n°1, European Investment Bank.

Sachwald, F., 2003, "Les migrations de la recherche", *Sociétal*, 4è. trim.

Sachwald, F., 2004, *The Integration of China and East European Countries in Global Networks*, Les Etudes de l'Ifri, n°2, Paris, Ifri ; downloadable from <ifri.org>

Sachwald, F., 2004b, "Délocalisations : une destruction créatrice ?", *Sociétal*, 2è. trim.

Sachwald, F., 2005, "Internationalisation de la R&D et attractivité de la France", *Le système français de recherche et d'innovation dans l'économie mondiale: enjeux et priorités*, P. Larédo et F. Sachwald (eds.), Institut de l'Entreprise/Ifri.

Strategy Analytics, 2002, « Wireless Device Strategies », downloadable from <strategyanalytics.com>

The Circa Group, 2002, 'Identifying factors of success and failure In European IST', working paper.

Wagstyl S., 2004, 'The next investment wave: companies in east and west prepare for the risks and opportunities of an enlarged EU', *The Financial Times*, April 27.

Appendix 1. Definition of ICT

For tables 3 and 4, the ICT manufacturing sector includes (ISIC Rev.3 Classification) :

- 30 Manufacture of office machinery and computers
- 30.01 Manufacture of office machinery
- 30.02 Manufacture of computers and other information processing
- 31.3 Manufacture of insulated wire and cable
- 32 Manufacture of radio, television and communication equipment and apparatus
- 32.1 Manufacture of electronic valves and tubes and other electronic components
- 32.2 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
- 32.3 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
- 33.2 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes
- 33.3 Manufacture of industrial process control equipment

For tables 2, 5, 6 and 7; and figures 1 and 2 ; the ICT manufacturing sector includes (ITSC Rev.3 classification for OECD data and 3.1 for UNCTAD data):

- 752 Automatic data-processing machines and units thereof; magnetic or optical readers, machines for transcribing data
 - 752.1 Analogue or hybrid (analogue-digital) data-processing machines
 - 752.2 Digital automatic data-processing machines
 - 752.3 Digital processing units
 - 752.6 Input or output units for automatic data-processing machines
 - 752.7 Storage units, whether or not presented with the rest of a system
 - 752.9 Data-processing equipment, n.e.s.
 - 759 Parts and accessories suitable for use with machines falling within groups 751 and 752
 - 759.97for the machines of group 752
- 761 Television receivers (including video monitors and video projectors)
 - 761.1 Television receivers, colour (including video monitors and video projectors)
 - 761.2 Television receivers, black and white or other monochrome
- 762 Radio-broadcast receivers, whether or not incorporating sound-recording or reproducing apparatus or a clock
 - 762.1 Radio-broadcast receivers not capable of operating without an external source of power
 - 762.2 Radio-broadcast receivers capable of operating without an external source of power
 - 762.8 Other radio-broadcast receivers (including apparatus capable of receiving radio-telephony or radio-telegraphy)
- 763 Sound recorders or reproducers; television image and sound recorders or reproducers; prepared unrecorded media
 - 763.3 Turntables (record-decks) and record-players, not incorporating a sound-recording device
 - 763.8 Sound-recording and other sound-reproducing apparatus; video-recording or reproducing apparatus,
- 764 Telecommunications equipment, n.e.s., and parts, n.e.s., and accessories of apparatus falling within division 76
 - 764.1 Electrical apparatus for line telephony or line telegraphy (including such apparatus for carrier-current line systems)
 - 764.2 Microphones and stands therefor; loudspeakers
 - 764.3 Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television
 - 764.8 Telecommunications equipment, n.e.s.
 - 764.9 Parts and accessories suitable for use solely or principally with the apparatus of division 76

Figures 5 and 6 focus on mobile phones, taken to be product 85252091 from COMEXT.

Appendix 2: Specialization Index

The indicator for revealed comparative advantage that is used in the paper is the following for each product i :

$$RCA_i = \frac{(EXP-IMP)^*2}{\sum EXP - \sum IMP} \cdot \frac{(EXP-IMP)^*2}{\sum EXP + \sum IMP} * \frac{(EXP-IMP)^*2}{\sum EXP + \sum IMP}$$

Negative values indicate a comparative disadvantage.

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