

NATIONAL PRODUCTION SYSTEMS
IN THE NEW
GLOBALIZATION PHASE

A TRANSATLANTIC COMPARISON

Luis MIOTTI and Frédérique SACHWALD

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Introduction

Since the second half of the 1980s, the global economy has been integrating ever more closely through multiform exchanges and the participation of more countries in these exchanges. The concept of globalisation was specifically introduced to signify the fact that—beyond international trade—national economies are integrating more directly, in several ways: not only commercially, but also financially and in terms of their production systems and human resources (Sachwald 1993). Economic integration exacerbates competition in world markets, and globalisation has powerfully stimulated the process of creative destruction, which reallocates productive capacity between enterprises, sectors, and countries. At the outset, the trend primarily concerned the developed countries, followed by the emerging countries, which quickened their integration into the global economy. In recent years, the integration of large emerging countries into global networks has altered the dynamics of world trade and its impact on national production systems. Since 2000 and the burst of the internet bubble, job losses and job turnover seem to have increased in a number of high wage countries. Competition from new countries has been blamed and new protectionist tendencies have surfaced both in Europe and in the United States. It is thus important to understand the characteristics of the new phase of globalisation in order to consider adequate policies.

The dynamics of globalisation can be explained by two broad, interacting movements. Since 2000, the arrival of new players has amplified the trends at work and caused them to converge—defining a new phase of globalisation.

The accelerating pace of innovation has been a major driver of globalisation. The long-term trend toward faster, cheaper transportation has persisted and even accelerated in the past twenty years or so. It has been powerfully amplified by the wave of innovations in information technology and telecommunications, which have lowered the cost of many national and international transactions. These changes have dramatically enhanced opportunities for producing in remote locations and segmenting value chains in manufacturing and certain service industries. Since 2000 and the bursting of the Internet bubble, the fall in prices of digital goods and services has further accelerated the international fragmentation of value chains and the geographic redistribution of production facilities.

The second major force behind globalisation has been institutional change. A series of changes in different countries and

sectors has fostered deregulation and opening to local and foreign competition. Deregulation and the lifting of barriers in financial markets have stimulated a wave of financial innovations, which, in turn, have made it easier to fund innovative enterprises and international transactions. Deregulation has also occurred in sectors where economies of scale and technical constraints had historically led to the emergence of highly concentrated and/or regulated structures. Examples include air transportation, telecommunications, and electrical distribution. The opening has gone beyond trade, with the liberalisation of foreign direct investment (FDI) and, indeed, all capital flows. The process has been particularly striking in the developing countries, long closed to FDI. These institutional changes have proceeded gradually in some countries, such as China and India, but more brutally in others, for example, the countries of Eastern Europe. The arrival of multinational firms has helped to open the emerging markets to foreign products. It has also quickened the vertical division of labour, which allows emerging countries to specialise in assembly and other labour-intensive activities, besides traditional sectors such as textiles-apparel. This explains the growth in industrial-product trade between advanced countries and emerging countries at different stages of the value chain.¹

Our study explores the new globalisation phase and the different adaptation paths taken by the U.S. and European countries since the 1990s. The first part discusses the emerging map of world production, with a focus on two specific issues : the role of China and the paradoxical shift of high tech industries to low wage countries. It stresses the crucial role of multinationals in redirecting emerging-country specialisation toward more sophisticated manufactured goods such as electronics (in Asia) and the automotive industry (in the new Member States of the European Union). The second part discusses the new pattern of world trade, which is largely influenced by the changes in emerging-country supply and demand. It then analyses the specialisation of high wage countries and their diverse capacity to exploit the dynamism of world trade in goods. The third part closely links these developments to globalisation with the emergence of the knowledge economy and their combined consequences on employment dynamics in the U.S. and Europe. It first discusses the dynamics of trade in services and shows that countries have quite different comparative advantage in services and in manufacturing. It then goes on to show that the dynamics of employment and job qualifications should be considered as part of the global evolution of production systems, rather than from the sole offshoring issue.

The conclusion draws on our transatlantic comparison of adaptation to the new globalisation phase and the evolution of the determinants of firms' competitiveness to discuss the outlook for change in the production systems of European countries. Transatlantic comparisons also lead to underline the interactions

¹ Feenstra (1998), Hason *et al.* (2001), Sturgeon (2002), Fukao *et al.* (2003), Masuyama (2004).

between production systems and the type of social protection workers benefit from.

Globalisation is redrawing the world map of manufacturing production

Foreign direct investment (FDI) has been a powerful engine of globalisation since the 1990s, but since 2000 its dynamics have been more conducive to the expansion of productive activities in low-wage countries. During the new-economy bubble, the wave of mergers and acquisitions attracted investment in the advanced countries. Since the bubble burst, the emerging countries have become steadily more attractive thanks to the expansion of local markets and their integration into global production networks, including in some high-tech sectors. Their integration into global production networks is reshaping the geography of manufacturing. This is the case in particular for China, which has become very open to international trade for a country of its size. Moreover, since the 1990s, high-technology manufacturing has made a large contribution to its export expansion. China's position in world trade is thus paradoxical: a labour-intensive country, it seems to perform particularly well in technology intensive exports. Rodrik (2006) has estimated that, at the beginning of the 2000s, its export bundle was that of a country with an income-per-capita three times higher than China's. Actually, China's integration explains this paradox and the few countries specialised in high tech products are still high wage countries.

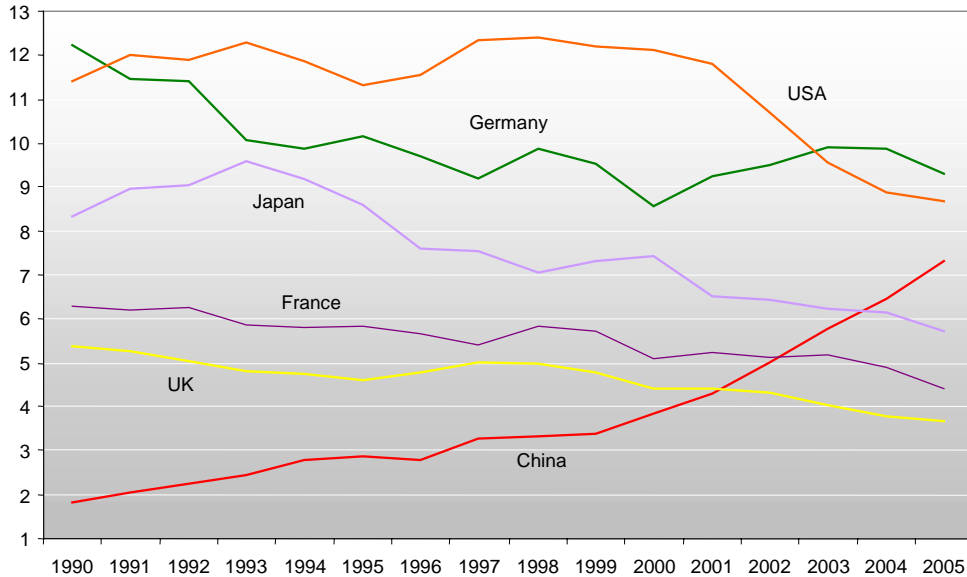
Global networks and the new geography of production

FDI has played a leading role of in the growth of internationalisation since the 1990s. The FDI boom in the late 1990s was largely due to the Internet bubble, which triggered a wave of cross-border mergers and acquisitions. After a drop in the early 2000s, the FDI share of the world economy returned to its pre-bubble level in 2004. Meanwhile, trade opening continued to spread. This globalisation momentum at the start of the twenty-first century is chiefly due to the greater involvement of developing and emerging countries in international trade and investment. The string of financial crises in a number of

emerging countries during the 1990s shook their production systems. In the aftermath, their investment requirements have grown because of the economic recovery and the trade opportunities created by their exchange-rate advantage and other factors. In other countries such as China and the NMSs, direct investment has been attracted by growth prospects in their domestic markets and by their export potential.

In sum, the crises of the 1990s have had only a temporary impact on the growth in the emerging countries' share of world manufactured exports. As a result, in the past decade, the ranking of leading exporters has changed dramatically. Chinese exports surged and since 2004 China has replaced Japan as the world's number-three exporter (figure 1). In 2005, China's advance was fuelled, in particular, by better access to rich-country markets for certain textile products. By contrast, rich countries have tended to lose export market share in the past fifteen years. The U.S. resisted the trend in the 1990s, but its world-export share has been decreasing since 2001. Germany has moved in the opposite direction since 2000. Japan's downtrend has not reversed, except for a brief respite in the late 1990s. However, it slowed with the acceleration of Japanese exports to China in 2002.²

Figure 1. Share of leading exporters
as % of world exports in value



Source: SYSPROD database

² The growth of Japanese exports to the United States also accelerated in 2003-2004 (OECD 2005a).

In recent years dynamic trade has been at least partly related with the multinationals' relocation of assembly operations. Several studies have shown an increase at the global level in the share of vertical FDI, lured by low production costs.³ China and the NMSs provide good illustrations of this trend in the location choices for new production capacity at the global level. NMSs have experienced a rapid shift in international specialisation thanks to the establishment of facilities by multinational firms, particularly in the automotive, electronic, and telecommunication-equipment industries (Kaminski and Smarzynska 2001, Sachwald 2005b). As in China, the NMSs' entry into major sectors of world trade has had a significant impact on their export structure. Specialisation in furniture and apparel has substantially decreased, while exports of automobiles and electrical appliances surged (Radosevic and Sachwald 2005). The case of China is also spectacular and has been much commented. China has won a significant share of world exports (figure 1), not only in labour-intensive sectors such as apparel and toys, but also in more R&D-intensive sectors.

Which countries are specialised in high tech products ?

China's impressive performance in high tech exports has attracted much attention and a number of authors have examined the possible causes for the country's competitiveness in technology intensive products (Adams *et al.* 2004; Rodrik 2006). The role of foreign affiliates is usually acknowledged, but not fully taken into account.

China has become the world first exporter of ICT.⁴ Figure 2 shows that its exports have increased rapidly since in 2000 and have become higher than exports from the U.S. This rapid growth contrasts with the stability of Japan's exports over the last decade. Sales by Germany, Korea and the U.S. have also increased substantially, but exports by China have more than trebled since 2000.

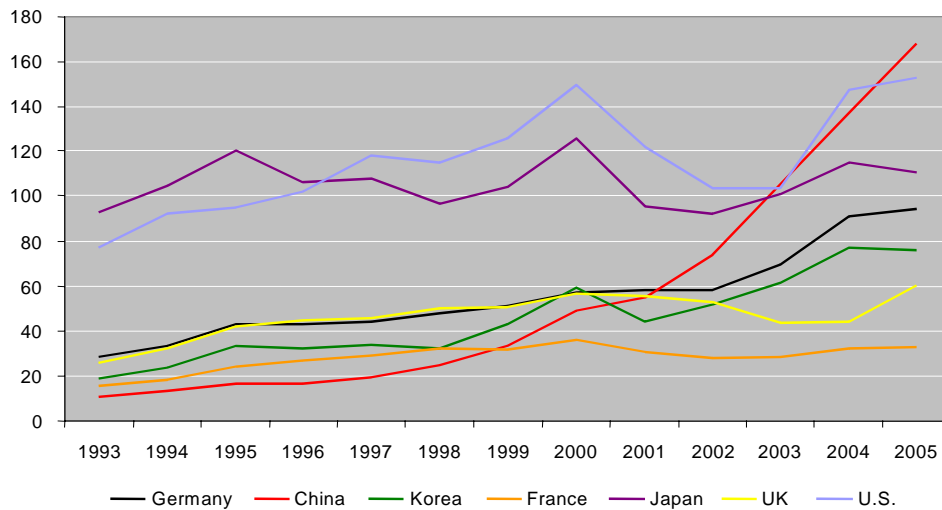
The relocation of productive capacity has shifted the distribution of ICT exports. The U.S. was the main engine of world export growth in the 1990s; since 2000, China is by far the top contributor (Miotti and Sachwald 2006). South Korea and Germany have also expanded their contributions to export growth, while the U.S. and Japan have made negative contributions. Hungary has significantly increased its contribution to world ICT export growth, whereas Ireland saw its contribution turn negative. This may be partly attributed to a transfer of electronic and computer assembly

³ For reviews of recent statistical studies, see Barba Navaretti and Venables (2004), Fontagné *et al.* (2005), Sachwald (2005a).

⁴ See Box 1 for the definitions of ICT and high tech products.

operations from Ireland to Hungary (Barry and Curran 2004). These changes reflect a maturing of ICTs and a shift in the center of gravity of production toward low-wage areas. For the most labour-intensive products, China benefits from the transfer of activities previously located in emerging countries, such as Mexico (Lall and Weiss 2004, Lora 2005) and Hungary (Radosevic and Sachwald 2005). It is also profiting from value-chain reorganisation at the regional level, with relocations of facilities from South Korea and Taiwan (Adams *et al.* 2004, Gaulier *et al.* 2005a) and from the relocation of Japanese subsidiaries. These dynamics have yielded significant changes in market share: Japan abandoned its rank as number-one exporter to the U.S. in the 1990s, then China conquered the top spot in the early 2000s. Germany has maintained its rank as Europe's leading ICT exporter and has been recapturing market share since 2000. Ireland and Mexico registered a mild decline in market share. Hungary has displayed the opposite trend thanks to the arrival of multinationals since the 1990s; its share of world exports moved from near zero in 1992 to 1.3%, and in 2004, it overtook Finland (Miotti and Sachwald 2006).

Figure 2. Main exporters of ICT
\$bn, 1993-2005



Source: SYSPROD database

China's share of world exports varies substantially across the different ICT sectors. China is the first exporter of electronic consumer goods, computers and telecommunication equipment, but has a more modest position in electronic components and instruments (SESSI 2005). Since the late 1990s, the positive balance in finished products has been increasing in parallel with an increasing deficit in components, such as integrated circuits, semi-conductors,

and television tubes. As a result, in 2005 China had a \$bn 120 positive trade balance for the first three categories, but a \$bn 60 deficit in electronic components (Sachwald 2006). This deficit is mainly with Asian countries such as Japan, Korea and Singapore. China's trade with OECD countries basically consists of components on the import side and IT equipment on the export side (OECD 2005b). This trade pattern suggests that China imports ICT components for assembly, after which the final products are exported back to the rest of the world. The United States is the largest market for these exports from China, followed by the EU and Japan (Schaaper 2004).

Box 1. Definition of high technology and ICT sectors

Definitions used to calculate trade flows for "Information and Communication Technologies", as well as for "High Technology" products are the same as those used by studies conducted at OECD (OECD 2002). Calculations have been made from the SYSPROD database, using International Trade in Commodity Statistics (ITCS) classification.

ICT

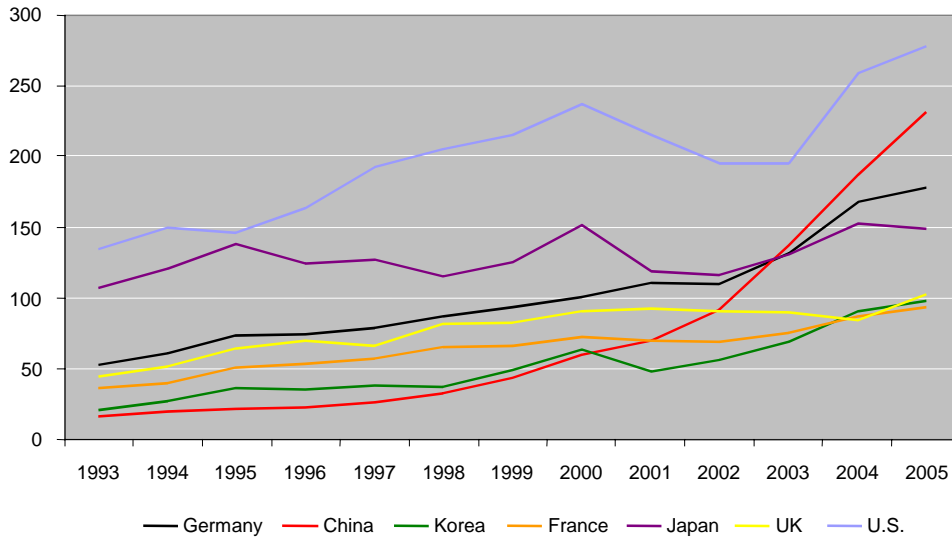
Office, accounting and computing machinery; Insulated wire and cable; Electronic valves and tubes and other electronic components; TV and radio transmitters and apparatus for line telephony and telegraphy; TV and radio receivers, sound or video or reproducing apparatus etc.; Instruments and appliances for measuring, checking, testing, navigating and other purposes except industrial process equipment.; Industrial process equipment.

High technology

Office, accounting and computing machinery; TV, radio and communication equipment; Instruments (medical, optical...); Aerospace; Pharmaceuticals.

In 2003, foreign affiliates accounted for 55 percent of China's total exports, but that share was much lower for labour-intensive exports and much higher for technology-intensive exports (Gilboy 2004, Gaulier *et al.* 2005). Multinationals are responsible for nearly all Chinese exports of computers, which have become a major export from China. Taiwanese and Korean firms have for example largely relocated the production of notebook computers to mainland China (Bergsten *et al.* 2006). In the case of electronic components, the role foreign affiliates has actually increased over time (Seong 2005). It has decreased somewhat in consumer goods, which is the least R&D intensive ICT sector. Moreover, Chinese ICT exports to the U.S. are concentrated in mass-market products, such as notebook computers, mobile phones and DVD players (Bergsten *et al.* 2006). The driving role played by ICT assembling explains the simultaneous growth of exports and imports of ICT by China. Imports of semiconductors and microprocessors, which are embedded in ICT products, have soared since the 1990s (Bergsten *et al.* 2006).

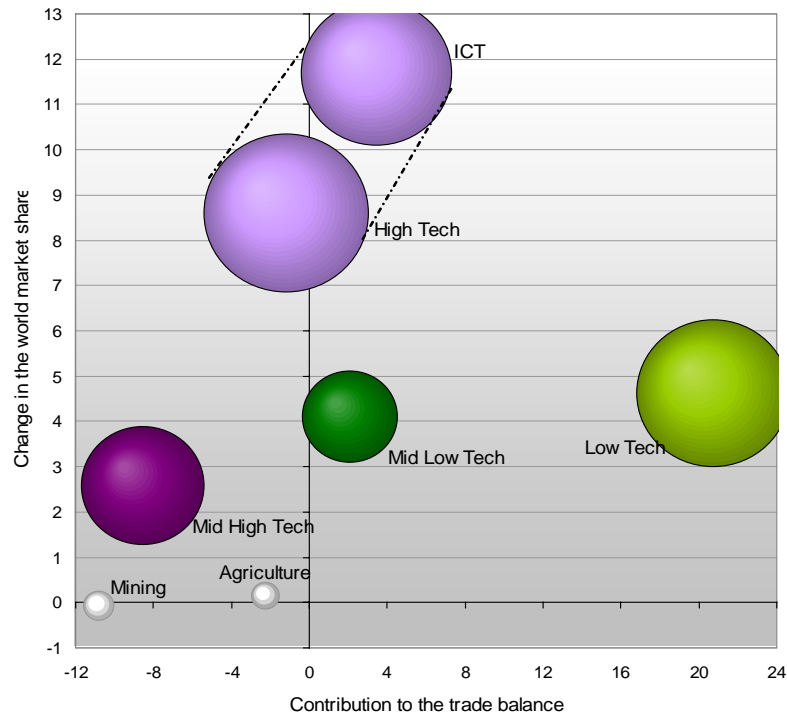
Figure 3. Main exporters of high tech products
\$bn 1992-2005



Source: SYSPROD database

Dynamic ICT exports have been fuelling the increasing share of high tech products in China's manufacturing exports. It is much weaker in other high tech sectors and the United States remain the first world exporter of high tech products (figure 3).

Figure 4. Comparative advantage and market share gains of China, by type of activities
2000-2005 in %



°Contribution to the trade balance for all goods,

$$CTB_i = \frac{100}{(X+M)/2} \left[(Xi - Mi) - (X - M) \frac{(Xi + Mi)}{(X + M)} \right]$$

The size of the bubble is proportional to the share of the sector in China's exports. Contribution to the trade balance is for 2005 and the change in the world market share for 2000-2005.

Source: SYSPROD

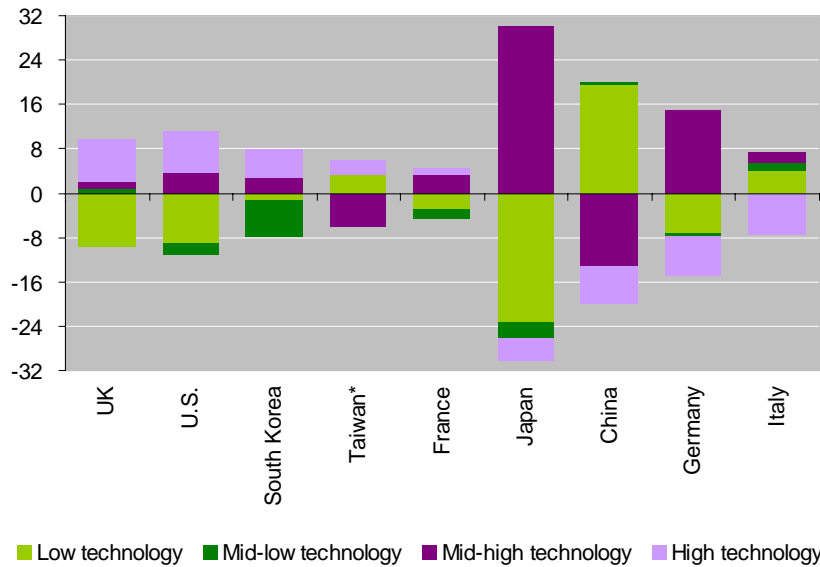
When both exports and imports are used to compute the contribution of high tech industries to the trade balance, China's dependence on imported inputs clearly shows (Figure 4). Figure 4 focuses on manufacturing trade, so that it can not be used directly to discuss comparative advantage, but it clearly shows that China remains strongly specialised in low tech products.

Our detailed examination of China's trade solves the paradox raised by Rodrik (2006). China's export performance is actually driven by the country's low labour cost, which has attracted assembly operations by ICT multinationals. As a result China's imports of ICT components have increased as dramatically as its exports. China is also a very weak exporter of other high tech products, such as pharmaceuticals. Overall, China is, logically, specialised in low tech production activities rather than in high tech activities (figure 4). Increasing fragmentation of production explains that China can be specialised in the labour-intensive activities along the value chain of

technology-intensive products. While China’s exports are “moving up the value chain” (Artus 2006b), the country still lacks a comprehensive production capability and is concentrating on the assembly of high-tech products.

In figure 5, the UK and the U.S. exhibit the highest manufacturing specialisation in high tech products. The contrast is clear with the specialisation of China in low tech manufacturing.⁵ Figure 4 also shows that Japan’s and Germany’s manufacturing trade surpluses are pulled by mid-high tech products (such as cars and machines). High tech products contribute positively on the contrary to South Korea and Taiwan trade balance.

Figure 5. Contribution of high-technology industries to the trade balance as a percentage of total manufacturing trade by technological intensity, 2005



⁵ Contribution to the trade balance in manufacturing as in Figure 4 * 2004
 Source: SYSPROD database and UNCTAD for Taiwan

Figure 6 shows that the contribution of high tech to trade balance⁶ has substantially changed over the last decade for some countries. The manufacturing specialisation of Korea, Taiwan and the UK in high tech has increased most, while that of Japan has dramatically decreased. China’s specialisation has remained strongly

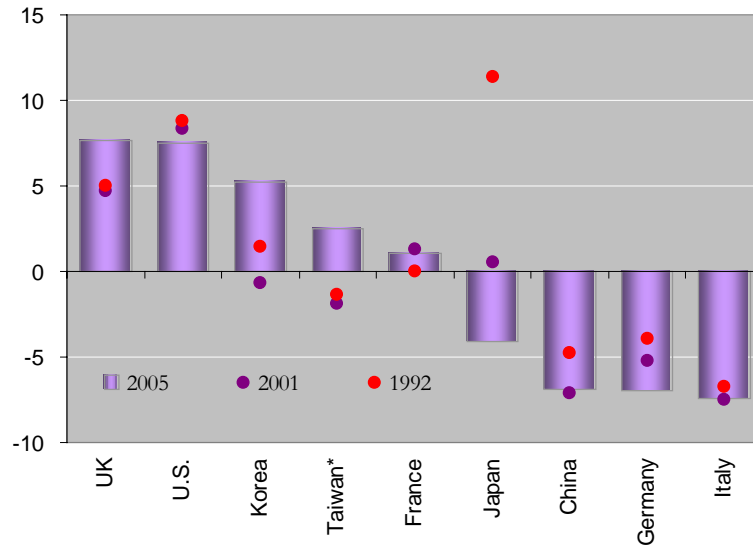
⁵ Specialization in low tech (and non specialization in high tech) is stronger on figure 5 compared to figure 4 because only manufacturing trade is taken into account. As a result, the negative balance in natural resources does not need to be compensated for.

⁶ The indicator of contribution to the trade balance of product *i* is defined as :

$$CTB_i = \frac{100}{(X + M)/2} \left[(X_i - M_i) - (X - M) \frac{(X_i + M_i)}{(X + M)} \right]$$

negative, despite the dynamism of its ICT exports. The specialisation of the U.S. in high tech has remained fairly stable and has been caught up by that of the UK.

Figure 6. Contribution of high-technology industries to the trade balance as a percentage of total manufacturing trade, 1992-2005



Source: SYSPROD database

Export performance and specialisation of the U.S. and European countries

High wage countries maintain their specialisation in capital intensive or technology intensive sectors. Our discussion nevertheless suggests that they have to adapt their production systems in order to take advantage of the new phase of globalisation. First, the increasing fragmentation of value chains represent both opportunities and threats for high wage countries in their sectors of specialisation. Second, firms have to adapt to emerging market specific demand in order to benefit from their rapid growth. In order to discuss these issues, we first show how growth in emerging markets has changed the dynamics of world manufacturing exports since 2000. Finally, high wage countries have also to adapt to exporting more services. This second part discusses the drives of manufacturing and service trade before discussing in detail the trade performance and specialisation of the U.S. and the EU countries. It shows that these performances differ across the Atlantic, but also within the EU.

The drivers of world manufacturing and service trade

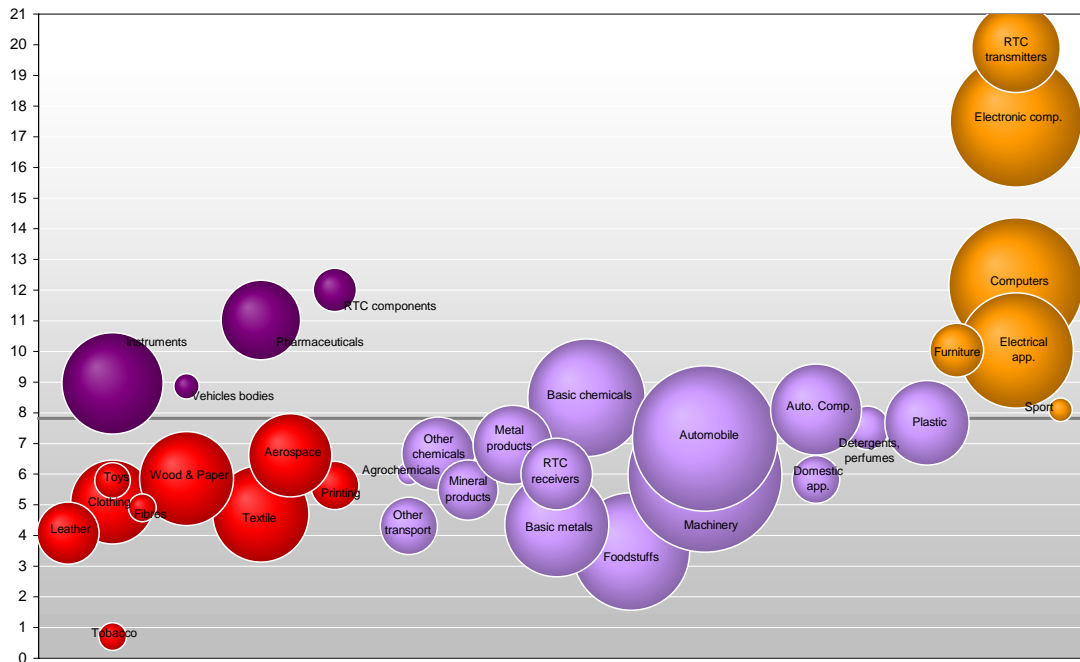
Between the 1990s and the early twenty-first century, world-trade dynamics have changed radically. Trade growth has remained vibrant, but the drivers are different. In the 1990s, the robust growth of the “new economy” and high-technology sectors in general powered world exports (figure 7a). Since 2000, by contrast, ICT exports have been less buoyant than total world trade (figure 7b). The most vibrant sectors of world trade are neither the new economy sectors nor the labour-intensive sectors hardest hit by relocations such as the apparel industry. Figures 7a and b show that despite relocations and the transfer of production to low-wage countries, exports by labour-intensive sectors have been sluggish for the past fifteen years. As a result, their share of world trade is falling. In contrast, exports of pharmaceuticals and radio, television and

communication (RTC) components have displayed growing dynamism since the 1990s.

Figure 7b also shows that the “old economy” sectors have become the engines of world trade at the beginning of the 21st century: machinery, automobiles (assembly, components), chemicals, foodstuffs, and metals. Their growth rates do not match those of the new economy in the 1990s, but they account for a substantial share of global trade and thus exercise a major overall effect. Some large sectors such as chemicals have been disaggregated to highlight the different dynamics of individual sub-sectors. Basic chemicals have been among the sectors with the most dynamic export performance since 2000 (figure 7b). The profile of the aerospace industry, marked by slack exports between 2000 and 2005, is partly due to its cyclical character. Its exports grew sharply in the late 1990s, but remained virtually stable between 1998 and 2003. The stronger growth since 2004-2005 has been fuelled, in particular, by orders from emerging countries.⁷

⁷ Aircraft orders hit a record level in 2005 and manufacturers are expecting either stable orders or a mild downturn in 2006 (*Les Échos*, February 23, 2006).

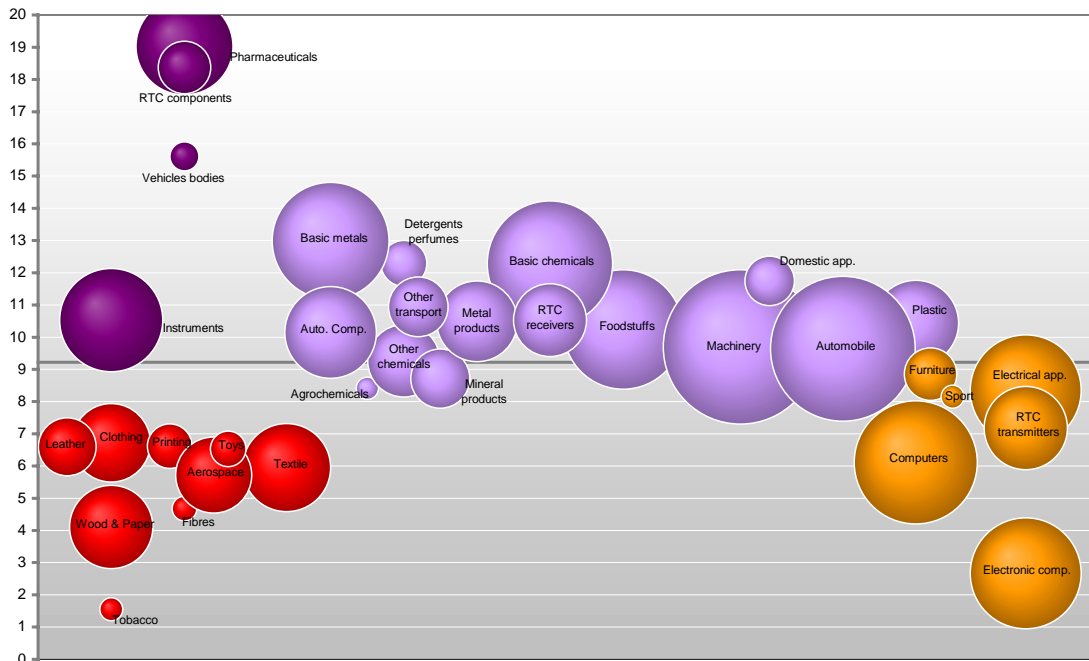
Figure 7a. Export dynamics by sector, divergence from growth of world manufactured exports, 1992-2000, in %



Note. Bubble size is proportional to value of sector's world exports. Colour code indicates relative growth rate of sector exports: red, below-average growth in 1992-2000 and 2000-05; purple, strong growth in both periods; orange, stronger growth in period 1, weaker in 2; mauve, weaker growth in 1, stronger in 2.
 Source: SYSPROD; data is in current dollars.

These shifts in export dynamism are due to a combination of price effects and volume effects. The value of world exports by ICT industries has suffered both from the burst of the new economy bubble at the turn of the century and from the diminishing prices of some products. By contrast, in recent years, dynamic demand has fuelled substantial price increases for commodities and some intermediate goods.

Figure 7b. Export dynamics by sector,
% divergence from growth of world manufactured exports, 2000-2005



Note. Bubble size is proportional to value of sector's world exports. Color code indicates relative growth rate of sector exports: red, below-average growth in 1992-2000 and 2000-05; purple, strong growth in both periods; orange, stronger growth in period 1, weaker in 2; mauve, weaker growth in 1, stronger in 2.
Source: Computations from SYSPROD database. See appendix 1, including for complete list of sectors.

The steel market has for example enjoyed strong demand. The industry's prospects and rising iron prices have played an important role in the incipient trend toward the consolidation of the iron and steel industry.⁸ The emerging countries' expanding needs have stimulated major investments, notably in China. The expansion of its productive capacity will reduce its steel imports and may dampen the world market's dynamism.

The emerging countries' growing market share in ICTs and, more generally, in manufactured goods is increasing their investment requirements, particularly for capital goods. This trend is thus fuelling an increase in demand for capital goods, whose market has been revitalised (figure 7b). The most dynamic capital-goods importers are no longer the advanced countries but the developing countries. Their contribution to the growth of capital-goods imports has expanded

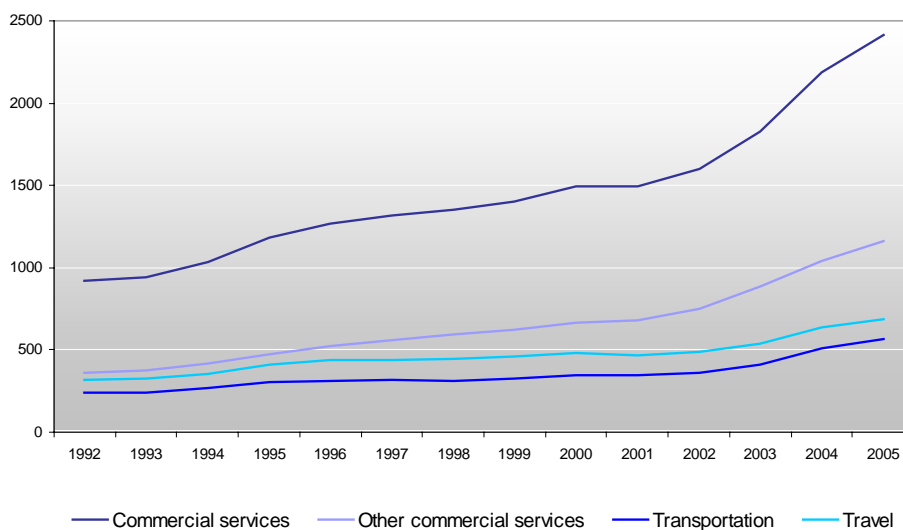
⁸ Witness Arcelor's takeover of Dofasco in 2005 and Mittal Steel's bid for Arcelor in January 2006.

from one-third in the 1990s to two-thirds in the 2000s (Miotti and Sachwald 2006).

The emerging countries' integration into the world economy is thus spurring a dual shift in international trade. Their growing share of manufactured exports reflects a transfer of the production of labour-intensive goods and of the assembly phases for certain R&D-intensive goods toward these countries. At the same time, the advanced countries are concentrating on more capital-intensive and research-intensive products. One of the aims is to tie the offering of these products to services, which can represent a substantial portion of value added.

Another major evolution of world trade is often overlooked : since 2000, trade in services has been more dynamic than trade in goods and its composition has changed. Services still represent about 20% of world trade, but exports of commercial services increase rapidly. As a result, these services (royalties and licence fees, financial and insurance services, business, professional and technical services...) represent a growing share of total service exports (figure 8).

Figure 8. Dynamics of world service exports, 1992-2005 \$bn



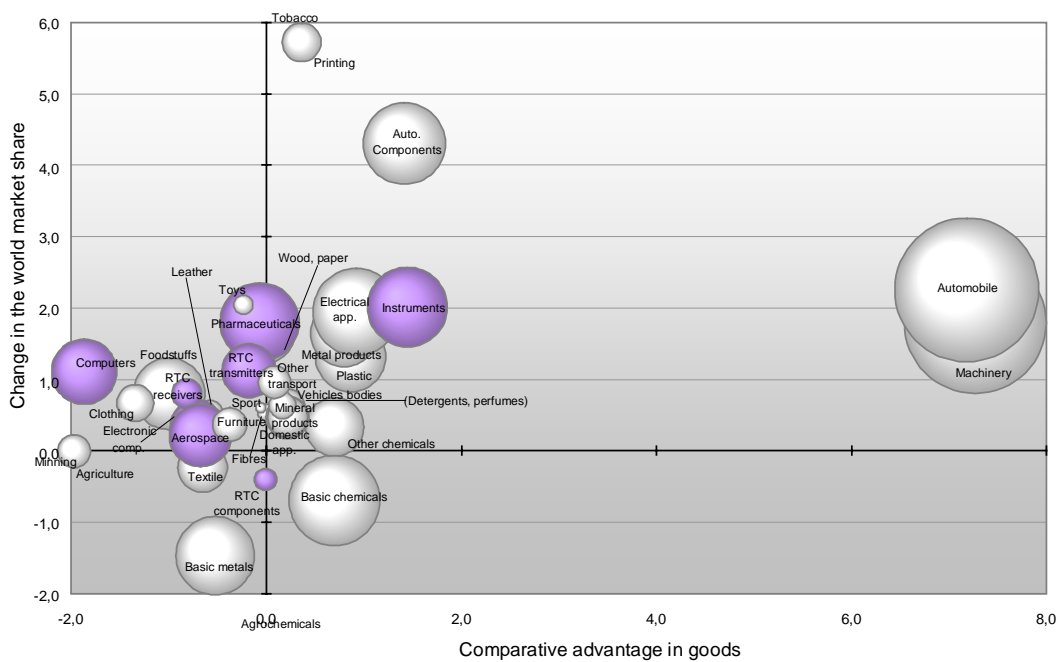
Commercial services : private services, excluding government services.
Source: WTO

Overall then, since 2000, world trade has been driven by mid-tech and often capital intensive products such as cars, machines and chemicals, pharmaceuticals and services.

Unequal capacities to take advantage of world market dynamism

Since 2000, high wage countries have very unequally taken advantage of the new globalisation phase. Germany has grown its market share in almost all sectors. Figure 9 shows that Germany maintains a strong specialisation in the automobile and machine industries, where it has gained market share since 2000.. Overall, Germany remains specialised in mid-high tech industries and to a lesser extend in mid-low tech industries such as chemicals. Conversely, figure 9 indicates that it is not specialised in high tech industries such as ICT (RTC sectors, computers), aerospace or pharmaceuticals. It has nevertheless maintained its specialisation in instrumentation, with dynamic exports. Besides, Germany has gained market share in high tech industries, except for RTC components. Finally, Germany appears least specialised in low tech sectors, including both labour intensive industries and agriculture related sectors.

Figure 9. Specialisation and export dynamics of Germany, 2000-2005

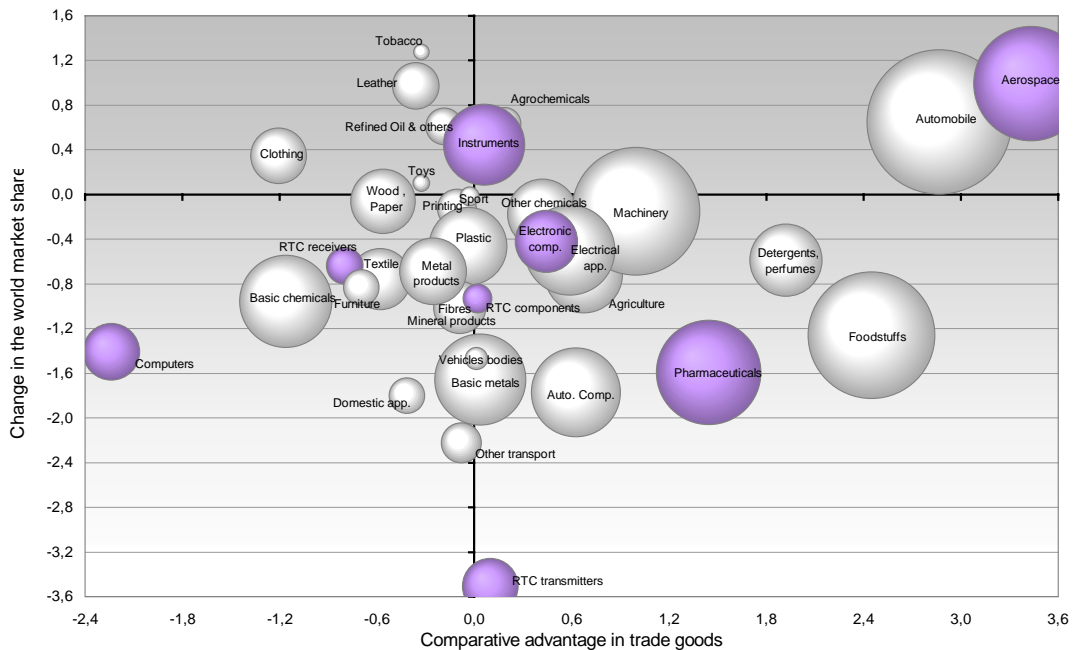


Notes: Bubble size is proportional to sector's share of German exports and specialisation is measured by the sectors' contribution to the trade balance (see above)

Source: SYSPROD database.

France's distribution of strengths and weaknesses is slightly different from that of Germany. Besides, France underperforms Germany in most sectors (figure 10). The only industry where France outperforms Germany is aerospace, where it gained 1% market share (against 0.2 for Germany). In the automobile industry, France has gained 0.7% market share, while Germany gained 2.3%. In automobile components, the contrast is even clearer, with a 4.3% gain for Germany, against a 1.8% loss for France. France has also lost market share in other important sectors of specialisation, such as machinery, pharmaceuticals and foodstuffs, which have been dynamic sectors at the world level since 2000 (figure 7b). To take the emblematic and widely discussed example of wine, French producers have been insufficiently responsive to the emergence of new competitors who have influenced consumer tastes.⁹ These lacklustre performances in traditional sectors of specialisation largely explain the widening trade deficit. In geographical terms, France has been losing market share on its largest markets (the US and the EU); it has also proved unable to draw large benefits from the new dynamic emerging markets (L'Angevin and Seravalle 2005).

Figure 10. Specialisation and export dynamics of France, 2000-2005



Note: Bubble size is proportional to sector's share of French exports.
Source: SYSPROD database.

⁹ The world market share of French wines, which stood at 70% in the early 1990s, fell to 40% in 2005 (*Les Échos*, February 13, 2006). In the same period, world consumption rose.

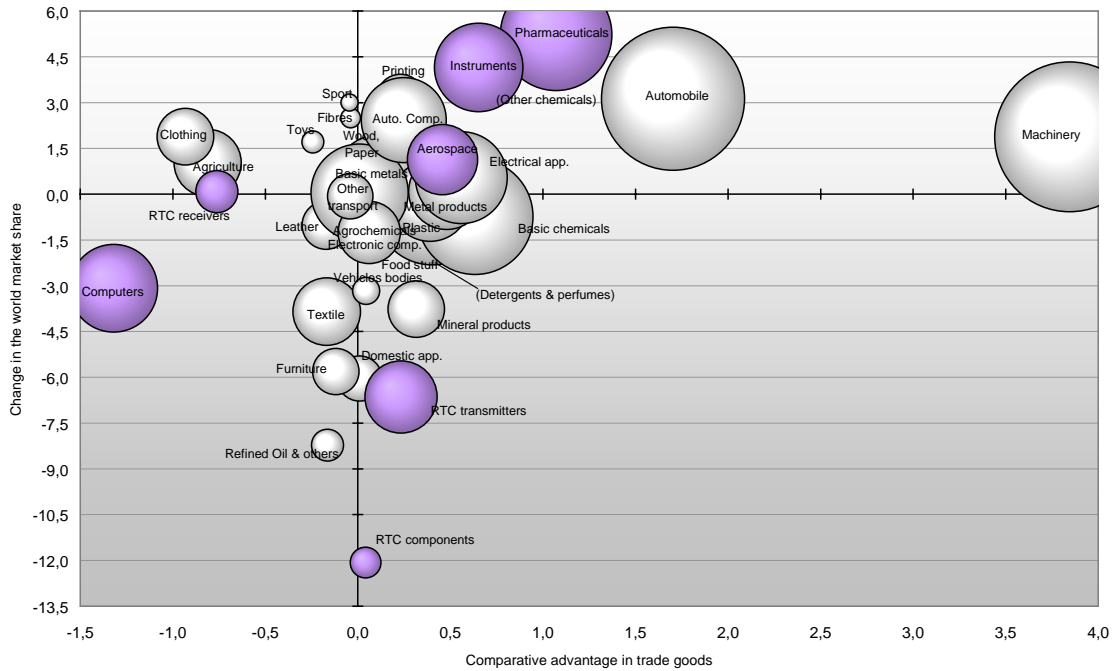
As Germany, France exhibits its strongest specialisation in mid-high tech industries, but high tech industries do contribute positively to its trade balance. This specialisation is largely driven by aeronautics¹⁰ and to a lesser extent by pharmaceuticals. Finally, contrary to Germany, France still exhibits a specialisation in agriculture (south east quadrant in figure 10).

The overall picture for the EU15 partly reflects the profiles of Germany and France, even though other member countries may have a quite different composition of trade. Italy for example continues to specialise in low tech industries such as apparel and leather. By contrast, high-tech sectors represent a small proportion of its exports. Machinery makes up an even larger export share than in Germany and Italy has won market share in this sector (Miotti and Sachwald 2006). Similarly, it has expanded its market share in metalworking and food products. Italy has thus preserved an atypical profile for a high-wage country. While it has lost market share in some labour-intensive sectors, it has scored some gains in some of its clusters' emblematic sectors.¹¹ Figure 11 clearly shows that the EU 15 is specialised in mid-high tech industries. The EU nevertheless exhibits specialisation and a market share increase in three high tech sectors: pharmaceuticals, instruments and to a lesser extent in aerospace.

¹⁰ The aeronautics industry accounts for 68% of France's exports of high-tech and high-end products (Artus and Fontagné 2006).

¹¹ This nuanced finding corroborates the analysis of Italian comparative advantages by De Benedictis (2005).

Figure 11. Specialisation and export dynamics of the EU15, 2000-2005
in %



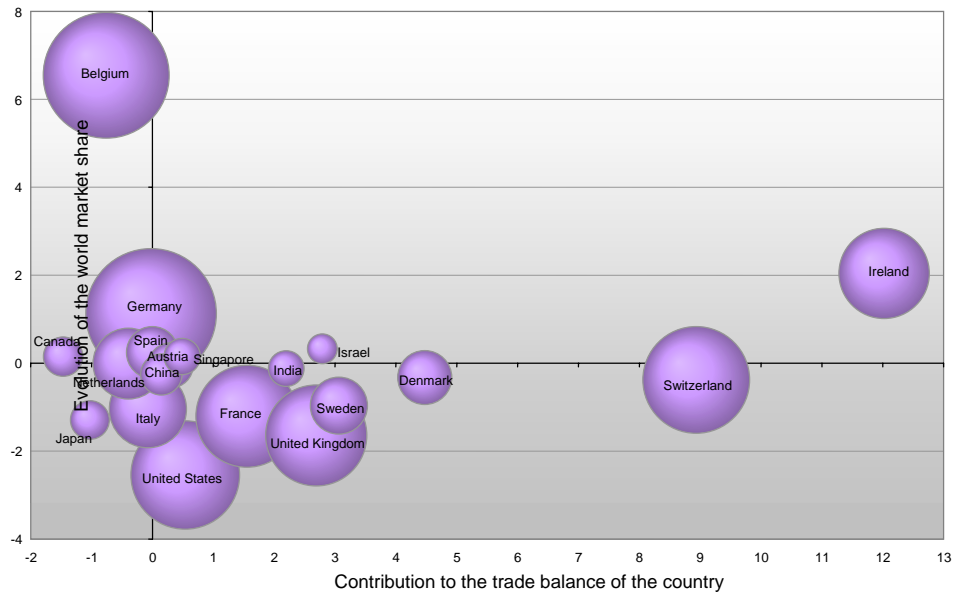
Note: Bubble size is proportional to sector's share of EU15 exports; white bubbles indicate high tech sectors. Specialisation on the horizontal axis is measured by the sectors' contribution to the trade balance (see above). The bubbles for Other chemicals and Detergents & perfumes are hidden by nearby bubbles
Source: SYSPROD database

Market share gains in pharmaceuticals are due to first Belgium, second Ireland and third Germany. Other European countries specialised in pharmaceuticals, such as the UK and France, have on the contrary been losing market share (figure 12). Belgium has nevertheless a negative trade balance in pharmaceuticals, while Ireland has a very positive surplus. Figure 12 shows that as a result, Ireland has a comparative advantage in pharmaceuticals, which is not the case of Belgium. This results from the considerable changes in Ireland's ICT and high-tech industries since the 1990s. Computer assembly operations have been partly transferred abroad, replaced by logistics centers and component-manufacturing facilities (Barry and Curran 2004). Ireland has also attracted sizeable investments in pharmaceuticals (Weinmann 2005), now one of its major export sectors.¹² Interestingly, the U.S. is losing market share in pharmaceuticals, despite the fact that the country attracts foreign investment and displays research leadership in the sector. This result

¹² Pharmaceuticals accounted for 22.4% of Ireland's manufactured exports in 2000-2004, versus 17% for computer manufacturing (SYSPROD database). For examples of production facilities.

is partly due to U.S. pharmaceutical firms' relocation of production facilities for active substances in Ireland. An examination of world R&D in pharmaceuticals suggests that it has partly relocated from Europe to the U.S. As a result of these different location moves, within pharmaceuticals, the U.S. appears specialised in R&D and biotechnology, rather than in production. Since the late 1990s, more new molecules originate from the U.S. than from the EU (Efpia 2006), but the country has nevertheless lost market share.

Figure 12. Specialisation and export dynamics in pharmaceuticals, 2000-2005

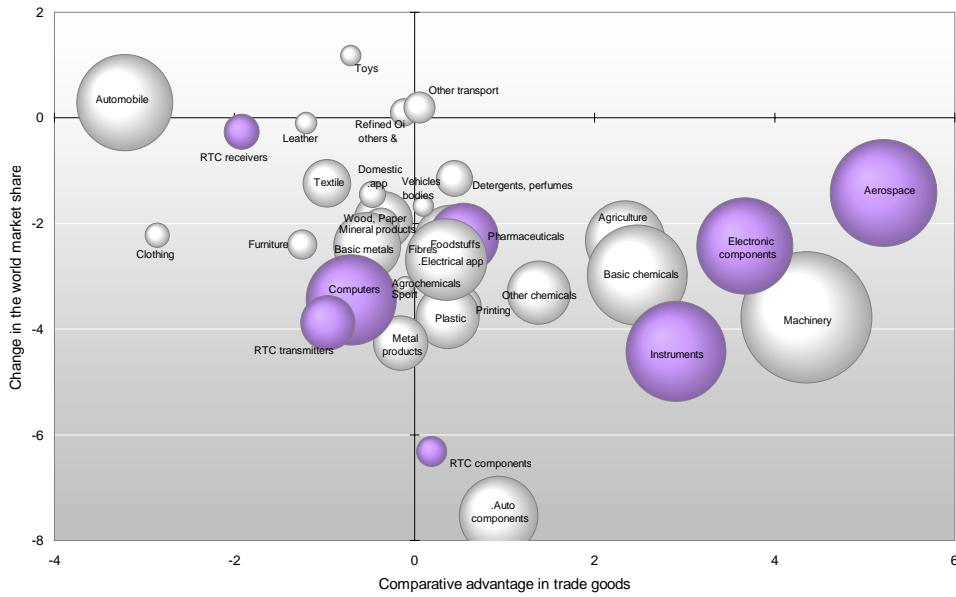


Note: Bubble size is proportional to the country's share of world pharmaceutical exports.
Source: SYSPROD database

Figures 13 shows that since 2000, the U.S. has lost market share for most goods.¹³ Its losses are particularly significant in the dynamic sectors where Germany performs well, such as machinery and instruments, in which it nevertheless has a comparative advantage. The country has maintained its market share in cars, but has a very poor performance in car components, in which it nevertheless still has a comparative advantage.

¹³ Which is also the case of Japan, despite its trade surplus (Miotti and Sachwald 2006).

Figure 13. Specialisation and export dynamics of the U.S., 2000-2005

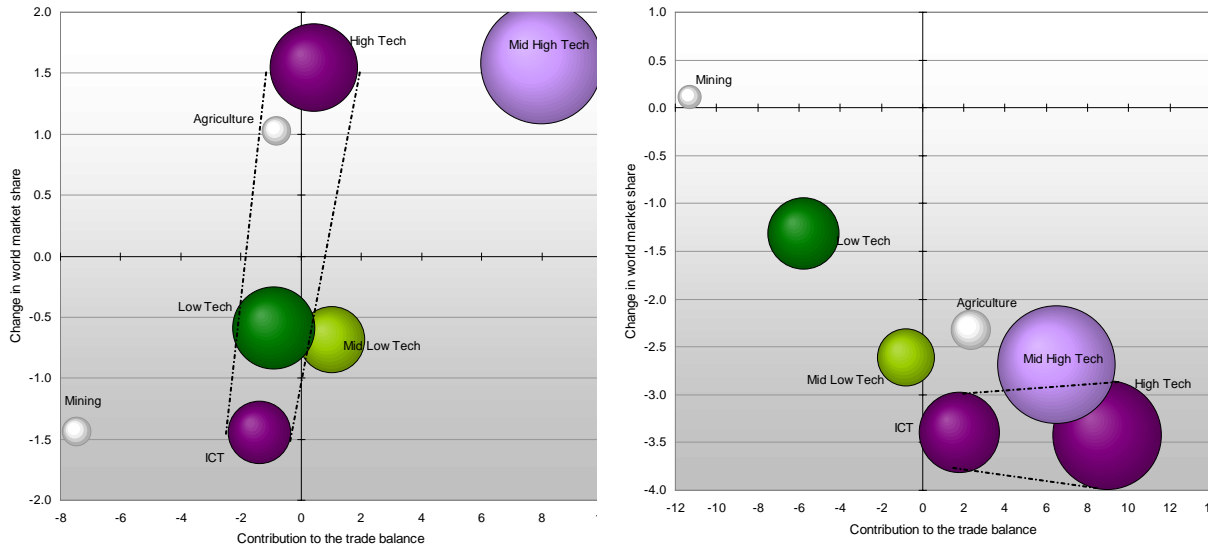


Note: Bubble size is proportional to sector's share of U.S. exports.
 Source: SYSPROD database

The U.S. has also lost market share in ICT sectors, such as computers. It retains a fairly strong comparative advantage in electronic components and a smaller one in RTC components. This is largely related to the massive relocation of production of ICT assembly, which pulls exports for assembly to China and other Asian countries.

Figure 14 summarises the comparison between the EU and the US trade performance by technological intensity. The U.S. loses market share across the board, while losses are concentrated in ICT and in products with low technological intensity for the EU. This figure also shows that both the EU and the US have a strong comparative advantage in mid-high tech sectors. The U.S. has on the contrary a much stronger comparative advantage in high tech sectors and even keeps an advantage in ICT. Both the EU and the U.S. have a comparative disadvantage in low tech sectors, but it is much stronger for the latter.

Figure 14. Specialisation and export dynamics of the EU and the U.S. by technological intensity, 2000-2005



Note: Bubble size is proportional to sector's share of total exports of the zone.
 Source: SYSPROD database

The knowledge economy and the dynamics of employment

Our discussion shows that countries have been unequally able to take advantage of the recent evolution of world trade. It also shows that, on both sides of the Atlantic, high wage countries maintain or even enhance their specific comparative advantage. The U.S. has stronger comparative advantages in high tech sectors than the EU, but differences are also clear among European countries themselves.

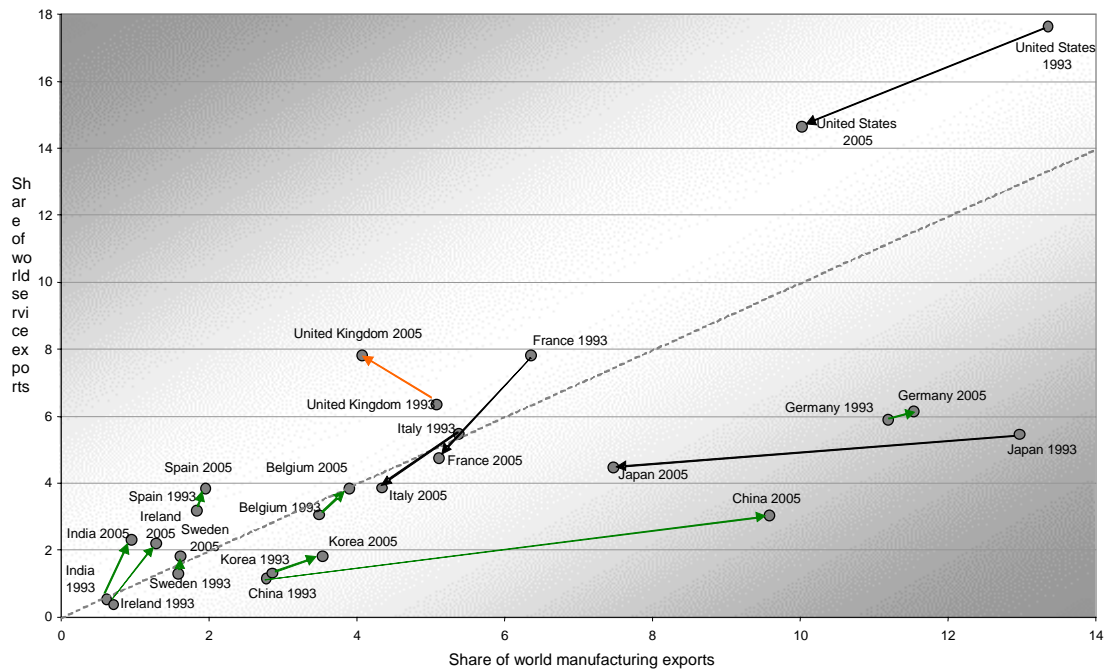
In this third part, we discuss the relationship between trade performance and the evolution national production systems. We first complete the description of trade performances by examining service trade. The respective situation of the U.S. and European countries are quite different in manufacturing and in services and it is important to take services into account as they represent a large share of production and employment. We then discuss the issue of relocation and its impact on firms' competitiveness and on trade performance. We finally examine the related dynamics of employment and show in particular that strong export performance in industrial products does not necessarily ensure a thriving job market.

Specialisation in services vs. specialisation in manufacturing

High wage countries are increasingly becoming service economies and the most specialised in services also have a larger share of the world service export market. The United States remains by far the first service export country, with a much larger market share than in world manufacturing exports (14.7% vs. 10%, figure 15). The UK has increased its share of world service exports from 6.3 to 7.8% while its share of manufacturing exports has decreased to 4%. It is the most specialised country in services, with a world market share twice as large as in manufacturing exports. Spain, Ireland and India are also strongly specialised in services. Germany is on the contrary specialised in manufacturing exports and is a rare high wage country to maintain such a specialisation. The ratio between its share of manufacturing exports and service exports was 1.9 both in 1993 and

in 2005. Korea has the same ratio and only China has a much higher specialisation in manufacturing (with a ratio 3.2). Japan's share of world exports has decreased substantially; it remains clearly specialised in manufacturing, but less so than in 1993. France and Italy have lost market share both in manufacturing and in services, and have, somewhat surprisingly for advanced countries, decreased their specialisation in services (crossing the diagonal on figure 15). European countries have thus quite different export profiles.

Figure 15. Evolution of market shares in world exports of manufactures and services, 1993-2005 in %



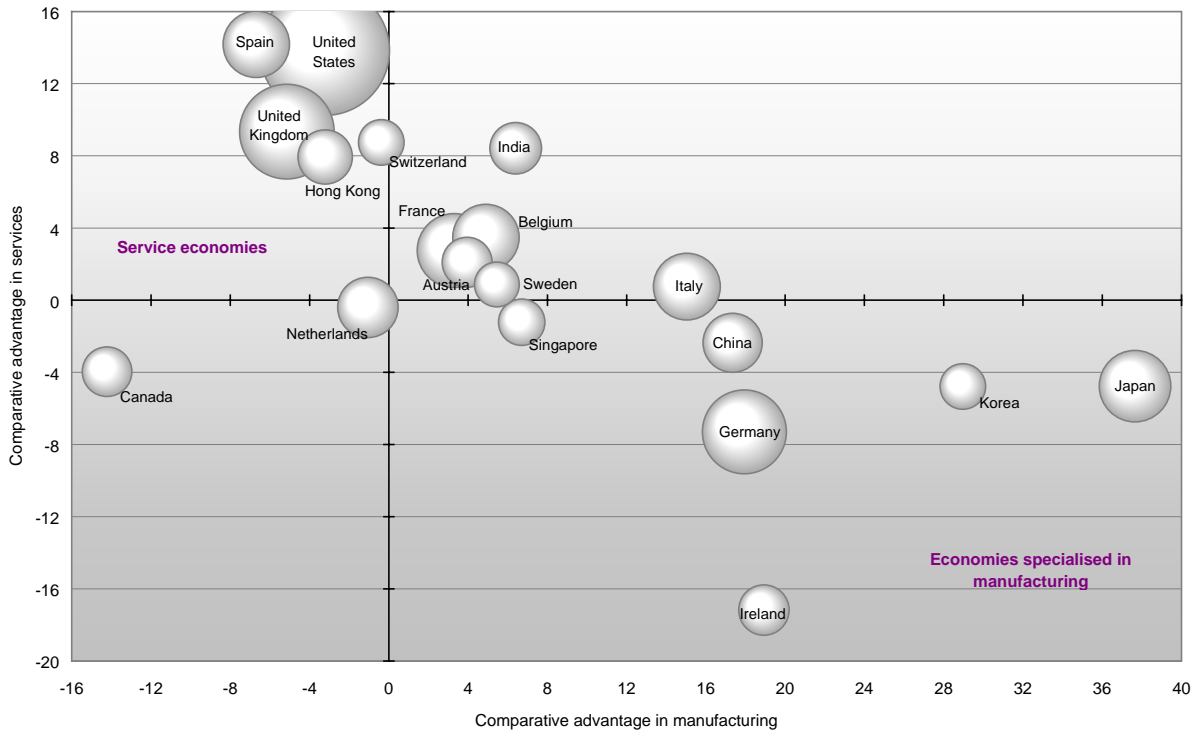
Source: SYSPROD database.

Beyond market share comparisons, figure 16 further shows that strong manufacture export countries have a comparative disadvantage in services.¹⁴ This is the case of Germany, Japan, Korea and China. Among high wage countries, those with strong comparative advantage in services exhibit on the contrary a comparative disadvantage in manufacturing exports (U.S., UK, Spain, Switzerland). India has nearly the same level of comparative advantage in services as Switzerland. Ireland has the same world

¹⁴ As in part 2, comparative advantage is defined with the indicator of contribution to the country's trade balance (thus taking into account both exports and imports, which is not the case of figure 15). Here total exports include natural resources, agriculture, manufacturing and services. Its scope is thus more complete than in many trade studies, which focus on trade in goods.

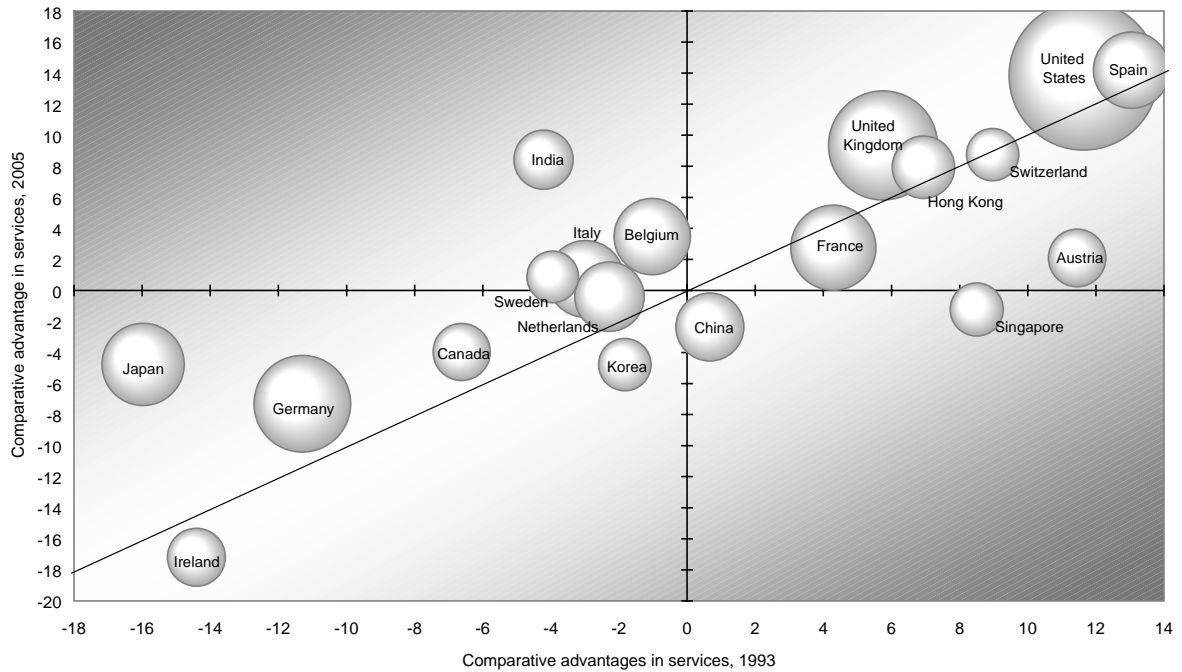
market share as India in services, but a strong comparative disadvantage, which is partly due to the presence of many multinational companies and to the management of their intellectual property, generating large royalty payments.

Figure 16. Comparative advantage in manufacturing and services of major export countries, 2005
in %



Note: Bubble size is proportional to country's share of world service exports.
Source: SYSPROD database.

Figure 17. Comparative advantage in manufacturing and services of major export countries, 2005 in %



Note: Bubble size is proportional to country's share of world service exports.
 Source: SYSPROD database.

Figure 17 shows that since 1993 high wage countries have generally increased their comparative advantage in services. This is not the case of France, Austria and Ireland though. For France, this result is in line with its decreasing market share in services and “respecialisation” in manufacturing (figure 15). India is the country with the largest increase in its comparative advantage. It is in a very different position compared with China, the comparative disadvantage of which has been increasing (below the diagonal). Again, this may be partly explained by royalty payments for technology transfer by multinational companies. Offshoring and outsourcing of services has certainly contributed to the formidable increase in India’s comparative advantage in services, but it has not pulled down that of the U.S. or the UK. The U.S. has lost market share in service exports (figure 15), but has maintained its strong comparative advantage in services (figure 17).

Relocation and export performance of manufacturing

At one point in time, a country's performance depends on two main characteristics of its exports: their structure (sector and geographic distribution) and their competitiveness. Switzerland has experienced the strongest sector composition effect since 2000, particularly thanks to the most dynamic sector of world manufacturing exports: pharmaceuticals (Miotti and Sachwald 2006). Unlike Ireland, however, Switzerland lost market share in this sector between 2000 and 2005.¹⁵ The fact that Swiss export growth exceeds the world average is therefore due to a favourable structure. Like Germany, Switzerland is traditionally positioned in medium- and high-tech sectors and in high-end products (Foray and Lhuillery 2005), but it has not leveraged this position to gain market share in dynamic sectors. Contrary to Switzerland, Germany has enjoyed both the benefits of the structural composition of its exports and strong competitive performances¹⁶. France has also benefited from a more favourable sectoral composition of exports in the recent period, but this structural effect was more than offset by the other determinants. The European-oriented pattern of French exports has played a negative role as the EU experienced slow growth, but weak competitiveness and market losses explain a large share of France's poor performance.¹⁷

As these examples suggest, competitiveness of products play a larger role than structural composition to explain export performances since 2000 (Artus and Fontagné 2006, Miotti and Sachwald 2006). Competitiveness of exports depends on the capability firms located in a country have to compete on world markets. In turn, firms' competitiveness may be divided into three elements: productivity, differentiation and adaptability. Productivity is quite straightforward, but for advanced countries, cost effectiveness should be understood as including a high level of quality. Differentiation is the ability of the firm to apply its commercial and technological capacities to adopt a specific and profitable positioning on its markets. Finally, adaptability is an even more demanding quality as it requires a more venturesome attitude to explore new markets, in particular through innovation (technological or else).

The ability of a firm to be productive, able to differentiate its products or services, and to prove adaptable depends crucially on the

¹⁵ With better results though at the end of the period.

¹⁶ Figure 9 highlights Germany's market-share gains in the vast majority of its export sectors.

¹⁷ Figure 10 and Bouhloil and Maillard (2005), Deruennes (2005), Felettigh *et al.* (2006), Gaulier *et al.* (2005b), L'Angevin and Serravalle (2005).

national business environment. Focusing on the case of advanced countries, we may identify three sets of interdependent factors: competition on product and service markets, flexibility on the labour market and the availability of adequate human and technological resources. Together, these elements ensure a lively creative-destruction process, stimulating innovation and repositioning of firms on profitable markets. In this perspective, it is interesting to discuss the relocation strategy adopted by some firms and which has been extensively criticised as it destroys jobs in their home countries.

American firms have been relocating manufacturing operations to lower-wage countries at least since the 1980s.¹⁸ In the 1980s and 1990s, competition from low-wage countries has triggered a process of reallocation of resources towards more capital intensive industries (Bernard *et al.* 2006). The process has accelerated in both ICT manufacturing and services since 2000. It has destroyed low qualified jobs, but has stimulated the creation of high qualified jobs and has contributed to the diffusion of ICT in the U.S. economy (Mann 2006). Extensive outsourcing of components can also allow faster innovation, as in the case of Apple's iPod (Berger 2005). Relocation and imports from emerging countries partly explain market share losses of the U.S. in world export, but also contributed to its specialisation in high tech sectors and services discussed above.

Germany presents a different implementation of relocation. Since 2000, German firms have become more competitive through a combination of cost-cutting and further efforts to differentiate. Cost-cutting, in turn, has involved reorganising production, including through relocations, particularly in Eastern European countries. The share of domestic value added in production may have decreased, in particular in the automobile industry, but Germany has not become a "bazaar economy" (Sinn 2006) to the extent that it has kept increasing production and has focused on sophisticated manufacturing and service tasks. In the case of Germany, reallocation of resources seems to occur mainly within traditional sectors of specialisation. A more extensive and cross-sector process would require Germany to offer a better and more flexible business environment (Würzel 2005).

Differentiation and integration of services can even ensure some success in low-tech sectors such as apparel. This point has been illustrated by the success of Italian firms as well as of other companies that focus on responsiveness and creativity (Berger 2005). Yet successful Italian firms have increasingly combined differentiation with relocation of part of their value chain to low wage countries such as Romania and China (*The Economist*, Feb. 25, 2006). A study based on a sample of Italian firms with foreign investment in low cost countries showed that such operations tend to enhance the efficiency of their home activity and also have a long

¹⁸ Even for high tech products, such as hard-disk drives (McKendrick 2000) and the semiconductors (Brown and Linden 2005) for example.

term positive effect on output and employment growth (Barba Navaretti *et al.* 2006).

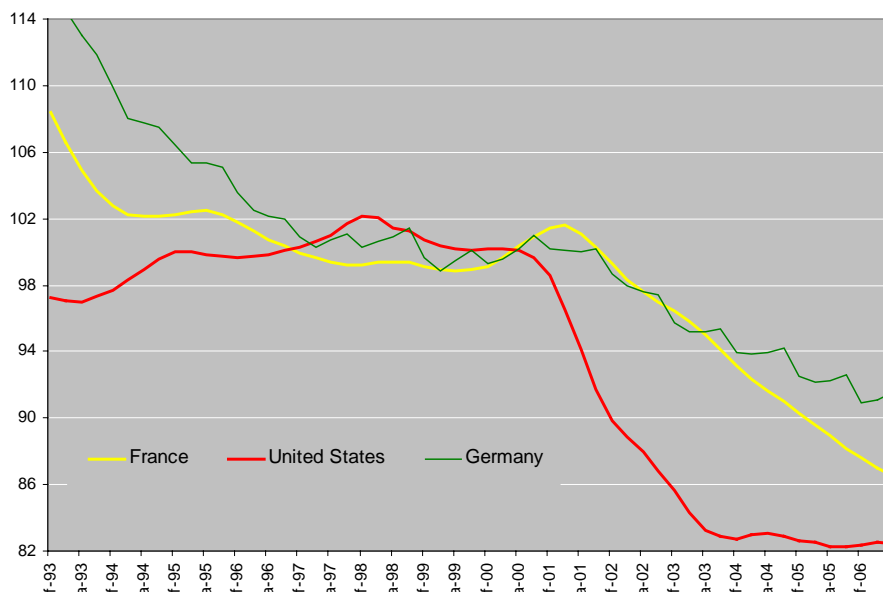
In France, offshoring and relocation has been relatively less important during the 1990s, even if the process seems to have picked up momentum since the early 2000s (Artus 2006b, c; DT 2004). Less relocation combined with sluggish investment in R&D has proved a deceptive combination for innovation, employment and growth. The European automotive industry shows that partial relocation—by product-range level or by labour intensity of operations—can enhance product-range diversity while lowering costs (Radosevic and Sachwald 2005). Thanks to reorganisations, value-chain fragmentation enables firms to manufacture new products, including at the entry level. The recent experience of the French and German automobile industries nevertheless suggests that such relocations may not be sufficient to sustain a specialisation in some mid-high tech European flagship industries.

Evolution of the production system and employment in high wage countries

We can now pull together the different threads and relate trade performances, specialisation and employment.

As advanced countries become service economies, the share of employment in manufacturing tends to decrease. If production nevertheless grows, this does not imply a reduction in the number of jobs in manufacturing. In the 1990s for example, manufacturing employment grew in the U.S. (figure 18). This trend was due to dynamic growth of the economy and occurred despite productivity increases and offshoring. The trend was brutally reversed after the internet bubble burst, but since 2004 manufacturing employment has stabilised. The decreasing trend has been more continuous in Germany and France, even if low growth has had less brutal consequences.

Figure 18. Employment in manufacturing, 100 index = 2000



Source: BLS and OECD, quarterly series.

In advanced economies, job losses in manufacturing are typically compensated by increasing employment in services. Table 1 illustrates this trend in the case of the United States. After the burst of the internet bubble, the number of jobs in manufacturing sharply decreased and jobs in services increased only slightly. But since 2003, growth of service jobs has more than compensated further decrease in manufacturing jobs. Overall, between 2000 and 2006, the total number of private jobs has increased by 2.6% (table 1). Table 1 further shows that ICT sectors have suffered very high job losses since 2000. Some, like electronic components, have started to increase employment again since 2003, but others seem to have persistently shrunk. This is the case in particular of computer equipment. This dovetails with the trade data discussed above showing a large market share gain for China as a result of its integration into global value chains.

Table 1. Employees on non farm payrolls by industry in the U.S.

	In thousands			Cumulated growth rate			
	15/07/2000	31/12/2003	30/11/2006	2000-2003	2003-2006		
Total private sectors	111002	108743	113896	-2259	5153	-2.0%	4.7%
Goods-producing	24653	21682	22317	-2971	635	-12.1%	2.9%
Manufacturing	17266	14296	14164	-2970	-132	-17.2%	-0.9%
Computer and electronic products	1820	1320	1332	-500	12	-27.5%	0.9%
Computer and peripheral equipment	302	214	204	-88	-10	-29.1%	-4.6%
Communications equipment	248	148	148	-99	0	-40.1%	0.1%
Semiconductors and electronic components	676	450	464	-227	15	-33.5%	3.2%
Electronic instruments	479	427	447	-52	21	-10.9%	4.8%
Services	86349	87061	91579	712	4518	0.8%	5.2%

Source: Bureau of Labour Statistics

The early 2000s may thus be interpreted as a period of accelerated reallocation of jobs between sectors (manufacturing vs. services) and within industries (like ICT). Detailed studies show that a process of reallocation has also taken place between qualifications in high tech industries and services. In their sector study, Brown and Linden (2005) explain how outsourced design and offshoring in the semiconductor industry have given rise to the growth of fables companies and increased the share of qualified jobs in the United States. More generally, Mann (2006) shows that within technology-related occupations,¹⁹ between 1999 and 2004, the number of U.S. employees in call centers and other low-wage occupations dropped by 32%, while the number of high-wage technology workers increased by 17%.

Since the 1990s, various studies have tried to assess the impact of offshoring and relocation on employment in high-wage countries.²⁰ They usually conclude that offshoring, both in manufacturing and in services, has had a small impact on jobs and unemployment at the macroeconomic level. The impact may of course be stronger at the regional and sector levels. Offshoring appears clearly biased against the less qualified jobs – either through job losses and unemployment (typically in European countries) or through lower wages (typically in the U.S). Besides, many studies emphasise the difficulty involved in distinguishing offshoring from technological progress, precisely because their impact on job reallocations between sectors and qualifications are similar. The global reorganisation of value chains and the emergence of the knowledge economy combine to increase productivity and to polarise the production of high wage countries on mid-high tech and high tech products and services. This involves both sector and qualification reallocations. To the extent that these trends lead to increasing productivity and standards of living, they should be encouraged rather than resisted.

In the end, the main challenge is not that of globalisation, but adaptation to these combined trends. In turn, this involves at least two types of policies. The first one aims at stimulating the business environment so that the most productive firms and the most promising activities are selected by the creative-destruction process. This process is more or less efficient in different countries²¹, due to various regulations on both the product and labour markets.²² The second type of policy involves a reorganisation of the education systems combined with a new design of social protection, so that workers are better equipped to face increased demands for qualification and mobility.

¹⁹ Both in manufacturing like computer equipment or services like computer operators or software engineers.

²⁰ See, Aubert and Sillard (2005) on France, Marin (2005) on Germany and Mankiw and Swagel (2006) for a survey of the literature on the U.S.

²¹ Bellone *et al.* (2006) for example suggest that it is less efficient in France.

²² Nicoletti and Scarpetta (2005), Hoj and Wise (2006)

Conclusion: Globalisation and the knowledge economy

The year 2000 was marked by the collapse of the Internet bubble, but it also corresponded, paradoxically, to the start of a new phase of globalisation. The bursting of the bubble challenged the notion of a “new economy,” i.e., the claim that market operating rules, and hence the principles of regulation, had changed in a world now dominated by services and intangible assets. At the same time, the notion of a “knowledge economy” gained strength, and the international dissemination of ICTs stimulated globalisation.

The new phase of globalisation stimulates the knowledge economy

The price of some ICT products and of telecommunication services has decreased spectacularly, which has promoted their dissemination in the emerging countries. Lower telecommunication costs have thus contributed to the explosion of service outsourcing to India and have made it easier to organise global production networks. In exchange, the growth and modernisation of the emerging countries’ productive capacity have stimulated exports of capital goods by their leading producers, the advanced countries. A good illustration of this trend is Germany: the champion of the old economy has become the world’s number-one exporter, ahead of the U.S., cradle of the new economy in the late twentieth century. On balance, since 2000, the accelerated diffusion of ICT-based products and services has helped to integrate emerging countries into global trade and revitalised key emblematic sectors of the “old economy,” from chemicals to metalworking to machinery.

Multinationals have played a key role in this new globalisation phase: the integration of China and the NMSs into global production networks has stimulated the shifts in their industrial specialisation. However, it would be wrong to conclude from the industry structure of China’s exports that the country is now capable of producing all products and capturing major market share in all sectors. Its exports of high-tech products closely depend on the local presence of multinationals in the corresponding sectors and China remains

specialised in labour-intensive operations, which reflect its comparative advantage. China has become the number-one exporter of ICT products, but it does not control the corresponding scientific and technological capabilities, which are still concentrated in high-wage countries (Sachwald 2006). Globalisation nevertheless, intensifies competition in most markets, whether via the entry of new countries, the dissemination of innovation, or simply the exploitation of new ideas and methods. In this context, the revival of strong growth in the “old economy” sectors only benefits traditional producers if they combine efficient production, innovation and adequate marketing. The emerging countries harbor the legitimate ambition of catching up with the advanced countries, particularly in those sectors. The speed at which they do so depends both on the development of their technological capabilities and on the advanced countries’ efforts to increase the sophistication of their supply.

Overall, even if the dynamism of “old economy” industries persists for a while,²³ offerings by high-wage advanced countries will not be competitive unless they are continuously differentiated. Even in medium-tech sectors, differentiation rests on a combination of attentiveness to evolving demand and a capacity to incorporate new characteristics and services into products. Germany’s performance in capital-goods sectors illustrates this point. Differentiation and integration of services can even ensure some success in low-tech sectors such as apparel. This point is illustrated by the success of Italian firms as well as of other companies that focus on responsiveness and creativity such as Zara of Spain or American Apparel of the U.S. (Berger 2005). Yet the competitive positions achieved through differentiation, whether based on technological innovation or not, seem ever less secure. Firms have to review their production positioning and organisation on a regular basis. They will thus need to reconsider periodically their decisions to outsource and relocate parts of the value chain, depending on competitive pressures from new entrants and the fresh opportunities offered by the latter in related activities. Firms in high-wage countries can score great successes in mature sectors by inventing a new type of enterprise—Dell, for example—but they cannot expect to retain leadership for many years.

²³ Beyond the cyclical behavior of some of these sectors.

The knowledge economy requires efficient resource reallocation

The new phase of globalisation facilitates catching-up for emerging countries and symmetrically implies increasing erosion of monopoly rents associated with innovation for leading firms and countries.²⁴ In this context, responsiveness has become a key factor for firms' competitiveness. At the country scale, this should translate into a greater capacity to mobilise new resources and reallocate existing ones, making it easier for firms to adjust their strategies and adapt to the changing competitive environment. Both in Europe and the United-States, recent policy debates have focused on supply side measures, in particular to promote more and better investment in R&D and education. In the EU, the Lisbon strategy has often been discussed in this perspective, even if it also includes recommendations to stimulate labour market flexibility and product market competition. In some countries the focus on innovation policies has been accompanied by a revival of industrial policy to support R&D in specific sectors.

Some of these supply side policies are sound and should be pursued, but they will not be fully implemented if social protection systems are not adapted to the globalisation of production networks, the knowledge economy and the increasing role of services (Soete 2006). A major challenge is to promote efficient adjustment of firms and markets to changing market conditions while keeping strong social protection of workers. In the United States, this may involve increasing protection of workers so that they do not shoulder most of the risks of the creative-destruction process.²⁵ In Europe, countries are in quite different situations, both with respect to the efficiency of the creative-destruction process and with respect to social protection.²⁶ In a number of European countries, social protection has been sought through protection from market flexibility, but this model is ill adapted to the new phase of globalisation. This type of protection actually seems to favour those who have an employment or are retired, rather than those who are unemployed or the young who would like to enter the labour market (Artus 2006a). In other words, current labour market regulation in some European countries both hinder growth in new sectors and fail to protect the less qualified and the younger people.

²⁴ Soete (2006) reaches this same conclusion by discussing the « knowledge economy paradigm ».

²⁵ For a discussion of this issue, see Brainard and al. 2006 and Brown and Linden

²⁶ Various studies have discussed this diversity and the relationship between the two aspects ; see in particular Miotti and Sachwald (2005), Amable (2004), Sapir (2006).

The United States may seem in a leading position to benefit from the knowledge economy. The American economy has kept specialising in services and products with high technological contents. Its dynamic creative-destruction process and large investments in higher education and R&D have greatly contributed to the emergence of American leaders in new industrial and service sectors. At the same time, its education system and its low degree of social protection may threaten this leadership. Symmetrically, the education system and social protection of some European countries are better adapted to catching-up and mid-tech manufacturing sectors. They should thus better assess and implement the mix of economic and social reforms needed to increase their ability to benefit from the knowledge economy.

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